



## Setting Kitchen Cabinets

### A guide to problem-free installation

BY JLC STAFF

Cabinet installation takes place after most of the other work in a kitchen has been completed, including framing, flooring, drywall, and rough-in for plumbing, electrical, and HVAC systems. Whether the cabinet installer is involved in this prep work directly or he arrives on site after it has been completed, he's likely to be faced with a variety of conditions that will affect not only the installation process but also the final appearance and functionality of the cabinets. In this article, we look at the most common problems that cabinet installers face—especially in existing homes—and the methods, tools, and products that help them find solutions.

#### CHECK DIMENSIONS

The best time to discover that cabinet dimensions don't match up with room dimensions is before you start putting the cabinets together. Follow these two procedures to uncover mistakes that can derail an installation:

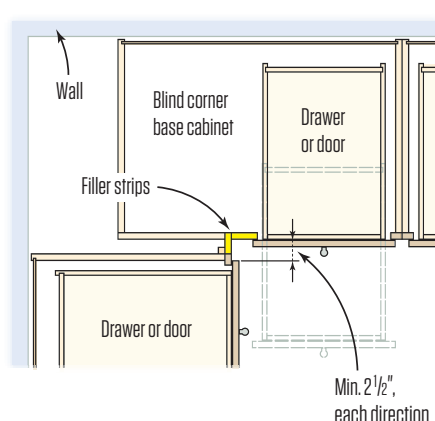
**Mark the layout.** Rather than check dimensions only on the plans, also mark the dimensions and the location of the cabinets on a strip of painter's tape on the wall or floor. Draw lines on the tape to designate the left and right sides of each cabinet face, then write the cabinet number from the plan in the space between. Left in place for the remainder of the job, these marks serve

**Inside Corner—Two Drawers.** Where cabinets meet at an inside corner, a 2 1/2-inch filler strip on each side prevents interference from drawers and pulls.

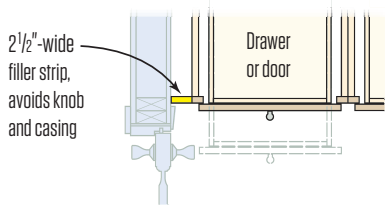
**Door at End of Run.** Where cabinets terminate at a wall, a filler strip can also prevent interference from the lockset of an adjacent door.

**1.** Built-up door or window trim can also cause problems. In the photo at top right, the cabinet door can't be opened because it's obstructed by the trim (a). A filler strip solves the problem (b).

Inside Corner—Two Drawers



Door at End of Run



double-duty—as a crosscheck for the cabinet package and as a spot check during installation. They will also help when it comes time to verify plumbing, electrical, and HVAC rough-in.

**Dry-fit the cabinets.** This can be done in the kitchen itself or in any space that's large enough. Take each cabinet out of its box and check for damage, then match the cabinet to the plan. Next, dry-fit the cabinets by placing them (without fasteners) in relation to one another according to the planned layout. This makes it easy to spot any dimensional and alignment problems, as well as potential installation problems, such as missing end panels or filler strips. After dry-fitting, repack the cabinets in their boxes to prevent damage.

The entire kitchen doesn't need to be dry-fit at once, but every run of cabinets should be checked for the following:

**Corner drawers or appliances.** Where cabinets meet at a corner, use filler strips to provide at least 2 1/2 inches of clearance in each direction to ensure that doors and drawers can open without interference (see Inside Corner—Two Drawers, above). Where an appliance must be located at a corner, a filler will also prevent interference with doors, drawers, pulls, and handles.

**Door or window at the end of a run.** Where a bank of cabinets terminates at a wall next to a window or a door (see Door at End of

Run, above), use a filler strip to prevent interference from a door knob or trim (**1**).

