

Scoping a Service Job

YES Electric • NEC 2026 with NEC 2023 numbers in parentheses

Draft 1 (October 2026). This chapter is under review. Code numbers are NEC 2026. Your local inspector may use an earlier edition, so ask your journeyman which one applies. Boxes marked "Picture coming" will get drawings and photos in a later version.

Phase 3, Estimating and Scoping Residential Service Work. This is the first Phase 3 module. Read it after you have worked at least a few months of Phase 2 service calls, because a scope is only as good as the diagnosis under it.

Before this module: R2.1 (the service call), and enough of R2.3 through R2.7 that you can find a fault on your own. Commercial Module 3.2 explains labor units and markup. Read its Parts A and B once. You do not need its pricing parts for this course.

What this module does not teach. It does not teach prices, rates, or margins. YES prices residential service work in its estimating program under the service job class. The tech fills in counts and hours. The office fills in money. Techs never quote prices and never collect payment.

Code edition. Code references are NEC 2026. Where a section moved, the NEC 2023 number is in parentheses. The local inspector (the AHJ) may enforce an earlier edition, so ask your journeyman which one applies.

Learning Objectives

When you finish this module you will be able to:

1. Turn a diagnosis into a scope with four parts: what is broken, what fixes it, what else should be done, and what the customer declined.
2. Build a material list with counts for a repair, using the actual parts on the truck and at the supply house.
3. Estimate the hours for a repair, task by task, and say what drives the hours up: attics, crawl spaces, finished walls, old panels, and occupied houses.
4. Write options (fix it, fix it right, upgrade) so a homeowner understands them.
5. Hand the count to the office in a form it can price without calling you back.

Background: Why the Tech Writes the Scope

Residential service is sold one house at a time. Most customers do not get three bids for a dead circuit or a tripping breaker. They call, a tech shows up, and the tech's write-up becomes the job.

The curriculum puts it this way: the tech's job is to scope the work accurately and hand a clean count to the office, and the office prices it.

You are the only person from YES who saw the inside of that panel, crawled under that house, and talked to that customer. If your scope misses the attic run, the office prices a job that loses hours. If your scope pads hours "to be safe," the customer gets a price that loses the job. Both mistakes come from the same place: a count that was guessed instead of taken.

Mike Holt's estimating book separates the estimate from the bid. The estimate is what the job will cost to do. The bid adds profit to that cost (Mike Holt, Illustrated Guide to Electrical Estimating, sample chapter, sec. 1.1, p. 2). In YES terms, you produce the parts of the estimate that only the field can know: what is wrong, what parts fix it, and how many hours it takes. The office turns that into a price. Holt lists "missing things on the bid" and "forgetting to bill things out" among the reasons contractors lose money (p. 4). A missed item on your scope is one of those.

Words used in this module

Word	Meaning here
Diagnosis	What you found wrong, with the readings that prove it (R2.1, Part F2)
Scope	The list of work that fixes the problem, plus anything else you recommend, written so someone else can price it
Count	Every part, with a quantity
Hours	The labor time to do the scope, broken out by task
Labor unit	Hours to install one of something, such as 0.5 hours per receptacle replaced. Commercial Module 3.2 defines it.
Factor	A multiplier on hours for a hard condition, such as 1.25 for a hot attic
Option	One of two or three ways to fix the problem, each with its own scope
Declined item	Something you recommended that the customer said no to or "not now"

Part A: The Four Parts of Every Scope

Every scope sheet has the same four parts, in this order. If one is missing, the scope is not done.

Part	Question it answers	Example
1. Findings	What is wrong, and how do you know?	"Bedroom circuit 9 trips. Clamp reads 15.4 A on a 15 A AFCI with the normal evening load."
2. Fix	What work makes the complaint go away?	"Customer moves the space heater to a different circuit. No repair needed."
3. Recommended	What else should be done, and why?	"Dedicated 20 A circuit for the space heater location. Two double-tapped breakers in the panel."
4. Declined or deferred	What did the customer say no to, or "later" to?	"Customer declined the dedicated circuit today. Wants a price for the double taps."

The findings come straight from your job board card (R2.1, Part F). The other three parts are what this module teaches.

Why "declined" gets its own part

When something you recommended later fails, the office needs proof that you told the customer. A scope that says "Recommended: replace the burned receptacle in the garage. Customer declined on [date]" protects the customer, YES, and you. The Arc Guide gives the same instruction: document everything in the work order regardless of the customer's choice (Arc Guide, Part 6).

Part B: Step by Step, From Diagnosis to Scope

Step B1. Finish the diagnosis first

Do not scope a job you have not diagnosed. "Outlets dead, probably a bad splice somewhere, maybe 2 hours" is a guess. "Backstab failed at the receptacle by the front door, replaced, 6 receptacles on the circuit tested good" is a scope.

If you could not finish the diagnosis on this visit, the scope is the diagnosis. Write it that way:

- "Breaker 12 trips 2 to 3 times a week. Did not trip during the visit. Clamp reads 4 A with normal loads. Recommend installing a dual-function breaker to catch the fault, with a return visit when it trips."

Kuhlman uses this exact approach. When a standard breaker trips once in a while and will not trip while he is there, he installs a dual-function (AFCI plus GFCI) breaker to make the hidden fault show itself, then mid-points it on the next visit (Kuhlman, Residential Electrical Troubleshooting, pp. 82-83).

