

SECRETS TO MORE EFFECTIVE ELECTRICAL ESTIMATING

The keys to producing a successful bid every time

Sponsored by

The ABB logo is displayed in a bold, red, sans-serif font. It consists of the letters 'A', 'B', and 'B' stacked vertically. The 'A' is a solid red block. The 'B's are also solid red blocks, with a white vertical line running through the center of each 'B'.

From the EC&M e-books library

A compilation of technical articles from EC&M

The EC&M logo is rendered in a large, bold, green, sans-serif font. The letters 'E', 'C', and 'M' are significantly larger than the ampersand '&'. A registered trademark symbol (®) is located at the bottom right of the 'M'.

Welcome

As an electrical engineer, I do not claim to be an electrical estimating expert — that specialized skill falls squarely within the contracting side of the house. My background does, however, lend insight into the significance of accuracy and attention to technical detail.

In order to deliver the most accurate bid or estimate on any project, you must clearly understand the scope of work, necessary materials and labor hours, and the technical electrical/mechanical specifications required to bring the project to life. After years of running a variety of technical articles in the magazine and online on this topic, there's one thing I know for sure: There's much more to electrical estimating than originally meets the eye.

Learning the ins and outs of the electrical estimating process is not something one can

achieve overnight. In fact, it takes years of education, training, and practice in a real-world setting. I seem to remember one of our past authors who may have characterized it best when he questioned whether the task of producing electrical estimates was an art or a science. I believe it's a little bit of both.

Although we've run a lot of content on this subject over the years, all of which has been popular with our readers, the following compilation of articles represents some of the most well-read and received pieces of late. Following the practical tips and tricks offered up in this e-book will help translate into better bids every time.



MIKE EBY

*Senior Director of Content
EC&M*

ABOUT ABB

Let's write the future. Together.

ABB is a pioneering technology leader in power grids, electrification products, industrial automation and robotics and motion, serving customers in utilities, industry and transport & infrastructure globally. Continuing a history of innovation spanning more than 130 years, ABB today is writing the future of industrial digitalization with two clear value propositions: bringing electricity from any power plant to any plug and automating industries from natural resources to finished products. go.abb/industrial



Contents

IN THIS ISSUE

How Technology Transforms Estimating for Electrical Contractors

Optimizing electrical estimating with the digital takeoff (August 2018)..... **4**

To Bid or Not to Bid

Taking the position of “we need the work” may cause you to win a project you’ll live to regret. (October 2017) **9**

How to Make a Good Estimate Even Better

A focus on labor productivity can improve profits. (August 2017)..... **12**

The Estimating Sequence – Part 1 of 3

Certain key ingredients ensure a smooth and accurate estimating process. (February 2018)..... **17**

The Estimating Sequence – Part 2 of 3

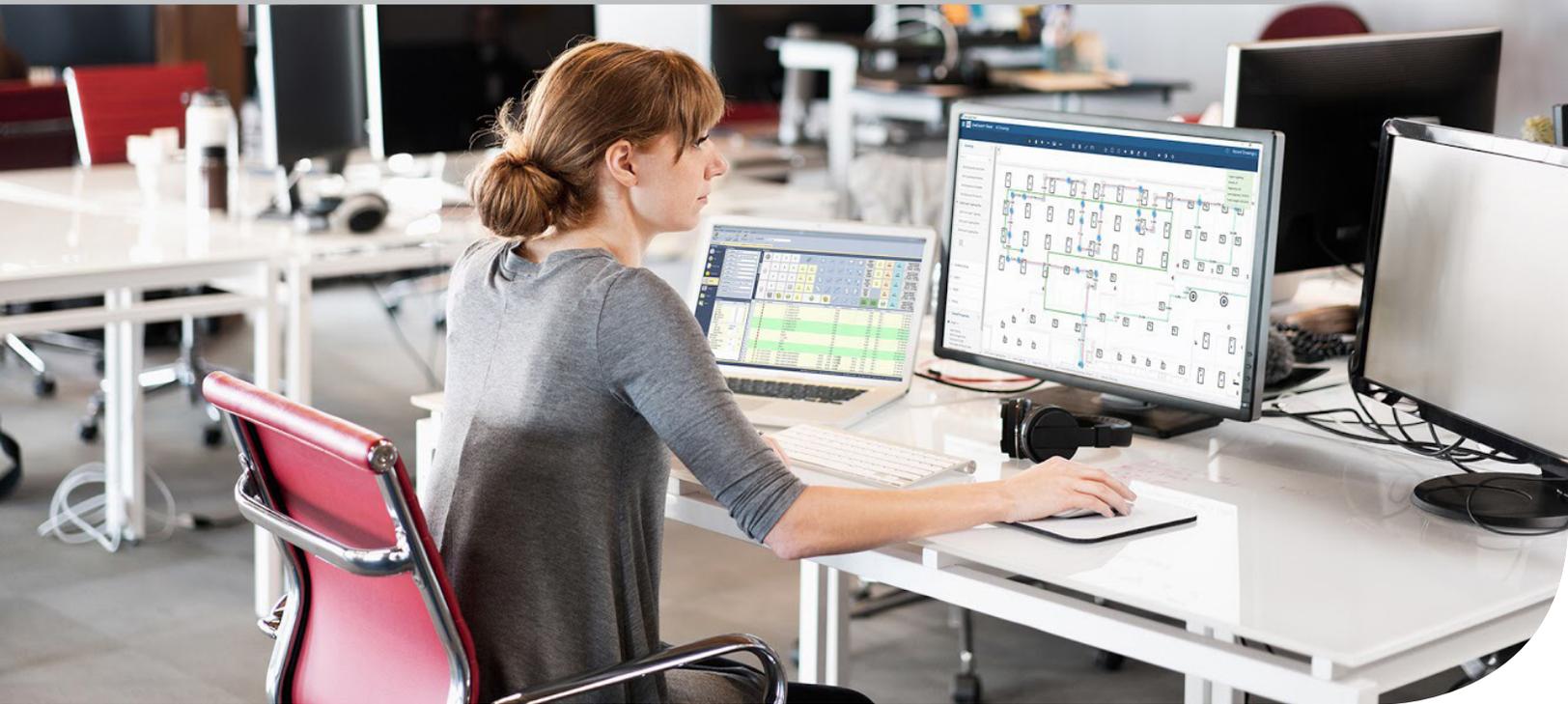
Practical steps to ensure a successful takeoff on your next estimate. (April 2018)..... **22**

The Estimating Sequence – Part 3 of 3

It’s finally time to check the estimate. (June 2018)..... **26**

How Technology Transforms Estimating for Electrical Contractors

Optimizing electrical estimating with the digital takeoff



By Paul Goldsmith, Trimble

Most people in the construction industry view 3-D modeling and building information modeling (BIM) as the future of building design and construction. The benefits of BIM extend far beyond simply having a visual representation of design intent. An information-rich model provides all stakeholders access

to reliable information, making collaboration across the project much easier. This reduces rework, improves safety, and gives contractors a greater ability to control costs throughout the entire project life cycle — from design to post construction handover. For electrical contractors (ECs), BIM adoption is gaining, thanks to its ability to communicate the design intent

and to deliver real cost savings in terms of materials prefabrication. BIM also gives ECs the ability to check one installation move against another for conflicts, allowing them to avoid costly rework and to resolve problems before installation.

