JOB-SITE POWER:
Handle With Care

Paying attention to how electricity is delivered to your jobs can save money — and maybe your life

by Sean Kenney

I remember a particular temporary electrical service I installed on a commercial job site. The builder hadn't given me a site plan, and didn't show up to tell me where he wanted the service, so I put it where it was convenient for the power company. Turns out it was in the parking lot. When the paving contractor came along, he moved the temporary service out of his way. Luckily, no one got hurt, but had there been any damage or injury, the lawsuits could have put us all out of business.

Builders have been jerry-rigging job-site power for years, but insurers, inspectors, and code officials have begun to take notice — and they don't like it. In fact, the industry as a whole is finally getting serious about electrical safety. Even builders who make it a policy of leaving electrical work to the electrician are liable for electrical mishaps on their jobs, so it behooves you to show some interest in how power is used on site. That means making an effort to communicate with your electrician, and making sure your employees and subs understand what they can and can't do. Besides helping prevent injury, thinking through the process of how power is used on your jobs will also save you time and money.

Power Pedestal

The first question you should ask is whether the job even needs temporary power. In many places, you can skip the temporary setup and put in the regular service at the beginning of the job. This usually means installing a pedestal — a permanent post to which the electric meter is mounted (see Figure 1). The power cable then runs underground to the service panel. If the plans call for the panel to be in the basement and if the foundation is poured, you can make the permanent hookup. If the panel is planned for the first floor, you can install a temporary panel near the house, then move it inside after the framing goes up. In either case, of course, the panel will have to be protected from the weather during construction. A pedestal will cost

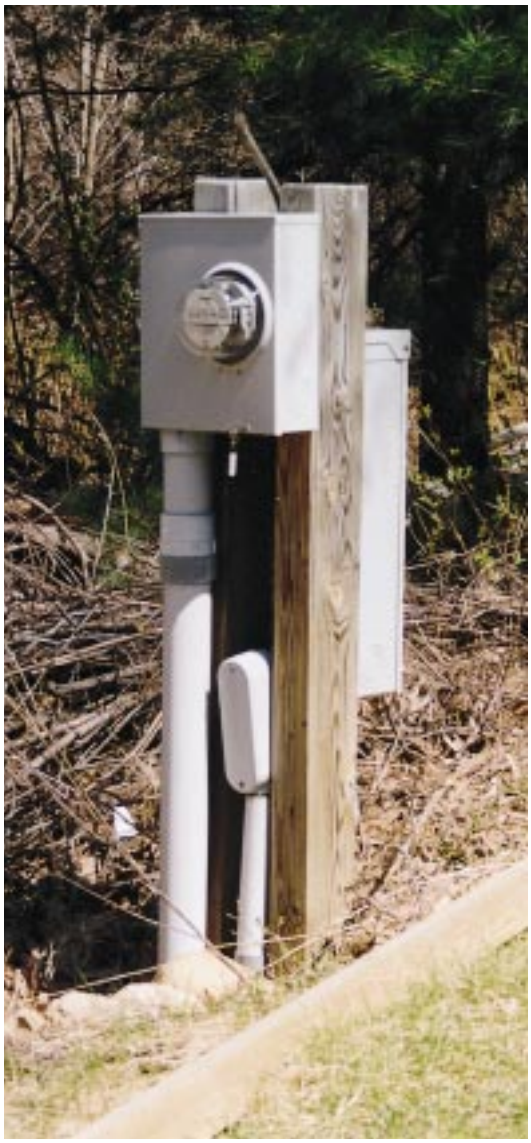


Figure 1. You may be able to install permanent power at the beginning of a job using a pedestal. The meter and main disconnect are installed on a short permanent post, while the power cable runs underground to the house service panel. If the panel is planned for the basement, you can install it immediately after the foundation forms are stripped. A pedestal is more expensive than overhead service, but you save the temporary hookup charge.