Step B2. Write the fix as tasks, not as a sentence

Break the fix into tasks you can count and time. A task is one piece of work with a clear start and finish.

Bad: "Fix the bathroom outlets."

Good:

1. Replace the existing receptacle at the vanity with a 20 A GFCI receptacle.
2. Move the downstream wires to the GFCI LOAD terminals.
3. Label the two downstream receptacles "GFCI Protected."
4. Test all three receptacles with the GFCI tester.

Each task gets a count of parts and an hours number. The office cannot price "fix the bathroom outlets" without calling you.

Step B3. Build the material list

For each task, list every part it uses. Use this order so nothing gets skipped:

Category	What to count	Example
Devices	Receptacles, GFCIs, switches, dimmers, smart devices	1 ea. 20 A TR GFCI receptacle, white
Overcurrent	Breakers by brand, type, pole count, and amps	1 ea. Square D QO 20 A single-pole dual-function
Boxes and covers	Boxes, extension rings, cover plates, weatherproof covers	1 ea. single-gang in-use cover, extra-duty
Wire and cable	Cable type, size, conductor count, and feet	45 ft 12/2 NM-B with ground
Connectors	Wire connectors, cable clamps, staples, push-in or lever connectors	6 ea. lever connectors, 3-port
Support and protection	Straps, nail plates, conduit, fittings	2 ea. steel nail plates
Specialty	Labels, AFCI/GFCI test equipment use, aluminum repair connectors	1 sheet "GFCI Protected" labels
Patch and finish	Drywall patch, paint (if YES is doing it), escutcheons	1 ea. old-work box, patch by others
Consumables	Anything used up beyond normal truck stock	Note only if more than normal

Rules for counts:

1. Count each part once. If a part is in two tasks, put it in only one.
2. Write the brand and series for breakers. A breaker that does not match the panel is not a substitute (R2.4; Arc Guide, Part 2).
3. Write cable length in feet, measured or paced, plus the slack rule from Step B4.
4. Write "by others" next to anything YES is not providing, such as drywall finish, paint, or a plumber's work.
5. Do not write prices, even if you know them.

Step B4. Measure cable runs, do not guess them

For any new run of cable, measure the route, not the straight line.

1. Start at the panel. Note which wall the cable leaves from and whether it goes up to the attic or down to the crawl space or basement.
2. Pace or tape the run along the path the cable will actually take: up the wall, across the attic or under the floor, over to the target wall, and down to the box.
3. Add the vertical drops. A wall in a house with 8 ft ceilings is about 8 ft from top plate to floor. A receptacle box at 16 in. to center is about 6½ ft below the top plate. A switch box at 48 in. is about 4 ft below the top plate.
4. Add slack at each end. The Arc Guide's new-circuit procedure leaves about 6 in. at boxes and 12 to 18 in. at the panel (Job 7, Step 4). Many techs add more to work with. Use what your journeyman uses.
5. Add a routing allowance for going around obstacles. Commercial Module 3.1 tells you to add waste and routing slack to every measured run. A common starting allowance on residential runs is 10 to 15 percent. Calibrate it against what you actually pull.
6. Round up to the next 5 ft.

Worked measurement: panel in garage to a bedroom receptacle

Segment	Feet
Panel slack	1.5
Up the garage wall to the attic (panel top at about 6 ft, wall 8 ft, plus 1 ft over the top plate)	3
Across the attic, routed along the joists	34
Down the bedroom wall to the receptacle box (8 ft wall minus 16 in.)	6.7
Box slack	0.5
Subtotal	45.7
Routing allowance, 10 percent	4.6
Total	50.3
Rounded	55 ft of 12/2 NM-B

Step B5. Break the hours out by task

Hours are where scopes go wrong. Commercial Module 3.2 calls the labor estimate the place where a contractor makes or loses the job. Write hours for each task, then add the non-task time.

Task hours. For each task, write the hours a journeyman would need under normal conditions. Normal means the panel is clear, the wall is open or the box is easy to reach, and nobody is in the way.

Non-task hours. These are real hours that do not belong to any one device. Most missed hours on service scopes are in this list.

Non-task item	What it covers
Setup and protection	Drop cloths, shoe covers, moving furniture, laying out tools
Shutdown and restart	Turning off circuits, resetting clocks if the customer asks, checking every circuit came back
Material pickup	A supply-house run if the part is not on the truck
Permit and inspection time	Meeting the inspector, if the office tells you a permit is needed
Testing and verification	Testing every device on every circuit you touched (R2.1, Part D Step 5)
Cleanup	Sweeping, vacuuming dust, hauling out old parts
Customer walkthrough	Showing the customer the work and how to reset it
Documentation	Photos and the job board card

Where to get task hours. A labor unit is the hours to install one unit of something (commercial Module 3.2). Published labor-unit books, such as the Craftsman National Electrical Estimator and the NECA Manual of Labor Units, list units per item. Craftsman states that its hours assume a trained journeyman with about five years of experience, the smallest crew suited to the work, and "good" conditions (Craftsman, National Electrical Estimator, 2023 ed., preview, pp. 6–7). Our library has only the free preview of Craftsman, and it does not include the residential device tables, so this module does not quote Craftsman hours for devices. YES's own job history is the best source. Ask the office for the actual hours on the last five jobs like the one you are scoping.