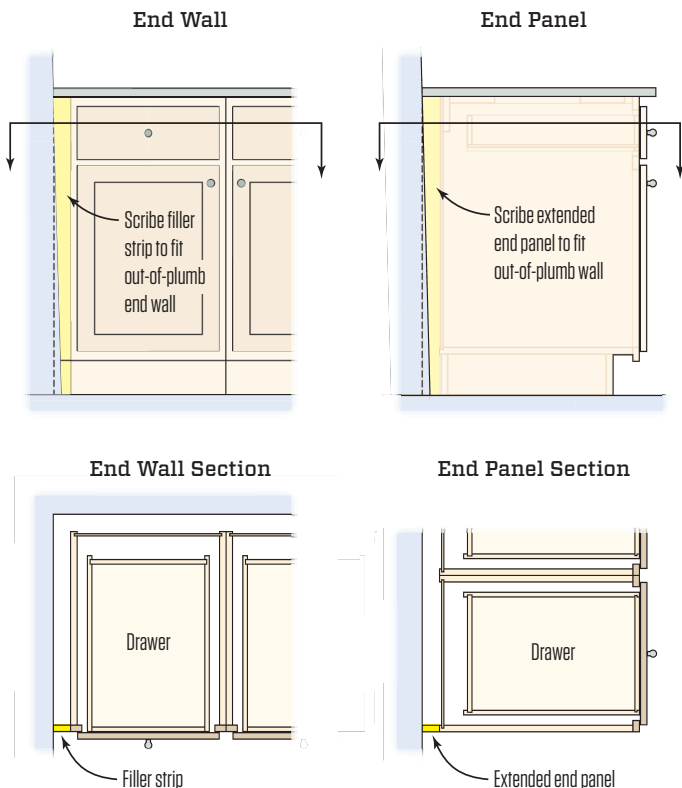
**Out-of-plumb end wall.** Where cabinet sides meet walls, use filler strips to close any gaps at the ends, scribing if necessary where a wall has an irregular surface or is out-of-plumb (see End Wall, facing page).

**Finish end panels.** Cabinets at the end of a run may need an extended finish panel; the excess depth allows for scribing to walls that are out-of-square or out-of-plumb (see End Panel, facing page).

**Centering, symmetry, and alignment.** Ensure cabinets align as planned with windows and doors (for instance, that sink bases are centered on a window or that wall cabinets are symmetrical on both sides of a door or window). Check for interference from window or door trim.

**Upper/lower alignment.** Check that base and wall cabinets properly align at inside and outside corners. A base-cabinet filler usually must be matched by a corresponding wall-cabinet filler.

**Appliance openings.** Make sure that all appliances will fit into the openings provided by the actual cabinets. This is especially important on jobs where the client orders the appliances. Check opening width and height, including where wall cabinets are hung above an appliance, such as a refrigerator, microwave, or



**End Wall.** Scribe filler strips to close gaps where cabinets meet irregular or out-of-plumb walls.

**End Panel.** At the end of a cabinet run against an out-of-plumb wall, scribe an extended finish end panel to match the wall. If the cabinet end is a standard depth, glue and scribe an extension made from a filler strip; as a last resort, cover any gaps with molding.

**2.** Correcting out-of-level conditions before ordering cabinets can minimize appearance problems at soffits and ceilings.

range. (Most appliance width dimensions are finish-opening dimensions; for example, a 30-inch range needs exactly 30 inches between cabinets.)

**Countertop alignment.** Check all dimensions where countertops will need to align with room features, such as window sills, door and window trim, and chair rail or wainscoting.

**Room access.** Determine that all appliances and large cabinets will fit through archways or doorways, and that there is enough height in the room to stand up tall cabinets (a 96-inch-tall pantry cabinet 24 inches deep, for instance, needs at least 99 inches of headroom).

## LEVEL, PLUMB, & SQUARE

Floors, walls, and ceilings are never as level, plumb, or square as they look, and many kitchens—especially in existing homes—show variations in all three measures. Standard countertop height is 36 inches, but this may vary depending on where the high and low points are in the floor (see Cabinet Layout Tips, page 43). Most installers are comfortable shimming or scribing cabinets to correct variances of 1 inch (possibly more, depending on the configuration of the cabinet run).

**Check the floor for level.** Using a laser level or long spirit level

along the wall, find the high and low spots in the floor (check island or peninsula locations, too, particularly if they will house an under-counter appliance). Also spot-check a line about 2 feet out to see if the floor is at the same level across the depth of the cabinets. Mark high and low spots on the floor (or on painter's tape), as well as any other humps or sags—these dimensions will help later when you are setting final base cabinet height.

**Check soffit and ceiling.** The ceiling will usually follow the floor, but not always. Check whether an existing soffit compensates for an out-of-level ceiling, and make sure it is level across its depth. The closer that wall-cabinet tops are to the ceiling or soffit, the more visible any variance will be (**2**). Simple, square-profile molding may disguise a small variance; if there are larger problems, now is the time to fix them.