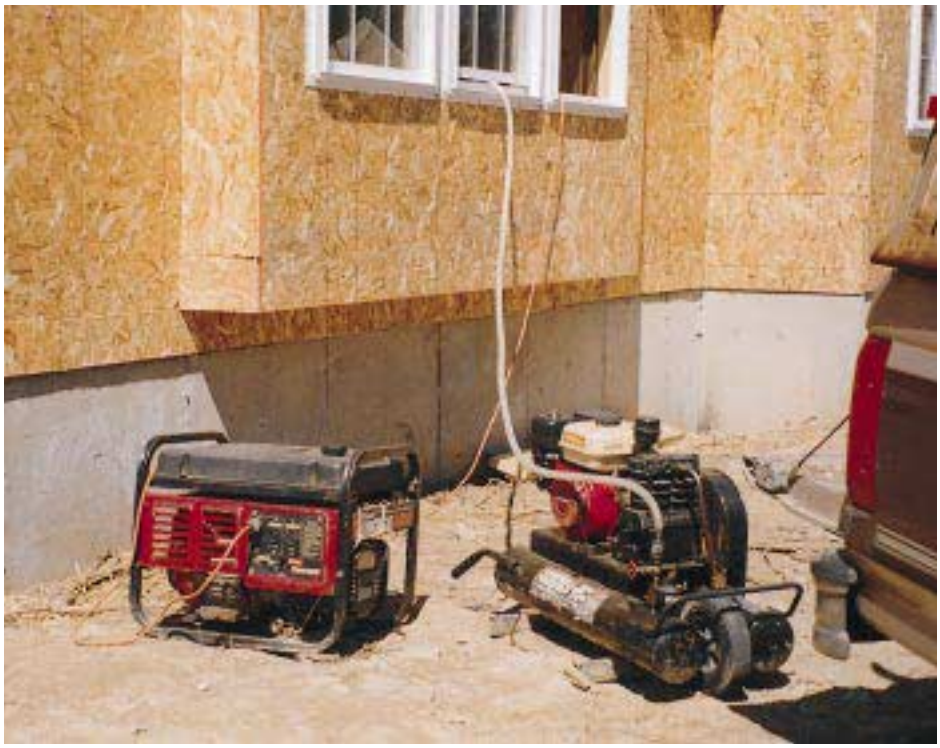


Figure 2. Generators save the temporary service charge, but they're noisy and you'll lose time gassing up and starting the engine on cold mornings. Depending on the size and number of power tools you use, you may also need a gas compressor, since a generator may not be able to supply enough amperage for an electric compressor.

more than a conventional overhead power setup, but the cost will be offset by the fact that you don't have to pay for a temporary service.

Utilities have strict rules about pedestals, including where to place them. The pedestal becomes a permanent feature of the landscape, so make sure your clients can live with the placement. The utility will also have specs for the equipment it wants you to use. Be careful, because these rules can be tricky. One utility I worked with specced "a weatherproof weather socket with disconnect" on an underground service, so I got one that was listed for both overhead and underground use. The utility refused to hook it up, because they wanted one that was listed for underground use only. Correcting the "mistake" cost more than $1,000.

Cooking With Gas

Some builders forego a temporary setup in favor of a gas-powered generator (Figure 2). With power companies charging up to $350 for a temporary hookup, it only takes a few jobs to pay for a generator. And there are times when a generator is the only real option, such as in some remote areas where the electric utility has yet to run power poles.

A generator will, however, take a toll on efficiency. On the few jobs I've done with a generator, I lost at least a half-hour every day stopping for gas in the morning and tanking up the generator during the day. On cold days, just starting the thing was a major chore. And if the combined amperage of the tools you're running exceeds the generator's output — which can easily happen if you have a compressor and a few saws — you can burn up the electric motors on your tools. To add insult to inefficiency, most generators are much too noisy; even the quieter ones make an irritating hum.

The bottom line? If a job requires a generator, I raise my price accordingly.

Temporary Service

If a pedestal won't work and a generator seems like too much trouble, you'll need to install a temporary service. All temporary services need a meter socket, a circuit breaker panel, and an enclosure for at least one GFCI receptacle, all of which must be weatherproof (Figure 3). If it's an underground service, you'll also need a temporary pedestal. If the power comes in from overhead, you'll need a tall, sturdy pole to hold up the mast. If the wires cross a road, the *National Electrical Code* requires that they be at least 18 feet above the ground.

Other requirements vary from town to town, and from utility to utility. Some want the service mounted on a 4x4 pole 12 feet high; others require a 6x6 standing 13 feet in the air; most tell you how to brace the pole and how deep in the ground to bury the base. That's why it can cost twice as much to install temporary power in one town as it does in the next.

Many contractors never see these costs. In my area, for example, most electrical contractors claim that the temporary service is "free." Don't believe it. Electrical contractors are like any other business. If they don't charge for their work, they won't last very long. And with the electrician's costs for a temporary service ranging from $200 to $600, you can bet they figured it into their bid. On the other hand, if you get an electrician's bid that's several hundred dollars lower than everybody else's, you might inquire whether it includes the temporary service.

The point is that if you can save the electrician some time and expense, you can get that reflected in the electrical contract. Most of the variables having to do with job-site power are out of the builder's control, but there are a few things you can do to hold costs down. For instance, if you build more than a few homes a year, you can reduce expenses by having your own temporary pole and moving it from job to job. If you work in several communities whose specs differ, build the pole to the strictest requirements you will have to meet.

Unfortunately, many builders take a hands-off approach to the temporary service. The commercial job I mentioned

at the beginning of this article is typical. Not only do builders seldom show up when I place the temporary service, some don't even tell me where the house will be. The consequences are rarely as serious at they were on that job, but I do hear a lot of grumbling that the temporary service was placed in an inconvenient spot — either too far from the house or in a place that will be hard to get to after the house has been framed. A little foresight and planning can usually prevent these problems. Power companies do have rules about temporary placements, but they also give you some negotiating room.