Example task hours to calibrate. The table below is a starting point for a green tech to sanity-check a scope. It is not a YES standard and not from a published labor-unit table. Each number assumes one journeyman, normal conditions, and a box that is already there. Compare your scopes to the actual hours on the job board and adjust.

Task	Example hours (journeyman, normal conditions)
Replace a standard receptacle or switch in an existing box	0.25-0.5
Replace a GFCI receptacle and test downstream devices	0.5-0.75
Move backstabbed wires to screw terminals at one device	0.25
Replace a branch breaker of the same type	0.5-0.75
Install an AFCI or dual-function breaker in place of a standard breaker, including test	0.5-1.0
Remake a failed splice in an accessible junction box	0.5-1.0
Panel directory: trace and label every circuit (Arc Guide, Job 10)	1.0-3.0, depending on circuit count and whether a helper walks the house
New 20 A circuit, panel to one receptacle, open attic route, 50 ft	2.0-4.0 (the Arc Guide's Job 7 gives 2-4 hours for a new circuit "depending on run length and framing")

The only published number in that table is the Arc Guide's 2 to 4 hours for a new circuit (Arc Guide, Job 7). The rest are examples to check against YES history.

Step B6. Apply factors for hard conditions

Labor units assume good conditions. Real houses are rarely good. Craftsman's preview says there is no accepted formula for how much bad conditions add, but accepted practice is to multiply labor by more than 1.0. It suggests about 1.10 when conditions are poor in minor ways and 1.50 or more when they are very poor (Craftsman preview, p. 6).

The Mechanical Contractors Association of America (MCAA) publishes a table of 16 factors that reduce labor productivity, each with a minor, average, and severe percentage. MCAA states that the percentages came from polling experienced members, not from a statistical study (MCAA, Change Orders, Productivity, Overtime: A Primer for the Construction Industry, pp. 99-100 and 125). NECA and the Electrical Contracting Foundation have also used these factors. The factor closest to residential service work is "Beneficial Occupancy": working in, around, or close to the owner's people and belongings, with dust, noise, and access limits. MCAA puts it at 15 percent minor, 25 percent average, and 40 percent severe (p. 99).

YES has not set its own factors. Use the table below as a starting point, write which factor you used and why, and let the office and your journeyman adjust it.

Condition	What it looks like	Starting factor	Why it adds hours
Attic, mild weather, good access	Pull-down stairs, floored walkway, under about 90°F	1.10–1.25	Crawling over joists, insulation, poor light
Attic, summer	Over about 100°F in the attic, which is normal in Birmingham from June through September by midday	1.25–1.50, and schedule for the morning	Heat breaks every 20 to 30 minutes. MCAA rates very hot weather at 10–30 percent (Season and Weather, p. 100). Heat illness is a safety issue (R1.1).
Crawl space	Under 24 in. of clearance, dirt floor, ductwork in the way	1.25–1.50	Slow movement, mud, pests, poor light
Finished walls, fishing	No attic or basement access above or below, plaster or drywall in place	1.25–2.0	Cutting access holes, fishing, patch prep. Plaster is slower than drywall.
Old panel	Crowded, no room in the gutter, brittle insulation, wrong breakers, no directory	1.25–1.50	Every termination takes longer. You may find more problems.
Occupied house	Family home, furniture, pets, children, people working from home	1.15–1.40 (MCAA Beneficial Occupancy, 15–40 percent)	Moving furniture, protecting floors, quiet hours, shutting power around the customer's schedule
Second floor with no attic access	Two-story with a finished attic or flat roof	1.25–1.75	Most work becomes fishing

How to apply a factor:

1. Apply it only to the tasks the condition affects. An attic factor applies to the cable run, not to the receptacle replacement in the kitchen.
2. Do not stack factors that describe the same thing. MCAA warns against overlapping factors (p. 109). "Finished wall" and "second floor with no attic access" overlap. Pick the larger one.
3. When two different conditions both apply, multiply them, then check the result against common sense. A 1.25 attic and a 1.15 occupied house give 1.44.
4. Write the factor and the reason on the scope. "Attic run × 1.40: attic measured 118°F at 11 a.m." The office needs to know where the number came .

Picture coming: Hours multipliers as a picture. A cutaway of a two-story house. Labels with arrows point to five spots, each with a small icon and a factor range in a box: the attic (thermometer icon, "Attic 1.10–1.50"), the crawl space under the first floor (low-clearance icon, "Crawl 1.25–1.50"), an interior wall with a fish tape coming out of a small hole ("Finished wall 1.25–2.0"), a crowded old panel in the garage ("Old panel 1.25–1.50"), and a living room with a sofa, a dog, and a child ("Occupied 1.15–1.40"). A footnote at the bottom reads "Starting points. Write the reason. Office adjusts."

Step B7. Total the hours

Add it up in this order:

1. Sum the task hours under normal conditions.
2. Apply factors to the affected tasks only.
3. Add non-task hours.
4. Round to the nearest quarter hour.
5. Say how many people. "4.5 hours, one journeyman and one helper" is a different job from "4.5 hours, one journeyman."

Worked example: hours for a new bedroom circuit

The customer wants a dedicated 20 A circuit for a space heater in a back bedroom. The panel is in the garage. The attic is accessible from the garage with pull-down stairs. It is August.