Despite ECs' move toward full BIM acceptance and more digitized processes from design to fabrication, there is still a large digital gap when it comes to bidding and preconstruction tasks. This gap is exaggerated for small and mid-size ECs that still primarily rely on Excel or other manual processes for construction takeoff activities. The fact remains that for hard money bids, even ECs leveraging a 3-D model still deliver takeoffs in 2-D PDF drawings.

Why the digital disconnect for takeoffs? Many believe roadblocks to embracing paperless takeoffs come, in part, from a historical stigma that often pegged the estimating process as largely an administrative exercise. Others point to a skills disparity and reluctance to change by some estimators that are used to conventional ways of viewing a project only on paper. In addition, smaller contractors with small estimating teams may not see the value in investing in technology to support more streamlined takeoffs.

THE RISE OF DIGITAL TAKEOFFS

Despite these barriers along the virtual design construction spectrum, there are strong signals that the rise of streamlined estimating

and digital takeoffs is here. Cloud computing continues to spur digital transformation across industries, and AEC is no exception. Secure cloud-based platforms like Google Cloud, Microsoft Azure, and AWS are making the adoption of 3-D modeling and digital tools a reality for even small and mid-size contractors that have light IT staffs and distributed resources across regional offices. Other factors driving the digitization of design, estimating, and takeoffs are an emphasis toward integrated data-driven workflows; a push for greater collaboration among owners, contractors, and sub-contractors; and a shift in employee demographics. Millennials are set to comprise 75% of the global workforce by 2025. As more digital-natives come into design, engineering, and preconstruction roles, their perspective on technology and demand for constant connectivity will certainly impact technology adoption in the enterprise.

ESTIMATING BECOMES MORE STRATEGIC

As we see these workplace dynamics play out over the next several years, design-build will evolve to model-based estimating. The more precise the quantities recorded during takeoff, the more precise the estimate and schedule are overall. This makes contractors much more cost-aware in estimating, bidding, and winning jobs. A comprehensive estimating solution with digital takeoffs empowers estimators to include greater detail in the estimate, making it more accurate, valuable,

and usable after the contract is won. By including a higher-level of detail in the estimate, the role of the estimator is also elevated. It gives them a more strategic seat at the table to impact the business and drive profits.

TELLING THE COST STORY IN THE FIELD

With the right estimating and digital takeoff applications, companies can effectively communicate the estimate intent directly to the field. This is important because it removes ambiguity around the estimate at all levels, saving time and injecting transparency to the estimating process. For instance, it may allow the estimator to clearly show that a costed feeder run needs to be moved in the field. This way, the field can initiate a change request if that move will cost substantially more.

Seattle-based Cochran, Inc., a family-owned electrical and technology construction company, has seen the benefits, telling the entire cost story firsthand. After revamping parts of its bidding and preconstruction process and adding a digital takeoff tool, the contractor realized 20% to 30% faster takeoff compared to traditional methods. In addition, they've also taken the guesswork out of bids, providing more cost context and allowing customers to see what's behind the numbers. Steve Burnett, director of preconstruction & estimating for Cochran, explains.

“On every job, there is some nugget of benefit. Our estimates are more accurate, more fluid with our estimating platform, which is a

huge selling point, and we're realizing a clear ROI” he says. “For sure, we're 20% to 30% faster [on the actual takeoff time] than traditional methods. We've realized time savings as well [on the overall estimating workflow], though that's a little tougher to measure. Digital takeoff is invaluable to our estimating and project management teams, helping us track and tell the story of a project's progress from design through construction.”

TIPS TO GET THERE

Although setting up a streamlined estimating and preconstruction process is no small task, ECs can start the journey by promoting a culture of collaboration and encouraging hesitant technology adopters to see the light. For those looking to digitize its paperless takeoff process, remember these top five considerations.

- *Leverage digital natives for training* – When used correctly, technology has great capacity to boost efficiency and productivity. The trick is getting teams to embrace estimating and digital takeoff tools so they “own” it and can keep improving on it. Look to digital natives on the team to champion a paperless digital takeoff process, and leverage them to train other estimators on the new path.
- *Tight integration with estimating tools* – Because many iterations of plans can be sent out during the bidding and final construction phase, tight integration between

estimating tools and digital takeoff is critical. This integration ensures that modified drawings are reflected in the estimating program.

- *Bidirectional link is key* – A bidirectional link between raster drawing and the estimate is key in delivering streamlined, paperless digital takeoffs. This helps present the logic behind the proposed takeoff item and associated relationships. It also allows the estimator to provide greater detail in the estimate or schedule. Clients have more information about what makes up the estimate, and design intent is communicated to the field accurately. A bidirectional link between the digital drawings and the estimating program also gives the estimator confidence knowing that a change made in the drawing is reflected in their estimate – and that any change in the estimate is linked back to the drawing.
- *Object-oriented tools drive productivity* – As the world becomes more visual and object-oriented, it's no surprise that estimating and takeoff applications are featuring more visual components versus descriptions of content. Digital takeoff tools that have symbol recognition capabilities are game changers because they allow for faster and easy identification of objects found in the drawings.
- *Don't underestimate dual screens* – While this may be standard practice for estimators today, the reality is that to emulate paper

takeoff the estimator needs one large monitor to view the drawings and another monitor to run the estimating program. Using a single monitor and moving back and forth kills efficiency and will frustrate the estimator.

As ECs continue to look for greater benefits in productivity, safety, and cost reduction, the estimating and takeoff process is primed and ready for disruption. Digital estimation and takeoffs tools are becoming more sophisticated and can keep pace with BIM advancements, greatly streamlining preconstruction activities and helping to tell the complete project cost story from design through construction.

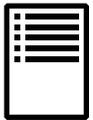
Goldsmith is the electrical/ICT segment manager for Trimble. He can be reached at paul_goldsmith@trimble.com.

[To view this article online, click here.](#)

☛ **[BACK TO TABLE OF CONTENTS](#)**

Project Notebook

A new contractor portal for easy, direct access to project information anytime, anywhere.