Circuit Safety

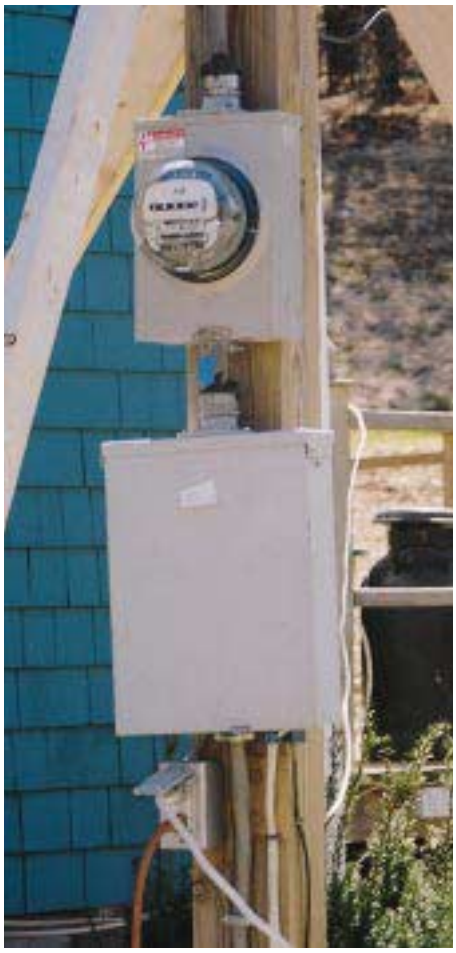
Getting involved in the placement of temporary power is optional, but maintaining a safe job site is an obligation. At the top of my list of potential dangers are extension cords. Not only does the tangle of cords on most residential construction sites make it easy to trip and fall, but the voltage drop caused by a long cord can damage your power tools and hurt their performance. And an extension cord that's too small for the load it's carrying is a fire hazard. (The chart on page 66 will help you pick the right-sized cord for the job.)

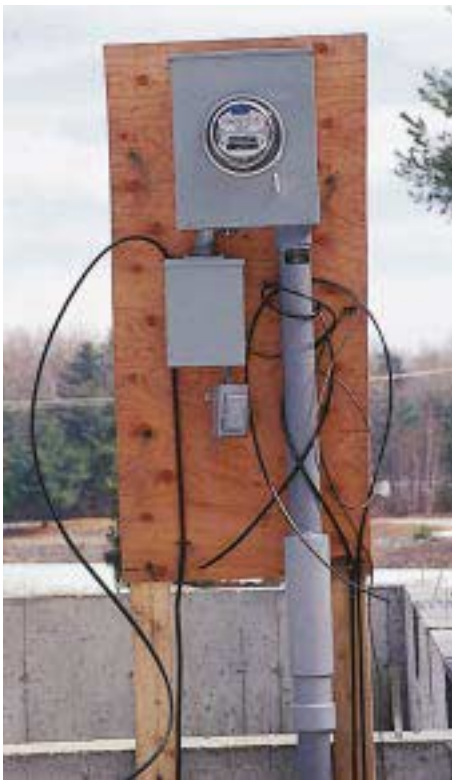
One way to shorten cords and minimize tangles is to have your electrician install one or two receptacles on each floor as early during the construction as possible, even if those receptacles are connected to temporary power. I try to use washer, refrigerator, or air conditioner outlets for this, because they're on dedicated circuits that are typically rated for 20 amps. (A 15-amp circuit might have trouble handling a compressor.) Even if the permanent power isn't yet available, you can often install the permanent service panel, run a couple of circuits, and backfeed the panel to the temporary service. Besides enabling you to use shorter cords, this system makes it easy to reset tripped breakers: You need only go down to the cellar to reset it, rather than having to trudge across the lot.

Some builders shorten the length of extension cords by using a device called a spider box. This is a portable load center with outlets mounted on it. A large power cord runs from the spider box to the temporary power source. Spider boxes have been used for years on large construction jobs, but are getting more popular on residential sites.

While spider boxes have their uses, I personally don't like them. The reason is that, to meet the needs of a typical job site, you need a power feed of at least 30 amps and, if you're running a table saw or other large tool, you'll need 50 or 60 amps. I'm not comfortable having that much power lying on the ground where someone can cut it or run over it with a truck. I know electrical inspectors who feel the same way, and who won't permit installations of even 30 amps. This is less of a concern on commercial sites, because they're more tightly controlled and under the watchful eye of OSHA.