**Check corners for square.** Measure out a 3-4-5 triangle in three locations—at the floor, at the ceiling or soffit, and at approximate countertop height. Obtuse-angled corners may permit cabinets to be set flush against both walls, depending on the type of corner cabinet used; acute angles may require spacing cabinets away from the wall to accommodate carousel-type hardware. Even where walls are square, a buildup of joint compound may have to be removed to prevent interference with corner base and wall cabinets.



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**3.** Cabinet Claws are designed to both clamp and align face frames (ponytools.com).

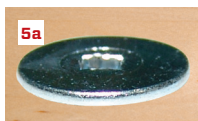
**4.** When assembling cabinets in banks, use a level to ensure that face frames are perfectly flush.

**5.** For a finished look, decorative fasteners such as Powerhead Screws (fastcap.com) have a thin head (a) that can also be driven flush (b) or capped (c); another option is to predrill for cabinet bolts (d).

**6.** One-man installation is possible with a cabinet lift like this older-model Cabinetizer (telproproducts.com).

**7.** One option for out-of-level floors is to first level and fasten a ladder base (a), then install plain base boxes by fastening through the bottom (b).

**8.** Some adjustable leveling legs, such as these from Camar (camar.it), come with clips to support toe-kick panels.



**Check walls for plumb.** If out-of-plumb walls are discovered before the cabinets are ordered, specify extended panels, whose extra depth will make it possible to scribe cleanly against the wall. (Added height at tall end panels may also be needed to compensate for low spots in the floor.) Where an out-of-plumb wall is discovered after the fact, adding a custom extension on site or adding molding to conceal any gaps may be the only solution.

**Check backsplash.** Wall cabinets are typically set at 18 inches above the finished countertop, but if you need to adjust this dimension, 17 inches is the recommended minimum. Where wall cabinets and backsplash are in different planes because of an out-of-plumb wall, you may need to use molding to conceal any gaps.

### SYSTEMS ROUGH-IN

The GC should have made sure that all appliances and equipment were properly roughed in, but cabinet installers should still compare the kitchen plans with the actual locations of pipes and wires in the walls, floor, and ceiling. Remember: Adjustments for out-of-level and out-of-square conditions may alter rough-in dimensions.

**Appliances.** Some installers insist on having all appliances and fixtures on site before cabinet installation begins so that they can

verify rough-in dimensions on the actual equipment. Where this isn't possible, check the plans against printed or online manufacturer spec sheets, or call the appliance dealer directly.

**HVAC ductwork.** Because wall space is at a premium in a kitchen, heating and cooling ducts or piping is typically routed through the toe space under cabinets, where it will be nearly inaccessible once cabinets are installed. Make sure that this equipment is in the right place, is properly secured, and will actually fit under or between cabinets. This is also the best time to seal around floor and wall penetrations to keep out air or small critters.

**Electrical.** The kitchen plans should indicate the types and positions of fixtures, outlets, and switches. Check these locations during dry-fit; where the floor is out of level, double-check rough-in locations for backsplash outlets and switches, and for undercabinet lighting that may be affected by adjustments to cabinet height. Make sure there is enough room in cabinets that will house low-voltage transformers.

### INSTALLING WALL CABINETS

Whether you install base or wall cabinets first is a matter of personal preference. Installing wall cabinets first avoids your having to reach over base cabinets. But where cabinets have to be mod-

ified for plumb, level, and square, it may be better to begin with base cabinets. In general, it's best to start in a corner, but adjustments for plumb and square or the presence of tall cabinets or full-height panels may require a different strategy.

**Fasten cabinets together.** Either way, alignment is usually easier when several cabinets are installed as a unit. Lay the cabinets on their backs on a flat surface, align the side panels, and clamp them together (3). Fasten frameless cabinets through the sides with four fasteners—top and bottom, front and back (4). Because these fasteners will be visible inside the cabinet, some installers use cabinet bolts, which require predrilled holes, #8 or #10 wood screws with finish washers, or Powerhead Screws (fastcap.com) with or without finish caps (5).

Face-framed cabinets are somewhat more difficult to align. The face frames on stock cabinets usually extend past the sides, so to keep everything square, add spacers between cabinets at the back before screwing them together. Cut spacers twice the thickness of the overhang (about  $\frac{3}{8}$  inch total), position them at the fastener locations, and clamp the cabinets together. Fasten the cabinets through the spacers at the back, top and bottom.

At the front, you can fasten with screws or cabinet bolts through the sides just behind the face-frame stile. Alternatively, fasten through the face frames, being careful to avoid hinge locations; use finish washers or countersink the screws, with or without caps.