Project List

Online access to your ABB projects 24/7



Product Information

Detailed drawings, specification sheets & installation instructions



Bill of Material

Full project BOM with line item details



Documents

Submittals, O&Ms & critical project deliverables



Order Tracking

Line item order status, ship dates & carrier tracking information

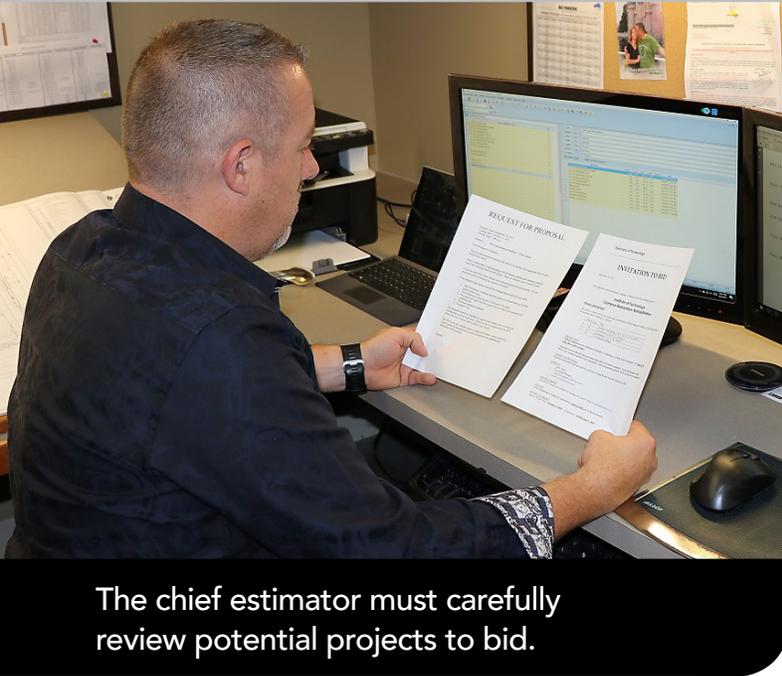


Want to learn more about Project Notebook?

[Click Here](#)

To Bid or Not to Bid

Taking the position of “we need the work” may cause you to win a project you’ll live to regret.



The chief estimator must carefully review potential projects to bid.

By Don Kiper, Estimating Consultant

As an electrical contractor, you must consider some important factors before choosing the best projects to bid on, the most important of which is to only bid work that has the potential to make a profit. Estimating time is expensive and valuable. Most estimating departments do not need estimating practice. So use your time wisely, and only select the best projects to bid. All contractors need work, but only work that is right for your company. Before deciding to bid a project, make sure the decision was made on

principles that fit your company’s capabilities. Consider the following when contemplating to bid or not to bid a job.

THINK ABOUT YOUR OWN COMFORT LEVEL

The ideal project is one that you have similar experience with and have previously performed successfully. Be sure that the scope of work is clear, you have a good understanding of the project, and provide the necessary tools/equipment for your workforce. If the project is out of your local area, check to see that there are electrical suppliers you can work with.

The chief estimator must carefully review potential projects to bid.

Out of town projects have unique challenges. Dealing with lodging and travel times will affect productivity and profit. Be sure your employees can handle working out of town away from their families for an extended period.

Some projects have compressed schedules, so ensure you can provide the necessary manpower to complete the project on time. Renovation projects sometimes have unique



Invitations to bid and requests for quotations can pile up quickly, so select projects where you have a proven track record.

phasing requirements. You may be required to have several mobilizations and demobilizations throughout the duration of the project. If this is the case, you must have other projects going on at the same time to move your manpower in and out of.

Be sure that you have a qualified project manager and experienced foreman to assign to the project. If speciality tools will be required, make sure you own them or have availability to rental options. If you are the successful low bidder, be sure your office and field staff will not be overloaded with this additional project. Most of all, do not take on a project that has no possibility of a reasonable profit.

CONSIDER THE ARCHITECT AND ELECTRICAL ENGINEER

Just as businesses have reputations, architects and electrical engineers also have reputations. If you've never worked with the

architect and engineer on the project you're bidding on, it would be best to consult with other contractors who have completed one of their projects. References may be found with the Better Business Bureau or a local state agency.

Some projects are put out to bid while still in the design stage. A good question to ask the architect is, "Are the drawings 100% complete for construction?" Quality drawings will have consistent detail notes, building match lines, and column lines. Accepting a contract on a project where the drawings are incomplete typically results in extensive non-productive time for your labor force. The paper trail of correspondence will be demanding.

Invitations to bid and requests for quotations can pile up quickly, so select projects where you have a proven track record.

A careful review of the specifications is important. Be sure there is a clear scope of work. The specifications should contain all

necessary sections related to the electrical scope of work. Most importantly, ensure it is a legitimate project. Sometimes architects will seek budget pricing for their clients. Don't allow your company to be used as a pricing service.

CONSIDER THE GENERAL CONTRACTOR

It is always best to work with general contractors (GCs) that you have had previous success with (i.e., profitable projects). Be sure the GC has a good track record for keeping the project on schedule and well-coordinated with its subcontractors. If an opportunity arises with a GC that you have never worked with, it would be wise to check with other electrical contractors who may have worked with them in the past.

One of the most important responsibilities you have is contract management. Read the subcontract agreement before signing. Carefully check the payment terms, change order procedures, and delay clauses. Not all GCs are created equal. A quick check with your contractor peers should reveal the GC's payment record.

CONSIDER THE MARKET

Keeping a steady flow of work can be challenging. Those involved in contracting know that it can be feast or famine. If available projects to bid are scarce, you will more than likely have lots of competition. It is good to choose projects where you'll have limited

competition. Not every project is for every contractor, so choose projects that are unique to your company's capabilities. Remember: Never try to bid against the "low ball" contractors. When you know your competition has a reputation for very low bids, patience will be the order of the day.

Most contractors have a good relationship with area architects. They are a useful source for projects that will soon be available for bid. So keep in mind there may be better projects forthcoming. You don't have to bid every project. Qualifying the project is the best way to bid. By evaluating your staff's comfort level, the architect and electrical engineer of record, the GC's reputation, and current market conditions, you will make a more informed decision to bid. Some decisions may be between good, better, or best. Never settle for good when you can have the best.