Line	Task	Normal hours	Factor	Adjusted hours
1	Cut in old-work box in bedroom wall, fish from attic	0.75	1.0	0.75
2	Run 55 ft 12/2 NM-B garage to bedroom through attic	1.25	1.40 (August attic)	1.75
3	Install 20 A TR receptacle and plate	0.25	1.0	0.25
4	Land at panel, install AFCI breaker, torque, update directory	0.75	1.0	0.75
5	Test circuit, run heater 10 minutes	0.25	1.0	0.25
	Task subtotal			3.75
6	Setup, drop cloths, move dresser			0.25
7	Cleanup, walkthrough, photos			0.5
	Total			4.5 hours, one journeyman with a helper on the attic pull

Check it against the Arc Guide's 2 to 4 hours for a new circuit (Job 7). This scope is 4.5 hours because of the August attic, the furniture, and the cleanup. If the office's job history says these take 3.5 hours, the factor is probably high. Ask.

Step B8. Note what you could not see

Every scope has things you could not see. Write them down as assumptions so the office can price the risk or ask the customer.

- "Assumes no fire blocking in the bedroom wall cavity. If there is, add an access cut and patch."
- "Assumes the attic route is clear from the garage to the bedroom. Did not walk the far end because of HVAC ducts."
- "Assumes the panel has an open space for a full-size breaker. Panel label allows tandems in slots 21-30 only."

Part C: Options

Most service scopes have more than one way to fix the problem. Write two or three options so the customer can choose and the office can price each one. The curriculum names three: fix it, fix it right, upgrade.

Option	What it means	Example: dead outlets from a failed backstab, house has backstabs throughout
A. Fix it	The smallest repair that makes the complaint go away safely and to code	Replace the failed receptacle, wires on screw terminals
B. Fix it right	The repair plus the work that keeps the same problem from coming back	Option A, plus move every backstabbed receptacle on the same circuit to screw terminals
C. Upgrade	A larger improvement the customer may want	Option B for the whole house, plus tamper-resistant receptacles throughout

Rules for options:

1. Every option must be safe and to code. You never write an option that leaves a hazard in place. If the only safe repair is the large one, write one option.
2. Each option is a complete scope with its own tasks, material, and hours. Do not write "Option B: same plus more."
3. Write what each option does for the customer in one plain sentence. "Option B fixes today's problem and the other five outlets on this circuit that are wired the same way."
4. Do not write prices. The office puts prices on the options.
5. Do not push. Show the options, say what each one does, and let the customer decide with the office.

Why option B matters: the Arc Guide says that when you find one backstabbed receptacle, you should assume the house was wired that way (Part 10, "Backstabbed Outlets"). Kuhlman says that when he finds a backstab on a no-power call, the problem turns out to be a backstab somewhere in the house (p. 27). A customer who gets only option A will often call again in a few months for the next one. When you write option B or C, every new device goes on its screw terminals. NEC 2026 406.10(3) allows push-in (backstab) terminals only on branch circuits of 15 A or less and only with 14 AWG solid copper. Older editions left that limit to the device's UL listing.

Writing options a homeowner understands

Use this format on the scope. The office copies it into the customer's estimate.

Option A. Replace the outlet that failed. Your four dead outlets will work again.

Option B. Option A, plus rewire the other five outlets on the same circuit so the wires are held by screws instead of the push-in holes that failed. This lowers the chance of the same problem on this circuit.

Option C. Option B for every outlet in the house (about 42), using new tamper-resistant outlets that keep children from pushing objects into the slots.

Plain words to use and avoid are the same as in R2.1, Part G1.

Part D: The Scope Sheet

Every service scope goes on the job board using the same layout. The layout follows the four parts plus options and hours.

Picture coming: Scope sheet template on a phone screen, one long scrolling card. Header: address, date, tech name, job board number. Section 1 "Findings" with three lines of text and two photo thumbnails. Section 2 "Fix" as a numbered task list. Section 3 "Options" with three collapsible boxes labeled A, B, C, each showing a task list, a material list with quantities (no prices), and an hours line ("4.5 hr, 1 JW + helper"). Section 4 "Factors used" with a line like "Attic × 1.40: 118°F at 11 a.m." Section 5 "Assumptions" with two bullet lines. Section 6 "Recommended, not in options" with one line. Section 7 "Declined / deferred" with a date. A footer bar reads "Counts and hours only. Office prices. Tech does not collect payment."

The sections, in order

1. **Header.** Address, date, your name, job board number.
2. **Findings.** From your job board card, with readings and photos.
3. **Fix.** The task list for the repair the customer called about.

4. **Options A, B, C.** Each with tasks, material with counts, hours, and number of people.
5. **Factors used.** Each factor, the tasks it applies to, and the reason.
6. **Assumptions.** What you could not see.
7. **Recommended items not in the options.** Other safety concerns you found, each with a photo, a short task list, and hours if you can estimate them.
8. **Declined or deferred.** What the customer said no to or "later," with the date.

The hand-off to the office

1. Finish the scope on the job board before you leave the driveway, or the same day at the latest. Details you do not write down in the first hour are gone.
2. Tell the office the scope is ready, using the method the office has set up.
3. Answer the office's questions the same day. If the office has to call you to price it, note what they asked so your next scope answers it in advance.
4. The office enters your counts and hours into its estimating program under the service job class and produces the customer's price. You do not see or set the price unless the office decides you should.
5. The office sends the estimate to the customer and handles approval, scheduling, and payment.