**Hanging cabinets.** Mark the locations of studs and blocking on the top and bottom mounting rails and, if necessary, predrill for fasteners. A wall cabinet should be fastened top and bottom to at least two studs; where that's not possible, fastening cabinets together will usually provide enough additional support. When in doubt, install solid blocking; the cabinets will conceal the patch.

Fasteners should be at least  $2\frac{1}{2}$  inches long—enough to penetrate  $\frac{3}{4}$  inch into the studs. For best appearance, use #10 wood screws with matching finish washers, or self-countersinking screws, such as R4 Torx (grkfasteners.com) or Powerhead Screws, which do not require predrilling. Avoid drywall screws, which don't have the required adequate shear strength to support cabinets.

Also locate and drill holes for any wiring that needs to pass through the back of the cabinet. To make installation easier, drill these holes neatly but oversized. Wiring, which typically powers undercabinet lighting, does not require much play, and the holes will usually be concealed by the fixtures. Pipes are less forgiving, but gaps can be concealed with one- or two-piece finish escutcheons.

Before lifting the cabinet into position, drive screws partway into the mounting rails. While not necessary, attaching a temporary 2-inch-wide plywood ledger to the wall on which to rest the bottom edge of the cabinet will make installation easier, whether you're working alone or with a helper. If working alone, use a lift (6) or blocking to hold the cabinet in place on the ledger or against a level layout line, then drive in a few fasteners top and bottom to snug the cabinet against the wall. Check the face of the cabinet for plumb and, if necessary, loosen the screws and shim the top or bottom. Before fully driving all fasteners, check for signs that the wall





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is bowed, and shim as needed to prevent the cabinet backs from bending when fastened tightly.

### INSTALLING BASE CABINETS

Fasten base cabinets together (following the procedure for wall cabinets) and install them as units. As with wall cabinets, mark stud locations in the mounting rails—one stud per base cabinet is adequate, but don't skip any studs—and drill neat, oversize holes in cabinet backs or bottoms to accommodate wires and pipes. When cabinets are securely in place, shim behind with screws as necessary to prevent bowing of the cabinet backs.

Set base cabinets level and flat, especially in kitchens with stone, pre-cast concrete, or solid-surface countertops. Where the kitchen floor is relatively flat and level, cabinets with integral toe-kicks can be trimmed and shimmed as necessary. Set cabinet height based on the high point in the floor, because shimming is easier than trimming. Where the floor is significantly out-of-level, however, you may need to split the difference, which will mean shimming some cabinets and trimming others. At exposed finish end panels, this may require scribing to the floor contour.

A second option is to build and level a “ladder base” from 5/4-stock or plywood, and fasten it to the floor with pocket screws and to cleats before mounting plain cabinet boxes (without toe-kicks) on top (7a). Attaching solid 1-by for crosspieces or cleats flush with the top of the base will provide ample surface area to receive screws driven down through the bottom of the cabinet boxes (7b).

Leveling legs are a third alternative for dealing with an out-of-level floor (8). When the toe-kick is integral, leveling legs can be installed behind the base panels and adjusted before a permanent toe-kick panel is installed (some types can be adjusted independently from inside the cabinet). For cabinet boxes with no toe-kicks, leveling legs are available with mated clips that can be used to attach matching toe-kick panels.

### TALL CABINETS & PANELS

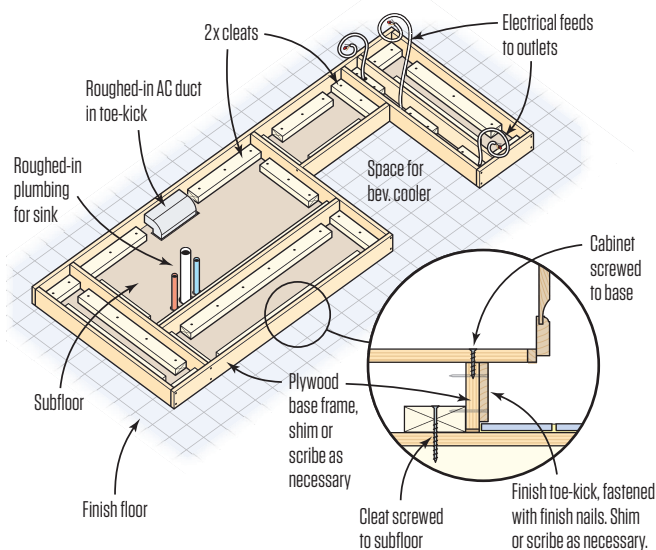
Full-height pantries, wall-oven cabinets, and panels are typically installed last when they are located at the end of a cabinet run, but may need to be installed earlier if they are near the middle. If the floor is out of level, extended-height panels can be scribed to fit; otherwise, shoe mold may be needed to conceal shims at the floor. At an out-of-plumb wall, scribe an extra-deep panel to avoid having to use molding to cover any gaps (9).