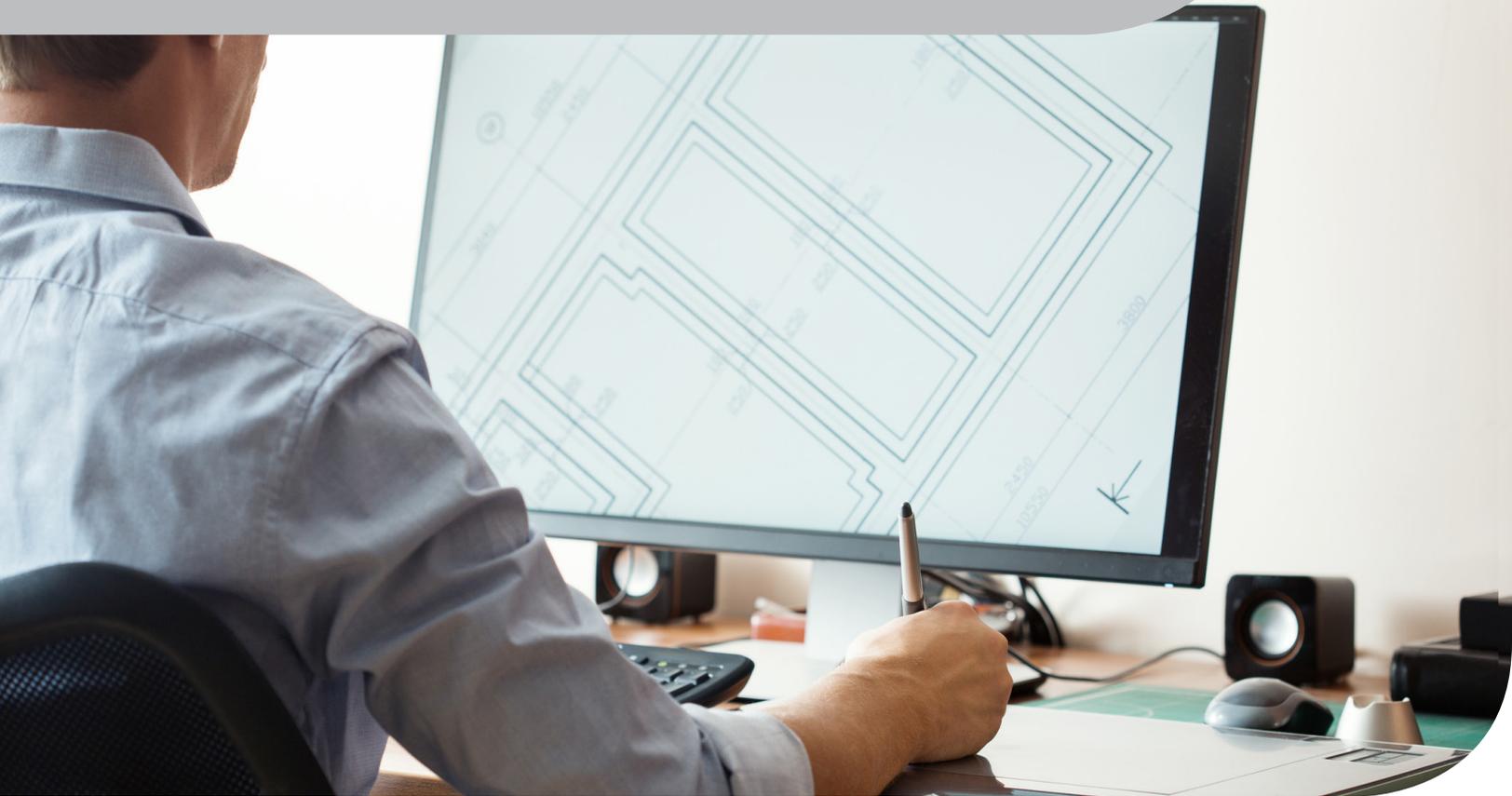
Kiper is an independent electrical estimating consultant based in Niagara Falls, NY. He can be reached at don@electrical estimating101.com.

[To view this article online, click here.](#)

☛ [BACK TO TABLE OF CONTENTS](#)

How to Make a Good Estimate Even Better

A focus on labor productivity can improve profits.



By Don Kiper, Estimating Consultant

The goal of estimating is to provide a quality estimate with a price that will allow the company to make a profit. Contractors should be in business to make a profit, not to win bids. When an estimator provides a quality successful low bid, the office atmosphere is filled with excitement. Now it's time for management, the

project manager, and the foreman to focus on making a profit.

As a contractor, you have several ways to increase profit on a project:

- Purchase basic materials for less than the amount in the estimate.
- Negotiate the best price for vendor equipment packages.

Estimate Components	Value	Percent
Basic materials	\$300,000	15%
Quoted packages	\$400,000	20%
Labor	\$1,000,000	50%
Subcontractors	\$50,000	3%
General expenses	\$20,000	1%
Equipment	\$10,000	1%
Overhead	\$160,000	8%
Profit	\$60,000	3%
Total	\$2,000,000	100%

Table 1. Typical estimate component breakdown.

- Share equipment rental costs with other trades (i.e., lifts and cranes).
- Manage labor productivity.

Money can be made by smart buying and eliminating unneeded overhead costs, but concentrating too much attention on these items will take your eye off the real prize.

The best way to increase profit is by managing labor productivity. Too often, project managers, foremen, and owners focus on material and package buyouts, squeezing subcontractors and cutting back on overhead to increase profits. These actions pale in comparison to what can be accomplished by having a highly productive labor force.

Let's look at a typical breakdown of a project's estimate components. **Table 1** shows a typical estimate component breakdown for a \$2 million project. Note: Depending on the type of project, these percentages will vary.

MATERIAL AND SUBCONTRACTOR SAVINGS

Most contractors expect to add to profits when they buyout the quoted packages and subcontractors. Ethics should be involved when awarding purchase orders to the vendors that helped you secure the project. Issuing purchase orders to vendors that did not provide a quotation on bid day is unethical. The vendors who helped you become the

Labor Savings	Increased Profits	% Profit Increase
8%	\$80,000.00	133%
10%	\$100,000.00	167%
12%	\$120,000.00	200%
15%	\$150,000.00	250%

Table 2. Increased profit percentages.

successful low bidder should be likewise rewarded.

Buying better is always a good thing. Winning several large projects at the same time will give the contractor quantity buying power. Grouping the lighting packages with the same vendor, for example, should decrease your pricing and increase your profits. This helps the bottom line.

Smart buying is always good. Contractors should seek to purchase the necessary materials at the best price. The best vendors are those who provide quality customer service after the sale. Therefore, having a good relationship with your vendors is vital to success.

Vendors who are the apparent low bidder are unwilling and unable to reduce their price by another 5%, let alone 10%. If the vendor is lowering the price more than 10% after the bid is awarded, you probably are not getting the right price on bid day. If the vendor is inflating his price, it's because he knows the contractor is going to ask for an additional discount. Repeated requests for discounted

pricing after bid day will result in higher prices from vendors on bid day.