Half the residential contractors I've worked with seem to have little concept of safety, and code writers seem to agree. The major codes now prohibit more





BUD SYMMES

Figure 3. The meter socket, breaker panel, and GFCI receptacle on a temporary service must all be weatherproof (left). Overhead service requires a well-braced pole to support the mast (middle); underground service components should be temporarily mounted to a sturdy frame (right). Requirements vary, so check with your local utility for complete specs.

than a few things that used to be standard practice on residential job sites. Take job-site lighting. In the past, the common way to run a string of lights was to run two wires and splice or clip them to each fixture. You can't do that anymore. All conductors must be installed in a cable or a cord, and all splices and connection points must be made in a junction box or be part of a cord assembly. The simplest solution is to buy an extension cord with light fixtures molded into it (see "Temporary Site Lighting," 12/96).

Watch out for receptacles, too. All work receptacles used on a building site must be GFCI-protected. Your electrician should install these as a matter of course on a new building, but if you're doing a remodel, chances are you'll have to ask that they be installed. You can also meet the requirement with a plug-in GFCI — a 3-foot long extension cord with a GFCI molded into it (Figure 4). Just connect the cord to any receptacle and plug your tools into the cord's outlet.

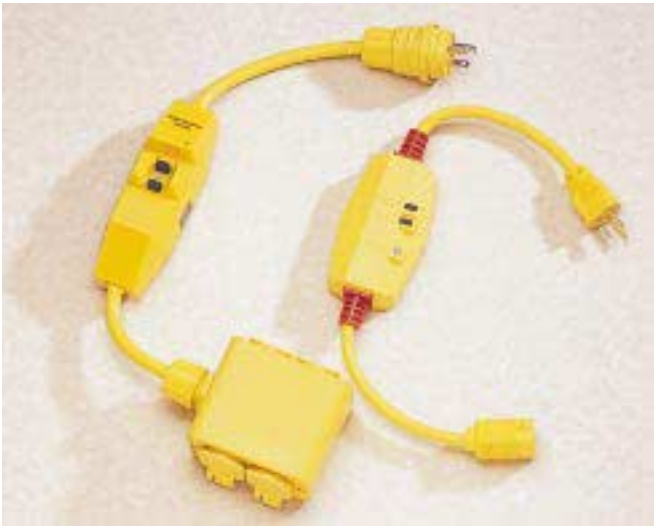


Figure 4. On remodels, a plug-in GFCI is an inexpensive way to protect your workers and meet code. Shown here are a multi-gang box from Daniel Woodhead Co. (left) and a simple single cord protector from Ericson.

Many of the cords I see are in pretty sorry condition. The risk of a shock is worse when a cord is damaged or not properly grounded. Inspect all cords to be sure that they have a secure grounding lead, and that they're not damaged in any way. Check your subcontractors' cords, too.

Speaking of subs, it's not uncommon for the floor finisher to wire his sanding equipment directly into the home's electrical panel. While this isn't a problem per se, if you let a non-licensed person make the connection, you're crazy. I know this will raise the hackles of floor finishers, but I've seen a lot of these connections, and some are downright frightening. Some flooring contractors hook right into the main lugs of the service panel. In most cases, the main lugs are connected directly to the street with no overcurrent protection. Someone could get hurt or killed while making this connection. Even when they tie into the distribution box, the circuit breakers they use are often too large for the cord.

Then there are the loose connections. Existing wiring is often moved to make room for these connections, then improperly reconnected later. A loose connection can overheat and start a fire, and if it burns the house down, I don't care how much liability you have, your insurance company probably won't pay a cent.

Don't let unlicensed people do electrical work of any kind. Even something as simple as changing a receptacle can lead to serious consequences. At least three electricians have been jailed for manslaughter in recent years because of faulty work that killed someone. You can imagine what would happen to an unlicensed person who did the same. Do yourself a favor and keep your hands out of the panel.

Sean Kenney *is an electrical contractor from Amesbury, Mass. He is also an electrical instructor at Whittier Tech in Haverhill, Mass.*

Sizing Extension Cords

The *National Electrical Code* recommends no more than a 3% voltage drop on any electrical circuit. That's 3.6 volts for a 120-volt circuit, and 7.2 volts for a 240-volt circuit.

The voltage drop of an extension cord (or any other conductor) is a function of its gauge, its length, and the amperage of the tool that's connected to it. The chart shows what types of tools you can safely connect to extension cords of various lengths and gauges. Circular saws and chop saws draw between 13 and 15 amps, reciprocating saws around 8 amps. Where you really need a beefy cord is with compressors, which need as much as 20 amps on startup.

Maximum Cord Length (feet)	Amperage		
	10A (recip saw)	15A (Circular saw, Chop saw)	20A (Compressor, Table saw)
	Gauge of cord (AWG)		
25	14	14	12
50	14	12	10
100	12	10	8
150	10	8	6
200	8	6	6 or 4