Techs never collect payment. If the customer asks the price, use the script from R2.1, Part G4: "The office handles all the pricing and billing so it's done the same way for everybody. They'll send it to you today."

Part E: The "Something Else Is Wrong" Conversation and the Scope

On many calls you find a problem the customer did not call about. R2.1, Part G2 has the script. Here is how that finding becomes part of the scope.

1. Photograph it.
2. Explain it to the customer at the spot, using "safety concern" or "code requirement," not "violation" (Arc Guide, Part 6).
3. Write it on the scope under "Recommended items not in the options," with a task list and hours.
4. If it is dangerous now, it is not optional. Make it safe (R2.1, Part E4), tell your journeyman, and write it as part of the fix.
5. If the customer says no or "later," write that under "Declined or deferred" with the date.

Finding	Usually goes in	Why
Burned or melted device, scorched wire	The fix, not optional	Fire hazard now
Breaker too large for its wire	The fix, not optional	The wire is unprotected (NEC 240.4(D))
Lost-neutral readings	Stop. Escalate (R2.5).	Utility or service problem; hazard now
Double-tapped breaker not listed for two wires	Recommended	Connection can loosen and heat (Kuhlman, p. 34)
No GFCI where one is now required, on an existing receptacle	Recommended	NEC 406.12(D)(3) requires GFCI protection when a receptacle is replaced in a location that now requires it. If you replace that receptacle, it becomes part of the fix.
Two-prong receptacles	Recommended, with the 406.12(D)(2) choices	Customer chooses between the code options (R-OLDHOUSE)
Missing panel directory	Recommended	Arc Guide, Job 10
Aluminum branch wiring	Recommended; escalate	Only approved repair methods (R2.7, R-OLDHOUSE)

Code changes that turn a small repair into a larger one

Some repairs bring newer code requirements with them. Know these before you write a "fix it" option, because they change the material and hours.

What you are doing	What the code then requires	NEC 2026
Replacing a receptacle in a place that now requires GFCI protection (bathroom, kitchen counter, garage, outdoors, laundry, and the other 210.8 locations)	The replacement must be GFCI protected	406.12(D)(3) (2023: 406.4(D)(3))
Replacing a receptacle in a place that now requires tamper-resistant receptacles	The replacement must be tamper-resistant	406.12(D) and 406.26 (2023: 406.4(D) and 406.12)
Modifying, replacing, or extending branch-circuit wiring in a room where AFCI protection is now required	The circuit must get AFCI protection: an AFCI or combination device at the panel, or an outlet-branch-circuit AFCI at the first outlet. The exception covers an extension of 6 ft or less with no new outlets or devices.	210.12(E) (2023: 210.12(D))
Replacing a two-prong receptacle where no ground exists	Choose among the 406.12(D)(2) options: another two-prong, a GFCI marked "No Equipment Ground," or a grounding-type receptacle fed through a GFCI and marked "GFCI Protected" and "No Equipment Ground"	406.12(D)(2)

If any of these applies, the "fix it" option must include it. The AHJ may enforce an older edition with different trigger rules. Ask your journeyman.

Part F: What Drives Hours Up, in Detail

F1. Attics

1. Before you scope an attic run, go into the attic. Do not scope from the hatch.
2. Measure the temperature if it is summer. Write it on the scope.
3. Note the access: pull-down stairs, a scuttle hole in a closet, or no access.
4. Note the clearance at the eaves where an exterior-wall drop will happen. Low-slope roofs leave a few inches at the top plate.
5. Note the insulation type and depth. Blown cellulose 12 in. deep hides the top plates and joists.
6. Note anything in the way: HVAC ducts, the air handler, bracing, flooring added by the homeowner.

Safety: attics. Step only on joists or on decking that is nailed down. Ceiling drywall will not hold you. Watch for roofing nails coming through the deck above your head. In summer, plan attic work for the morning and take breaks. R1.1 covers heat illness.

F2. Crawl spaces

1. Look in with a light before you commit to scoping a crawl run. Note the clearance, the floor (dirt, vapor barrier, concrete), water, and the duct layout.
2. Note whether the crawl is open at the far end of the house or blocked by a foundation wall.
3. Note anything that suggests a hazard: standing water, animals, damaged existing wiring.

Safety: crawl spaces. Never enter a crawl space with standing water and energized wiring that may be damaged. Tell someone you are going in. R2.9 covers post-flood conditions.

F3. Finished walls

Fishing a finished wall takes longer than working in an open wall, and it creates patch work. Before you scope:

1. Look for the access above (attic) and below (crawl, basement). A wall with access both ways may be easy. A first-floor wall in a two-story house with a finished basement may need a ceiling cut.
2. Check for fire blocking. A horizontal 2×4 inside the wall stops a fish tape. Older houses and taller walls are more likely to have it.
3. Check the wall material. Plaster and lath cracks when cut and is slower to cut than drywall.
4. Count the access holes you expect to cut and say who patches them. YES's usual practice is your journeyman's call. Write "patch by others" or "YES to patch [count] holes" on the scope.

R1.12 (remodel and old-work wiring) teaches how to fish. R3.3 covers scoping full remodels.

