



ESTIMATING TODAY

February 2007

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Centex Construction Works with Subcontractors to Weigh in on Design Decisions

Look inside for the Education Board update, page 5



*New Emergency Operations Center in Manatee County, Florida
See full article in the Project Profile section of this issue.*



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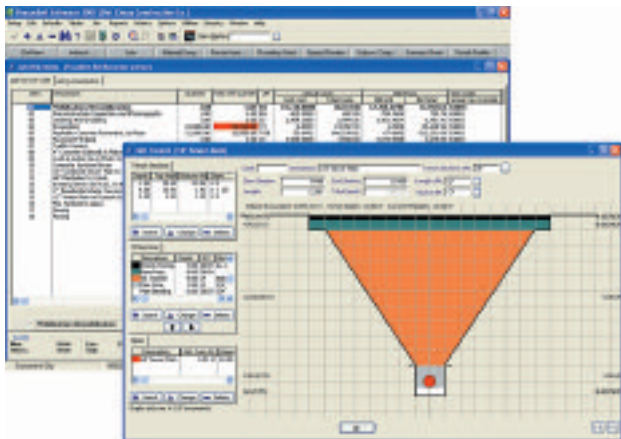
With a continued emphasis on 'user-friendly' estimating, SharpeSoft, Inc's latest release, *Estimator 2007*, a full-featured estimating and job costing tool for heavy construction professionals, offers estimators and project teams the capacity to drive winning bids. Just like SharpeSoft's earlier releases, *Estimator 2007* gives estimators a tool for most accurately estimating construction costs – labor, equipment, materials, and all other resource costs are stored in a central database for easy retrieval and use. However, this latest release of SharpeSoft's top-rated estimating program is the fastest and easiest to use yet!

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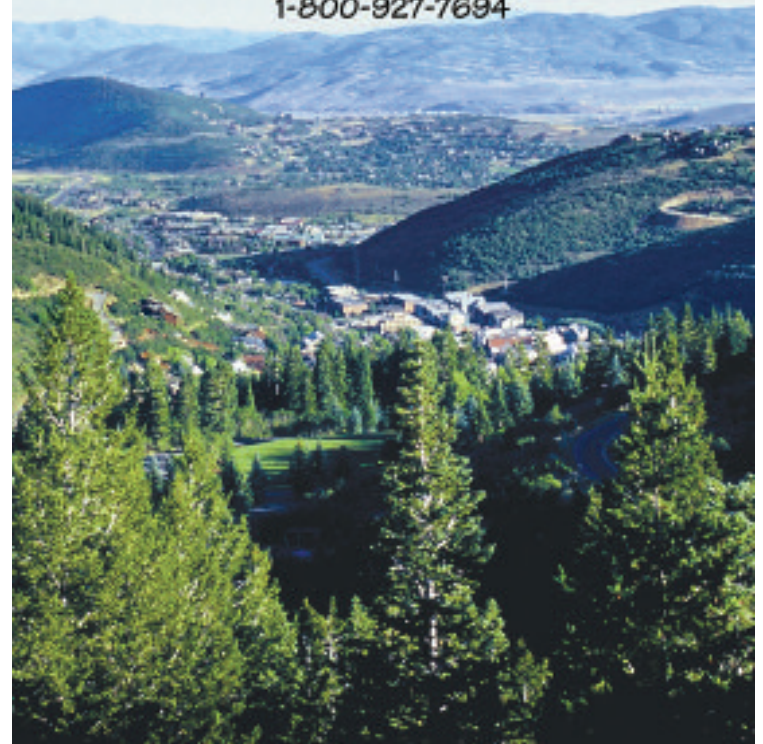
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**By John B. Stewart, CPE
ASPE President**

ASPE Corner

SBO Update

The SBO is in the midst of a technology upgrade. The office is being brought into the 21st century with the installation of a T1 line, new computer hardware including two servers, and the installation of a software package that will

increase the efficiency of the SBO. The ultimate goal is to have a secure membership management database system, online purchasing and dues renewal, web-accessible digital library of PDF reports and lists for board and SBO use, web on-demand filtered lists of members, better office administration of the database, and integration of the sales, dues renewals and membership list into the Peachtree accounting software.

Another part of the upgrade is to have our website and email systems on servers located in the SBO. This will eliminate the need for outside vendors for our website and email. It will also give the staff the capability to do minor changes and upgrades to our ASPE website and not have to wait for a webmaster to post changes to chapter presidents lists, awards guidelines, leadership lists and the like as we have done in the past.

Along with this whole upgrade is the “building” of an entirely new ASPE website. The new and improved version will be brought up to date and improved in order to be more user friendly for the membership.

I would ask for the membership’s patience while the new system is brought on line, and if all goes according to plan, the implementation should be seamless.

I would like to thank Patsy Smith, Ed Walsh and Bob George for their input and guidance through this process, and I know that the membership will notice an improvement in Society operations as a result.

Strategic Planning

In my acceptance speech given at the Awards Dinner at the convention, I made a commitment to resurrect the Strategic Planning Committee. Rex Edmonds, CPE, agreed to take on the position of chair for the committee and to jump-start the process. Rex has put together a committee whose members are:

- Lewis Finkel, FCPE
- Paul Neuharth, CPE
- Paulette Rutlen, CPE
- Don Greenland, FCPE

The committee has come up with a five-year goal and elements to attain that goal along with a mission statement for the committee which is to “formulate and recommend the near-,

mid- and far-term steps necessary to accomplish the elements of the five year goal.”

I will have the committee’s report, and subsequent reports, posted on the members-only side of our web site for those members who might be interested in seeing the progress of the committee.