In today's highly competitive market, estimating departments are squeezing every ounce of savings from vendors just to win the project. Even if you could achieve 5% savings from your vendors in our sample project, the total savings would amount to \$37,500. Profit goes from \$60,000 to \$97,500 — thus increasing the profit from 3% to 5%. This only increases the profit number by 62%.

INCREASING LABOR PRODUCTIVITY

Studies have shown that on most construction sites, productive labor stands at about 50% to 65%. Productive labor is defined as actual installation time versus the non-productive labor (i.e., material handling, supervision, layout, etc.).

Management's energy will be best spent on increasing labor productivity. Labor savings of 5% to 10% are very realistic, and 15% is possible. **Table 2** shows how various labor-saving percentages would increase profits on this \$2

million project.

As you can see, there is greater potential for increased profits by focusing on labor savings in lieu of material and subcontractor buyouts.

IMPROVING PRODUCTIVITY

Consider implementing as many of the following as possible:

- *Staging materials differently.* Staging materials closer to your work area will reduce man-hours. Using wheeled carts to organize materials allows for quick and easy movement throughout the project.
- *Efficient material deliveries.* Identify the best times and locations to deliver materials. A less busy entrance to a project can speed up delivery times.
- *Preplanning the work.* The project foreman should concentrate on installing the work. Having to spend time combining circuits, identifying work that can be installed in a concrete slab, will distract a foreman from his main task, which is supervising the labor crew. Using an office employee to preplan sections of the project will allow the foreman to focus on organizing labor and materials for installation.
- *Prefabrication of materials.* Fixture whip assemblies, conduit nipples, site lighting conduits for cast-in-place bases, and other assemblies can be assembled in your shop, then sent to the project site.
- *Providing better and sufficient tools.* Quality proper working tools save labor. Broken

and worn out tools should be discarded. Accidents and injuries are minimized with quality tools, therefore reducing installation time.

- *Only working in areas where you can be productive.* Not having the necessary information, tools, and materials increases labor. Having to move employees back and forth from one area to another is counterproductive and costly.
- *Better coordination with other trades.* The adage “what goes around comes around” is applicable. The better your employees work and coordinate with the other trades, the better they should work with your employees. Strife between trades is detrimental to a productive labor force.
- *Reduction in crew size.* If a task would take an employee 8 hours to complete, having two employees work on it does not mean that it will be completed in 4 hours. The larger the work crew, the greater the loss of labor productivity.
- *Regular site visits by the management and/or owner(s).* Regular site visits from management will minimize slow starting times, extended lunch periods, and early knock-off times. When workers realize that management never visits a project, some employees will arrive late, leave early, and take longer lunch times.

THE BIG PICTURE

Each project and company have specific

needs that are different, so implementation will vary. The first thing you need to do is ensure you are measuring your productivity. Having detailed weekly labor reporting from the field is paramount. Knowing how much labor has been used in relationship to how much has been completed is vital. Labor is best tracked by categories, the most common of which include: demolition, conduit, boxes, and hangers, wire pulling, cable tray, fixtures, and devices. Most projects will have similar categories, although some will vary.

Don't wait until the project is 75% complete to make labor improvements. The earlier you begin, the greater potential for greater profits you will reap later. Following are some important factors to consider when analyzing labor productivity.

- Know what is taking place in the field and why.
- Tracking labor by systems, areas, etc., will give you greater insight to best manage your work. Numeric measurements are a good thing.
- Saving labor hours will reduce the number of workers and amount of work days. This will hopefully mean safer projects, fewer accidents, and less stress.
- Those who manage labor need to be thinking about ways to increase productivity.

Remember: Major on the majors and minor on the minors. If you manage the labor productivity wisely, you can improve profits by 100% or more — a reality that will make your

estimate and your estimator look a whole lot better.

Kiper is an independent electrical estimating consultant and trainer based in Niagara Falls, N.Y. He can be reached at don@electrical estimating101.com.

[To view this article online, click here.](#)

👉 [BACK TO TABLE OF CONTENTS](#)

numerical record of their estimates. An estimate number can be used in your estimating program, file structure on your server, and in an estimate log.

Set up an estimate three-ring binder. An estimate of any size should have an estimate binder. When working on smaller service-type projects, a manila file folder will suffice. This approach will keep your work organized and readily available for review.

Add the pre-bid meeting date, bid date, and meeting times to your calendar(s). It doesn't matter what type of calendar you use (e.g., wall calendar or Microsoft Outlook). Just make sure you use one.

Create your own numbering system for the electrical drawings. Many engineers use a series of drawings (e.g., E100, E101, E102, E200, E201, E202, E300, E301, E302, etc.), whereas you might use a simplified reference (e.g., E1, E2, E3, E4, etc.). Before separating the drawings to do your takeoff, number them in the lower right-hand corner of the drawing block. This will make it easier to put the drawings back in their proper order after you've worked with them for a while.

STEP 3: SUBMIT BONDING REQUEST, IF APPLICABLE.

When the electrical contractor has a contract directly with the owner in lieu of being a subcontractor to the general contractor, a bid bond is sometimes required. Most bonding companies will require some

basic information about the project, such as approximate value, start date, completion date, and liquidated damages. Most of this information can be found in the project specifications. The architect or electrical engineer should be able to provide you with the approximate value of the project. If not, you'll need to provide the bonding company with an approximate budget.

STEP 4: PERFORM PROJECT REVIEWS.

Determine how long it will take to complete the estimate. A good rule of thumb is three hours per drawing. Multiply the number of electrical drawings (less detail drawings) by three hours. This should establish the approximate total number of hours required to complete the estimate. This time includes reading specifications, sending out material requests, and entering a complete takeoff into your estimating program.

Review the bid form. The bid form or bid proposal will indicate the prices required for a complete bid submission. There is typically a base bid price, and sometimes an architect may request alternate pricing for selected portions of the project. You must do this before beginning any material takeoffs.

Review Divisions 0 and 1 of the specifications. The "Invitation to Bid" section will provide you with the bid date, time, and location and method of bid delivery. Your goal as an estimator is to identify all items that will affect the estimating and bidding processes for

your company. Here are some basic items to take note of: completion date, works hours, liquidated damages, allowances, and bonding/insurance requirements. You must also identify any phasing requirements on the project.

Carefully read the General and Supplemental Conditions and the Summary of Work. Coordination with other trades and items provided under other contracts must also be identified. A careful review of Division 1 should provide you with requirements for temporary power and temporary generation for any power shutdowns. Since owner furnished equipment (OFE) can be labor-intensive, it must be clearly identified. For example, some owners will furnish lighting fixtures through a national account. These fixtures may require assembly or need additional hardware for installation. Owner-furnished generators may have to be transported from a remote location to the project site. If the owner is providing selected equipment, be sure to clarify your responsibilities.