F4. Old panels

An old panel affects hours even when the job is not about the panel:

1. Find the panel label. If there is no label, or the brand is one with a known failure history (Federal Pacific Stab-Lok, Zinsco), note it (R-OLDHOUSE).
2. Check whether there is a space for a new breaker of the right type. Check whether the panel allows tandems, and where.
3. Check whether new breakers of that brand and type are available. Some old panels have no AFCI or GFCI breakers made for them, which means any circuit that now needs AFCI protection must get it another way, or the panel must be replaced.
4. Check the gutter space and the condition of the existing wires. Brittle insulation and a crowded gutter add time to every termination.

If the panel itself is the problem, the scope becomes a panel job. That is R3.2.

F5. Occupied houses

Most service work is in occupied houses. Plan for:

1. Moving furniture and putting it back.
2. Protecting floors with drop cloths and wearing shoe covers.
3. Pets that must be put away and children who must be kept away from open boxes and panels.
4. Shutting power off around the customer's needs: someone working from home, a medical device, a freezer full of food.
5. Dust control when cutting drywall or plaster.
6. Cleanup at the end of each day if the job runs more than one day.

Safety: medical equipment. Before you shut off any circuit, ask: "Does anyone in the house use medical equipment that plugs in, like oxygen or a CPAP?" If yes, find out which circuit, and do not shut it off without the customer's agreement and a plan. Note it on the scope.

Worked Examples

Example 1: Breaker trips, overload

Diagnosis (from R2.1, Example 2). Bedroom circuit 9, 15 A AFCI, clamps at 15.4 A with a 1,500 W space heater, TV, and lamps. No fault.

Scope.

Section	Content
Findings	Circuit 9 overloaded by 1,500 W heater plus normal bedroom loads. 15.4 A on a 15 A breaker. Photos: clamp reading, heater nameplate.
Fix	No repair. Customer moved heater to hall receptacle on circuit 11 (2 A normal load). Ran 10 minutes with no trip.
Option A	Leave as is, heater on circuit 11. No material. 0 hours.
Option B	New dedicated 20 A circuit for the heater location. Tasks, material, and hours as in the Part B worked example: 55 ft 12/2 NM-B, 1 old-work box, 1 20 A TR receptacle, 1 AFCI breaker matching the panel, 1 plate. 4.5 hours, one journeyman with a helper.
Factors used	Attic run $\times$ 1.40: attic 118°F at 11 a.m., August.
Assumptions	Open full-size space in panel (confirmed, slot 26). Attic route clear (walked it). No fire blocking in bedroom wall (not confirmed).
Recommended, not in options	None.
Declined or deferred	Customer wants the price for Option B before deciding.

Example 2: Dead outlets, failed backstab, house backstabbed throughout

Diagnosis. Four living room receptacles dead. Last working receptacle upstream had a backstabbed hot that burned open. Repaired today. Opened two other receptacles in the room: both backstabbed. House built 1988.

Scope.

Section	Content
Findings	Failed backstab at receptacle by front door (photo). Circuit 7 restored. Two more backstabbed receptacles found on circuit 7 (photos).
Fix (done today)	Replaced 1 receptacle with a 15 A TR receptacle, wires on screw terminals, torqued to the label. Tested all 6 receptacles on circuit 7. 0.75 hours. Material: 1 TR receptacle, 1 plate.
Option A	Done. No further work.
Option B	Move the other 5 receptacles on circuit 7 to screw terminals, replacing each with a 15 A TR receptacle. Material: 5 TR receptacles, 5 plates. Hours: $5 \times 0.4 = 2.0$, plus 0.25 setup and 0.25 cleanup = 2.5 hours, one journeyman.
Option C	Same as B for all receptacles in the house. Count: 42 receptacles total, 6 already done or in B, 36 remaining (counted room by room, see list). Material: 36 TR receptacles, 36 plates. Hours: $36 \times 0.4 = 14.4$, occupied-house factor $\times 1.15 = 16.6$, plus 0.5 setup and 1.0 cleanup and test = 18.0 hours, about 2½ days for one journeyman.
Factors used	Option C only: occupied $\times 1.15$, family home, furniture against most walls.
Assumptions	Boxes are deep enough for new TR receptacles. Did not check box fill. Bathrooms, kitchen counter, garage, and outdoor receptacles must be GFCI protected when replaced (406.12(D)(3)); count of those included separately below.
Recommended, not in options	Option C includes 9 receptacles in GFCI locations (2 baths, kitchen counter, garage, 2 outdoor). Add 4 GFCI receptacles to feed them (1 per bath, 1 kitchen, 1 garage/outdoor), or confirm existing GFCIs.
Declined or deferred	None yet. Customer wants prices for B and C.

Notice that Option C's room-by-room count has to be a real count. Walk every room, count every receptacle, and write the list. Do not estimate "about 40."

Example 3: Breaker trips sometimes, not while you are there

Diagnosis. Circuit 14, standard 15 A breaker, living room and front porch light. Trips about twice a week, usually after rain. Did not trip during the visit. Clamp 6 A with all normal loads on. All receptacles and devices looked normal.

Scope.