Tall finish end panels are typically fastened to wall cabinets from inside or occasionally by means of interlocking cleats. Anchor the free end using pocket screws, ledgers, or angle brackets from the inside, or pin to shoe mold. Where tall panels support wall cabinets over a refrigerator, make sure that there is adequate clearance on all sides of the appliance.

### SPECIAL SOLUTIONS FOR ISLANDS

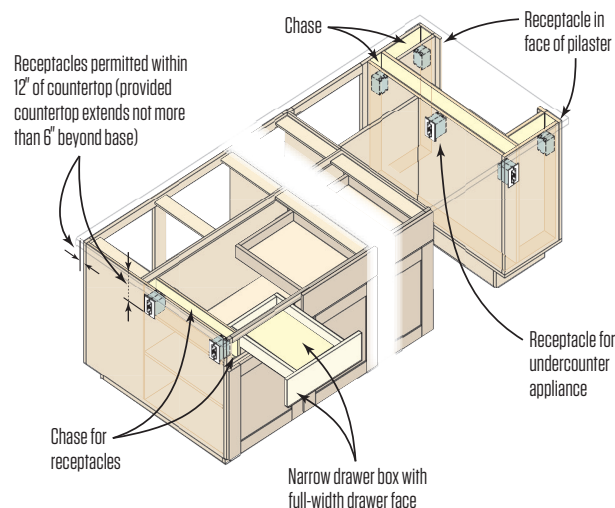
Kitchen islands present a number of challenges, including how to fasten cabinets securely without any supporting walls, and

## Island Base Assembly



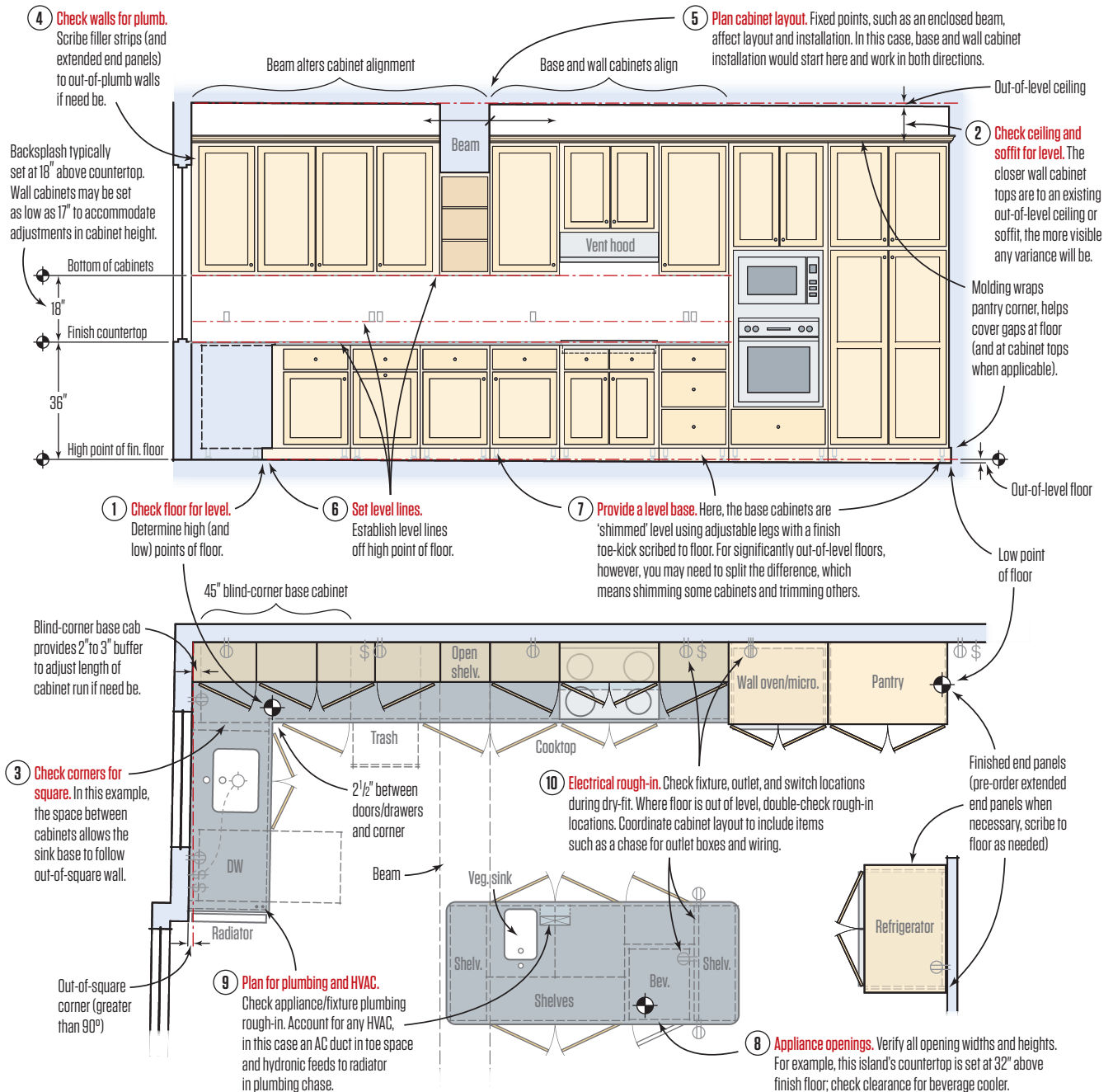
At an island, fasten cabinets through cabinet sides or toe-kicks to cleats secured to the floor along the inner outline of the cabinets. Fasten ladder bases the same way (or with pocket screws or angle brackets), then screw through the bottom of the cabinet boxes into the base frame.