Identify any concerns related to schedule, phasing, and completion date with your chief estimator. If the risks are too great, the two of you might decide it's in the best interest of your company to pass on this particular project.

Review Divisions 26, 27, and 28 of the specifications. Make note of any specific wiring methods mentioned. Identifying acceptable wiring methods is vitally important. You

must identify conduit types and uses, wire and cable types, and hardware material type such as zinc, galvanized or stainless steel. In addition to power wiring, you also need to identify the wiring method requirements for fire alarm, security, data, and sound systems.

Take note of the following information with regard to the site, landscape, structural, and architectural drawings: utility connection points for power and communications, contractor staging areas (for temporary power requirements), site lighting, and landscape lighting.

If the specifications allow for conduits to be installed in the slab, then the grade slab and floor slab thicknesses must be known. The framing construction is also important. Buildings can be steel structure, poured concrete, or some other type of construction. When working in a building that is using poured concrete construction techniques, your conduits will be embedded in the poured walls or slabs. If the building is a multifloor design, you must make note of the distances between floors.

Identifying interior wall partition types will tell you what types of boxes and other wiring methods should be used on the project. Ceiling types and heights are also important. A gypsum wall board ceiling may require access panels whereas an acoustical ceiling tile (ACT) ceiling will not. Where ceiling heights are above a typical 8-ft height, you'll need to add in the cost of working from scissor lifts to complete the work. You should also identify

Bid Item	System	Phase	Area	Drawing
Base Bid	Site Power	Site	Site	E001
Alt 1 – Add Room 201	Lighting	Basement	Elem School	E002
	Branch Wiring	1st Floor	Middle School	E003
	Distribution	2nd Floor	High School	E101
	Feeders	3rd Floor	Bus Garage	E102
	Equipment Connections	4th Floor		E201
	Fire Alarm	5th Floor		E202
	Data	Roof		E300
	Security			E400
	Generator			

Sample estimate breakdown.

chase ways for feeder conduit routing.

All of these findings should be marked on the electrical drawings. This process will allow you to fully understand the building's construction type before you begin to prepare your estimate.

STEP 5: SET UP PROJECT IN YOUR ESTIMATING PROGRAM, UNLESS USING MANUAL ESTIMATING.

Most estimating programs allow you to structure your takeoff. This structure has various names based on estimating software program you're using. It may be referred to as labels, breakdown, or takeoff tree. The estimate structure is very powerful and im-

portant when creating an estimate. It is vital that you know how the project breaks down by system, floor, area, and phase. Here are five ways in which you could break down the estimate:

- *Bid Item* – This should be the base bid and any alternates you come up with. This will allow you to break out any add or delete alternates. List your alternates as follows: Alt #1 – Add Cable Tray. Giving your alternates their appropriate number and description will help you keep things straight when doing your takeoffs.
- *System* – This would include any of the systems on the project. In addition to those listed in the **Table**, some project systems

might include: demolition, nurse call, code blue, heat tracing, snow melt, cable trays, electric heat, or area of rescue.

- *Phase* — This can be used for different floors on the project. Projects with sections that will be completed at various times will require a phase breakdown.
- *Area* — If you are bidding a project that has multiple buildings, you can use this area to identify each building on the project. In addition, you can use this breakdown to identify an area within the building such as an auditorium or gymnasium.
- *Drawings* — Breaking down a project by drawings can be very helpful. This is especially true if the drawings break down a project by areas. This will allow you to know labor hours per area. A sample estimate breakdown is shown in the **Table**.

The preliminary steps in the estimating process are important. You must start right to finish right. Get the documents, organize the estimate, perform project reviews, and set up your estimate in an estimating software program. Once this work is complete, you will then be ready to perform systematic and accurate takeoffs.

In part two of this three-part series, we will cover five steps to performing a quality takeoff.

Kiper is an independent electrical estimating consultant based in Niagara Falls, NY. He can be reached at don@electrical estimating101.com.

[To view this article online, click here.](#)

☛ **[BACK TO TABLE OF CONTENTS](#)**



The Estimating Sequence — Part 2 of 3

Practical steps to ensure a successful takeoff on your next estimate.



By Don Kiper, Estimating Consultant

In part one of this column, we looked at the estimate preliminaries that are necessary to put together a solid estimate, which were summarized in five steps. Once the preliminaries have been completed, the estimator's main responsibility shifts to quantifying that estimate. Depending on the project size, this will require a lot of counting

and measuring. Let's see what's involved in this process.

STEP 6: PERFORM ALL COUNTS FOR PACKAGE QUOTATIONS.

Basic materials, such as conduit, boxes, wiring devices, and wire, are typically priced through a service with most leading brands of

estimating software. However, items such as luminaires, panels, generators, and fire alarm systems will need to be quoted through local vendors. That's why it's important to establish a good working relationship with several electrical suppliers. Having several quotations on bid day will help you know if you're getting the right pricing levels.

A manufacturer's representative can also provide great support to electrical contractors during the bidding process. This is especially true if you are required to modify existing equipment. For example, if the project requires you to install a 2,000A breaker in an

existing switchboard that was installed in the 1970s or 1980s, a manufacturer's representative will be valuable in finding the right components.

Getting your quantities for all quoted packages as early as possible will give your vendors plenty of time to review specifications and schedules. Some prefer to perform counts for their own systems. However, it's a good idea to send vendors your own quantities. This would include, but would not be limited to: luminaires, gear, fire alarm, security, data communications, heat tracing, surface raceways (if a large quantity), and sound.

By counting the luminaires first, the estimator can get familiar with the project early. When counting luminaires, the estimator should balloon panel locations with a highlighter, a technique that will prove beneficial once you begin taking off the branch wiring for each system.

If possible, wait until you have completed your takeoffs to send your quantities to suppliers. If you're under time constraints, then send them right away (as outlined in Step 8).

STEP 7: PERFORM ALL TAKEOFFS SYSTEMATICALLY.

Once you have counted all equipment that will be quoted by vendors, you're ready to finish the quantifying process. Performing takeoffs systematically will minimize mistakes. Estimating each system completely is best. Jumping from lighting to the fire alarm

System Takeoff Breakdown Options	
1	Demo
2	Site power
3	Site lighting
4	Distribution
5	Generation
6	Feeders
7	Lighting
8	Branch power
9	Equipment connections
10	Grounding
11	Lightning protection
12	Fire alarm
13	Data and telecommunications
14	Security
15	Sound
16	ADA
17	Nurse call/code blue

Table 1. System takeoff breakdown options.

system, for example, will provide the perfect scenario for making mistakes and omissions.