Section	Content
Findings	Intermittent trip, not an overload. Pattern after rain suggests outdoor wiring. Front porch light fed from circuit 14. A post light at the end of the walk may be on this circuit (not confirmed).
Fix	Replace the standard 15 A breaker with a dual-function (AFCI and GFCI) breaker matching the panel to catch the fault (Kuhlman, pp. 82–83). If it trips right away, mid-point the circuit (R2.4) in the same visit.
Option A	Dual-function breaker, test, return visit when it trips. Material: 1 dual-function 15 A breaker matching the panel. Hours: 0.75 install and test, plus a return visit of 1.0–3.0 hours to mid-point and repair, depending on what is found.
Assumptions	Panel brand makes a dual-function breaker for this panel (confirmed on the label: Square D QO). The fault may be in underground wiring to a post light, which would be a separate scope with trenching.
Recommended	If the post light feed is the cause, scope a replacement feed or disconnect it at the switch.
Declined or deferred	None.

This is Kuhlman's "Ipswich" call (pp. 100–101), scoped the way he says he should have done it the first time.

Common Mistakes

1. **Scoping before diagnosing.** A guessed fix gives a guessed price. Finish the diagnosis, or write the diagnosis as the scope.
2. **Writing the fix as one sentence.** The office cannot price "fix the bathroom." Break it into tasks.
3. **Missing non-task hours.** Setup, cleanup, testing, supply runs, and the walkthrough add up to an hour or more on most calls.
4. **Measuring cable in a straight line.** Measure the actual route, add the drops and slack, and add a routing allowance.
5. **Ignoring code triggers.** Replacing a receptacle in a bathroom without GFCI protection is not a legal option (406.12(D)(3)). Extending a bedroom circuit without AFCI protection is not either (210.12(E)).
6. **Stacking factors that overlap.** "Finished wall" and "no attic access" describe the same problem. Use the larger one.
7. **Hiding the factor.** A scope that says "6 hours" without saying "attic × 1.4" cannot be checked.
8. **Writing an unsafe option.** Every option must leave the house safe and to code.
9. **Counting "about 40" receptacles.** Walk the house and count.
10. **Leaving out "declined."** If the customer said no, write it down with the date.

11. **Quoting a price or discussing money.** The office prices. Techs never collect payment.
 12. **Never checking your hours.** Your scopes only get better if you compare them to actual hours (Field Exercise below; commercial Module 3.3, Part E).
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Field Exercise: Three Scopes and a Red-Pen Pass

Setup. Pick three service calls you worked in Phase 2 that are now finished and have actual hours on the job board. Pick three different kinds: for example, a dead-outlet call, a breaker-trip call, and a call that needed a new circuit or a device upgrade.

Step 1. Write a scope sheet for each, from memory and your notes. Do not look at the actual hours yet. For each call, write all eight sections from Part D:

1. Header.
2. Findings with readings and photos from the job board card.
3. Fix as a task list.
4. Options A, B, and C where they make sense, each with tasks, material with counts, hours, and number of people. If only one option is safe, write one and say why.
5. Factors used, with the reason for each.
6. Assumptions.
7. Recommended items not in the options.
8. Declined or deferred.

Step 2. Material list check. For each scope, list every part with a count, brand and series for breakers, and cable in feet. Show the measurement for any cable run the way the Part B worked measurement does.

Step 3. Hours by task. For each scope, show task hours under normal conditions, the factors, the non-task hours, and the total, rounded to the quarter hour.

Step 4. Red-pen pass. Hand all three scopes to your journeyman. The journeyman marks:

- Any task that is missing.
- Any part that is missing or the wrong type.
- Any code trigger you missed (406.12(D), 210.12(E)).
- Any factor that is too high, too low, or overlapping.
- Any option that is unsafe or not to code.
- Any sentence a homeowner would not understand.

Step 5. Compare to actual. Now pull the actual hours from the job board for each call. Make a table:

Call	Your estimated hours	Actual hours	Difference	Percent off	Why
1					
2					
3					

Percent off = (actual – estimated) ÷ actual × 100.

For each call, write one sentence on why the hours were different. Typical reasons: a task you did not list, a factor you did not apply, a part you did not have, a supply-house run, a customer interruption.

Step 6. Adjust your example hours. Change the numbers in your own copy of the Step B5 example table to match what you learned. Keep this table and update it every month for your first year.

Pass standard. You pass when your journeyman signs off that all three scopes have all eight sections, every part has a count, every hour total is broken out by task with factors shown and explained, no option is unsafe or misses a code trigger, and you completed the estimate-versus-actual table with a reason for each difference.

NEC 2026 Cross-References

Scoping is mostly method, not code. These sections come up most often because they change what a "fix it" option must include.

Section	What it says	Why it matters for a scope
210.8	Where GFCI protection is required in dwellings	Tells you which replacement receptacles must be GFCI protected
210.12(E) (2023: 210.12(D))	Modified, replaced, or extended branch-circuit wiring in AFCI areas must get AFCI protection; exception for extensions of 6 ft or less with no added outlets or devices	Turns a circuit extension into an AFCI job
240.4(D)	14 AWG copper at 15 A, 12 AWG copper at 20 A, 10 AWG copper at 30 A	Breaker too big for the wire goes in the fix, not the options
406.12(D) (2023: 406.4(D))	Rules for replacement receptacles: grounding, non-grounding choices, GFCI, AFCI, tamper-resistant	Code triggers for replacement work
406.26 (2023: 406.12)	Tamper-resistant receptacles	Material type for replacements in dwellings
406.10(3)	Push-in (backstab) terminals only on 15 A or smaller branch circuits, 14 AWG solid copper only. New in 2026; older editions left this to the UL listing.	Options that rewire backstabbed devices
110.14(D)	Torque to the value on the equipment	Every termination in every task

The AHJ may enforce an earlier edition, and the trigger rules for replacements have changed between editions. Ask your journeyman which edition applies before you write a "code requirement" on a scope.