## Island Receptacle Options



Accommodate island wiring and boxes for outlets by providing chases between cabinets or in wide pilasters or end panels. The space next to a drawer can also be used to create a chase, which can be hidden behind an extended drawer front.

## Cabinet Layout Tips



One hour spent dry-fitting cabinets and verifying dimensions will save many hours later by ensuring that cabinets will fit properly and that doors, drawers, and appliances won't interfere with one another. Trim or shim cabinets to adjust for walls, floors, and ceilings that are not plumb, square, and level, being careful to note how this affects countertop height and rough-in dimensions. Use filler strips to provide clearance for doors and drawers, to close up gaps at the ends of cabinet runs, and to hide structural imperfections.



**9.** For a clean appearance, scribe extra-deep and extra-tall full-height panels to the floor and wall.

**10.** Use jigs to locate and drill for pulls (a) and handles (b).

**11.** To prevent blow-out, first drill partway through doors from the back (a), then drill all the way through from the front (b).

how to accommodate sink drain and vent lines, and the wiring for outlets.

**Anchoring island cabinets.** With integral toe-kicks, set the cabinets in place temporarily and trace lines where the inner edges of the side panels meet the floor. Then remove the cabinets and fasten cleats along the lines (see Island Base Assembly, page 42). Reposition the cabinets and screw through the toe-kick to secure the cabinets to the cleats. For plain cabinet boxes, fasten through the cabinet floor to a ladder base that has been leveled and fastened to the floor.

**Plumbing and wiring.** Most codes require at least one outlet in a kitchen island, and more may be necessary for convenience. Where an island includes a raised eating bar or half-wall, outlets can be installed in the vertical curb. Otherwise, they can be installed in chases built into or around the cabinets (see Island Receptacle Options, page 42).

## DOORS & DRAWERS

Doors and drawer fronts are typically drilled for pulls and handles while mounted to the cabinets, but this work can also be done at

a workbench. Most kitchens have enough hardware to make it worthwhile to use a template to locate and predrill holes. Though commercially made jigs are available, it's easy enough to build a template for each job (10) or even a custom-made "universal" template that fits the screw spacing for most pulls and works for the most common drawer depths and door-frame widths.

Using a strip of painter's tape at the rough location of knobs or pulls will make marks easier to see and will help protect the finish. Align the jig over the tape and drill through it. When working at a bench, prevent the wood on the back side from blowing out by drilling through the door into a scrap of plywood underneath it. To prevent blow-out when drilling mounted doors or drawers, mark both sides and drill partway through from the back before drilling from the front (11).

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Photos: 9, Ted Cushman; 10a, Jim Copen; 10b, 11a, 11b, Rob Corbo