Having a systematic order is more important than the actual order. Having an order that is consistently followed is paramount. Arrange an order that best suits your own estimating style, and follow it every time. **Table 1** on page 23 shows a suggested breakdown list of possible systems the average commercial project may have.

A commercial project will have a different list of systems compared to an industrial project. Be sure to customize your project to specific conditions. Having your takeoff broken down by specific systems will allow you to analyze each component of the estimate and scrutinize it for mistakes and omissions.

STEP 8: SEND QUANTITIES, SCHEDULES, AND ONE-LINE DIAGRAMS TO SUPPLIERS.

Once your estimate is complete, send all luminaires, panels, switchgear, and device quantities to your suppliers. A good estimating program will allow you to copy and paste this from your extension screen into your email.

When emailing quotation requests to vendors, be sure to include all applicable sections of the specifications, panel schedules, and one-line drawings. Your request should include the date the quotation is needed as well as any individual pricing that may be required to bid the project. Avoid last minute pricing requests. This may cause you not to receive proper pricing from your vendor.

STEP 9: SEND QUOTATION REQUEST FOR SPECIALTY ITEMS.

Most projects will have a handful of specialty items that require quotations, some of which might include: high voltage cable, cable trays, cord reels, hand dryers, and specialty floor boxes. Some of these items may need to be quoted from a different vendor than your lighting supplier.

Inform your supplier regarding the quantity of each of these items — most of the time these items will have a lower unit price with larger quantities. Most engineers will usually provide details on the drawings for these specialty items. These detail drawings



should be provided to your vendors, quoting your specialty items along with specification information.

STEP 10: SEND QUOTATION REQUESTS WITH SCOPE OF WORK TO SUBCONTRACTORS.

Send a quotation request as soon as possible to your subcontractors. The request for quotation (RFQ) should include the following: project name and location, bid date, time, and any required price breakdowns.

You should provide your subcontractor with a complete scope of work that you need included in your quotation. For example, a scope of work for an excavator should include trench widths and depths, asphalt removal and repair, concrete encasement require-

ments, excavation requirements for site lighting bases, and pad-mounted transformer equipment pad requirements.

Send your subcontractor all drawings and spec sections related to his work. Be sure to check all drawing notes that may provide information related to this work. **Table 2** shows a suggested list of possible subcontractors on an average electrical project.

SUMMING IT ALL UP

Following steps six through 10 will allow an estimator to completely quantify the project and request all the necessary equipment and subcontractor pricing necessary to summarize the estimate. Not every system or subcontractor will apply to every project, so analyze your project and set up the takeoff process that streamlines the project you're bidding.

In the next article we will learn how to check and summarize the estimate and arrive at a final price for bidding.

Kiper is an independent electrical estimating trainer and consultant based in Niagara Falls, N.Y. He can be reached at don@electrical estimating101.com.

[To view this article online, click here.](#)

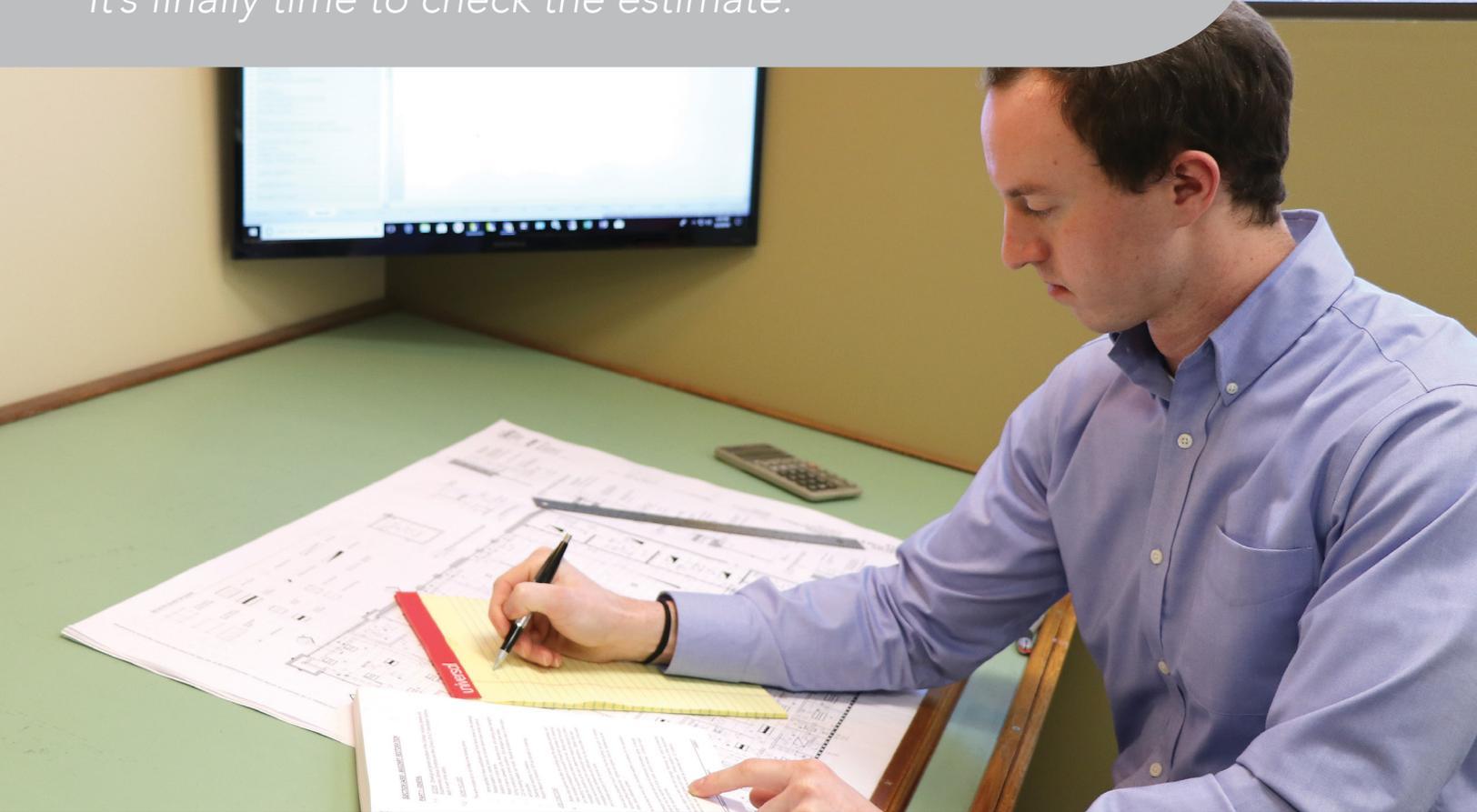
☛ **[BACK TO TABLE OF CONTENTS](#)**

Subcontractors	
1	Excavation
2	Concrete coring/cutting
3	Asbestos abatement
4	Lead abatement
5	PCB disposal
6	Seismic supports
7	Lightning protection
8	GPS locales
9	Fire alarm
10	Data cabling
11	Nurse call
12	Security
13	BIM modeling

Table 2. Possible subcontractor listing.