End-of-Chapter Checklist

Before you scope - [] The diagnosis is finished, or the scope says the diagnosis is the next step. - [] You went into the attic or crawl space you plan to use. You did not scope from the hatch. - [] You checked the panel label, open spaces, tandem rules, and breaker availability. - [] You asked about medical equipment before planning any shutdown.

Tasks and material - [] The fix is a numbered task list. - [] Every task has its parts listed with counts. - [] Breakers list brand, series, type, poles, and amps. - [] Cable runs are measured along the route with drops, slack, and a routing allowance, rounded up to 5 ft. - [] "By others" is written next to anything YES is not providing.

Hours - [] Each task has normal-condition hours. - [] Factors are applied only to the tasks they affect, are not overlapping, and have a written reason. - [] Non-task hours are listed: setup,

shutdown, supply run, permit or inspection, testing, cleanup, walkthrough, documentation. - []
The total is rounded to the quarter hour and says how many people.

Options - [] Options A, B, and C are written where they make sense, or one option with a reason. - [] Every option is safe and to code, including 406.12(D) and 210.12(E) triggers. - [] Each option has its own tasks, material, and hours. - [] Each option has one plain sentence a homeowner understands.

Scope sheet and hand-off - [] All eight sections are filled in. - [] Assumptions list what you could not see. - [] Other safety concerns are listed with photos. - [] Declined and deferred items are written with the date. - [] No prices anywhere. - [] The office has been told the scope is ready, the same day. - [] You did not quote a price or collect payment.

After the job - [] You compared your hours to the actual hours and wrote down why they differed.

Sources

- Jesse Kuhlman, Residential Electrical Troubleshooting (2019) Pages cited: 27 (backstabs found on no-power calls), 34 (double taps), 82–83 (dual-function breaker for occasional trips), 100–101 ("Ipswich"). Paraphrased.
 - Arc Workforce, Residential Electrical Field Guide. Part 2 (breakers must match panel), Part 6 (customer scripts, document everything), Part 10 ("Backstabbed Outlets"), Job 7 (new circuit, 2–4 hours, slack lengths), Job 10 (panel labeling).
 - Craftsman Book Company, National Electrical Estimator, 38th ed. (2023), publisher's free preview,, pp. 6–7 (conditions multiplier 1.10 to 1.50 or more; hours assume a journeyman with about five years' experience; smallest appropriate crew).
 - Mike Holt, Illustrated Guide to Electrical Estimating, sample chapter,, sec. 1.1, p. 2 (estimate versus bid) and p. 4 (reasons contractors lose money).
 - Mechanical Contractors Association of America, Change Orders, Productivity, Overtime: A Primer for the Construction Industry (2016 printing),, pp. 99–100 (factor table), p. 109 (avoid overlapping factors), p. 125 (how the percentages were gathered).
 - YES Electric commercial course, Modules 3.1 (takeoff, routing slack), 3.2 (labor units), 3.3 (job costing, estimate versus actual).
 - NFPA 70, National Electrical Code, 2026 edition, sections listed above.
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Videos to watch

These videos are made by other electricians and companies, not YES Electric. Watch each one after you read the section it goes with. Where a video does something differently from this module, the caution line says so. Follow this module and your journeyman, not the video. Click a title to open it on YouTube.

Section	Video
Part B Step B1 (finish the diagnosis first) and Part C (options): diagnose on the clock, then stop and give the customer a firm scope before fixing	Pricing Service Calls, Electrical Estimating On the Electricians in Action Everyday @ 9:00 am Electrical Code Coach • 6:51 A licensed electrician explains how a troubleshooting call is run: the first hour buys diagnosis, and as soon as the problem is found he stops and gives the customer a set price for the fix before doing it, or asks for more time if he is not close. Caution: Told from the owner's side with example dollar amounts (100 to 180 dollars) that are his market, not YES prices. At YES the tech writes the scope and hours and the office prices it; techs do not quote prices on the job.
Part B Step B5 (break the hours out by task; non-task hours): what a labor unit includes	Electrical Estimating ©2011 - Labor Units MikeHoltNEC • 6:41 Mike Holt breaks a labor unit into installation (about half), layout, material handling and cleanup, nonproductive time, supervision, and tool handling, and lists what labor units leave out, such as fixture assembly and cutting openings. Caution: Classroom recording from a commercial estimating course; the examples are commercial (fixtures, large wire pulls). The module's non-task list (setup, shutdown, supply run, testing, cleanup, walkthrough, documentation) is the residential version of the same idea.
Part B Steps B5 to B7 (task hours, factors for hard conditions, totaling): one device built up from material, labor unit, and a labor adjustment factor	Electrical Estimating ©2011 - Unit Price MikeHoltNEC • 6:15 Builds the cost of one switch from its parts list and its labor hours, adds a 10 percent labor adjustment for job conditions, then shows a sliding per-outlet price for small residential jobs where the trip and setup cost is spread over the first few outlets. Caution: The worked switch is an EMT conduit installation with 2011 wages and prices, not NM in a house. The overhead, markup, and selling-price math is office work; the tech's part is the count, the hours, and the condition factors.