The Estimating Sequence — Part 3 of 3

It's finally time to check the estimate.



The estimator must review all addendums and address all electrical items in the estimate.

By Don Kiper, Estimating Consultant

In Part 1, we learned to care for the estimate preliminaries. In Part 2, we learned the steps for quantifying the estimate, requesting material pricing, and caring for any subcontractors. In this third and final installment, we will look at the steps necessary to check the

estimate that will bring confidence on bid day.

STEP 11: CHECK, REVIEW, AND ANALYZE YOUR ESTIMATE.

First, check the estimate for omissions. If your company uses estimating software, the

program should allow you to print a materials report. Review your report, looking for items that may have been missed during the takeoff process.

Second, check for material mistakes. The most common mistakes are the duplicated and missing items.

Third, analyze your estimate, and make any necessary adjustments. Remember this important principle in estimating: Focus on what matters. That means you must identify where the greatest risks are in the project — both in material and labor. One example of material risk would be copper wire and cable. If copper wire and cable make up 50% of the material

costs, then the estimator must be sure that these materials are priced at current market levels. Labor must also be analyzed. If the conduit, boxes, and hangers make up 65% of the labor hours, the estimator must double check the labor units used for this portion of the work.

Fourth, check the estimate labor per device. When the estimate is broken down by systems such as lighting, branch wiring, and fire alarm, then the hours for each device in each system can easily be determined. Simply divide the total labor hours of a given system by the total number of devices, and that will give you the hours per device. The estimator



that does this consistently will notice a pattern of hours per device. This is a great way to check an estimate.

Fifth, the labor must be checked for adjustments due to installation difficulty. It will require more labor hours to install conduit at 40 ft in a vehicle maintenance building than it will in a space with a 9-ft ceiling.

Sixth, all basic and quoted materials must be checked and verified. The basic materials, such as conduit, boxes, devices, and hangers, are typically priced using a pricing service or through local suppliers. This is a much better option than maintaining your own prices manually on 25,000 different electrical items.

Most commercial projects require quoted packages, such as luminaires, panels, switch-gear, and fire alarm systems. These quotations must be checked for accurate quantities and spare parts. Be sure to note lead-time on these quoted materials. When working on projects with aggressive schedules, long lead-time items may require extra costs to expedite the delivery date.

STEP 12: ESTIMATE TEMPORARY POWER REQUIREMENTS.

Temporary power and lighting on some projects can be expensive. If there is no existing local electric utility power source near



the project site, then either generators must be used or the power must be extended to the site. This may require utility poles and overhead power lines. If the power must cross an existing roadway, permits and fees may be required by the authority having jurisdiction (AHJ).

A careful reading of the temporary power requirements in the CSI MasterFormat is necessary to arrive at the costs for a project. Per the document, temporary power requirements are listed in Section 01 51 00 Temporary Utilities. Temporary power costs may include:

- Establishment of a temporary service or extending of an existing service.
- Monthly consumption charges.
- Lights per square foot of the construction area.
- Convenient receptacles — the quality is usually based on so many per square foot.
- Connection of construction manager's trailer.
- Connection of each contractor's trailers.
- Security lighting around the site perimeter.
- Grounding of any temporary fencing.
- Connection of specialty equipment of various trade contractors such as welders.
- Temporary generation.

Depending on the project and temporary requirements, additional labor hours might be required for the following: maintaining light stringers, removal of temporary power lights, receptacles, and generator fueling and maintenance if temporary power is required 24/7.

STEP 13: CHECK FOR ALL ADDENDUMS.

Most projects will have addendums issued during the bidding stage. The estimator must check that all addendums have been received. Most addendums will address items for multiple disciplines. The estimator must carefully review all addendums and address all electrical items in the estimate. Remember, addendums may change more than material quantities. Changes may include items such as the project's schedule, phasing, staging areas, allowances, and working hours. These will have an impact on the electrical contractor's price.

STEP 14: IF QUOTING TO GENERAL CONTRACTORS, SEND LETTER WITH SCOPE OF WORK EARLY.

When the electrical contractor is quoting as a subcontractor to the general contractor, a scope of work letter is necessary. This scope letter is the contractor's terms and conditions of the bid. It is vital to have a clear scope letter with your quotation. Your scope letter to the owner or general contractor should include the following:

- Base bid.
- Alternates – indicate add or delete.
- List of drawings, list date, and any revision numbers.
- Specification sections covered by your quote.
- List of addendums and dates received and included.

- Your company’s “Terms & Conditions” at the end of the quote.
- Length of time the quote is valid.
- Change order policy.
- Back charge policy.
- Delay clause.
- Payment terms.
- Exclusions or inclusions.
- Overtime or off-hour work.
- Hazardous materials disposal.
- Power company and utility charges.
- Demolition — make safe for others to remove.
- Taxes and/or bond.
- Temporary power.
- Trash removal.
- Sales tax.
- Rock removal, if you are responsible for excavation.
- Roof penetrations and sealing — be aware of roofing warranties. Check who is the current warranty or maintenance holder.

It will prove helpful in your relationships with general contractors if you can provide your scope letter the day before the bid is due. This will allow you to adjust your price per a well-defined scope.

STEP 15: REVIEW WITH CHIEF ESTIMATOR.

Reviewing the estimate with the chief estimator is necessary to properly bid a project. The estimator must prove to the chief estimator that the takeoff is properly quantified, materials priced to specification requirements,

and labored per the project conditions. This will bring assurance when the bid summarization is done.

IN SUMMARY

In this three-part series of the estimating sequence, we have looked at the estimate preliminaries, performing the takeoffs, and checking the estimate. The benefits of having an estimating sequence are as follows:

- Estimators will have increased confidence in their work.
- Increased speed and greater estimating departmental production.
- Increased organization.
- Increased estimating accuracy.
- Reduced estimating omissions.
- Confidence during the bid summarization.

Using an estimating sequence preparing estimates is essential for speed, accuracy, and consistency. Consistent procedures will produce consistent results.

Kiper is an independent electrical estimating trainer and consultant based in Niagara Falls, N.Y. He can be reached at don@electrical estimating101.com.

[To view this article online, click here.](#)

☛ **[BACK TO TABLE OF CONTENTS](#)**