I would like to thank Rex, and his committee, for taking on this most important project for our ASPE, and I am sure that the results of this committee’s work will guide our ASPE for the foreseeable future.

BOT Meeting

The next meeting of the board of trustees will be held in the Nashville office of our ASPE March 30-31, 2007. The Standards and Education Boards will also be in attendance so it should be a very cozy time for all.

2007 Convention

Just a reminder that our ASPE Convention will be held in Park City, UT July 12 – 14, 2007. Please mark the dates down and plan to attend and help our ASPE celebrate our 51st.

Thanks., JBS ●

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By Ed Walsh, ASPE Executive Director

From the Executive Director

We are halfway through winter, so I hope things are starting to pick up at your companies and at your chapters. This month's column is dedicated to some housekeeping items and also to Society growth in 2007.

If ASPE is to be the organization we all want, it has to start at the individual level. This means each member must consider it an obligation of membership to bring a prospective member into the Society or at least to a meeting. Members must consider it their obligation to be sure the administrative office knows their current information. All the marketing efforts implemented by the national office or individual chapters means little if we are not operating on a grassroots level. Ask members who have recruited fellow estimators, and they will tell you it means a great deal.

As I mentioned in January, we are embarking on some new "tech savvy" opportunities that we think will lead to more industry recognition and new members. We plan to begin offering "webinars" as soon as we can, as many other associations have started doing. We will also be using our new blast e-mail system to contact members and to keep you informed on a more regular basis. One thing we hope to do is speed up the process of communications between the national activities and your local activities.

I wanted to bring back an old recommendation. Please consider getting a "remote" address for your Society news and communication. Many companies have firewalls that keep out some great information from you. I know Google offers "gmail" accounts that will forward mail sent to those addresses on to your office account. This way you can read and delete mail at your office knowing it is saved on the Google server. I am sure many other free e-mail companies will do the same. Services like Yahoo, Myway, MSN, AOL, mail.com and others offer free e-mail.

We are very pleased to hear news of ASPE members starting to meet in Hawaii; we hope to see a core group there soon. Things are moving forward in the Carolinas and Washington State.

We have started marketing the National Estimating Academy and Convention this summer in Park City, UT. I am truly proud to be the point man marketing the event and selling sponsorships. I would suggest you all get online and check this place out; those of you who plan to attend are going to love Park City.

I welcome our members to consider informing their companies that display booths and sponsorships are available and STRONGLY requested. This is a great way to show their appreciation of the Society and to give back to the organization. Some companies might want to send an HR representative to meet some talented potential employees.

In December I did a full clean up of the Chapters and Events pages on the ASPE website. They should be about 99 percent accurate and up to date now. Please keep us abreast of any changes needed as soon as you know. Let's keep this important information up to date.

The final numbers for our website career center are in for 2006. The number of "jobs viewed" reached 20,000, over two times the number from 2005. The jobs posted and resumes viewed also doubled 2005 totals. The best news is our revenues from this section were just a hair under \$40,000, which beats out the 2005 total by \$24,000! Estimators who might want to "test the waters" can put their resume on our website career center at no charge; over 800 invitations to view them go out every month. Employers who need good talent should be sure to view those resumes.

Advertising in our *Estimating Today* has picked up again, and we expect to see 2006-2007 be a big year for new revenues there. If you think your company can benefit from reaching out to the top estimating talent in the United States, please let me know, and I'll send a rate card.

LEADERSHIP AND VOLUNTEER OPPORTUNITIES

We are seeking out leaders to help run our "SIGs" [Special Interest Groups]. Do you have a particular passion for one segment of the industry? Do you have great information to share, and do you have maybe one hour per month to oversee a "SIG"? Please let me know. We have sponsors ready to jump into the activity just as soon as a SIG is set up.

I am still hoping for volunteers for my local estimating academy mentoring team. Those of you who have helped set up local academies and know the ropes can be a real asset to our new chapters. If you think you'd be interested, please volunteer. No heavy lifting is required, just some advice, feedback and consultation. Local estimating academies on whatever scale a chapter can muster are great. Whether your program has one or two instructors, features one-half or a full day of training — whatever form it takes — it will bring great benefit back to the chapters.

Next month the ASPE Education Board will once again partner with AGC national to host and run an estimating academy, this time in San Antonio. Please let me know if you want information or visit the AGC national website events page. The Society will have a booth at this event and also at the ABC national convention in Nashville. Any members who can "man" the booths please call me at (877) 273-5679. A few hours of your time would be appreciated greatly!

Next report comes in March. I look forward to the months ahead as we head towards our 51st anniversary events in Park City.

All the best!

Edward Walsh
Executive Director ASPE National

ASPE Society News!

Meet ASPE's Newest Members

New Member	Chapter	Location	New Member	Chapter	Location
Gian-Piero Pazzia	1.....	Los Angeles	Dino Galli.....	41.....	Greater Lehigh Valley
Martin McLennan, Jr.	4.....	San Diego	Richanell Ruiz	49.....	Gold Coast
Ramsey Mesec	5.....	Denver	Bruce Brownell	66.....	Packerland
Daniel Azar.....	10.....	New York	Timothy Smith	71.....	Quad Cities
Norman Scheff	10.....	New York	Nicholas Gehl.....	73.....	Des Moines Area
Tim Nobles.....	12.....	Reno	Bill Millard	73.....	Des Moines Area
John Williams, PhD.....	14.....	Atlanta	Shamus Stephens.....	73.....	Des Moines Area
Richard Swilder.....	21.....	Baltimore	Greg Heuer	94.....	Northeast
Michael Ward.....	23.....	Greater D. C.			Region MAL

An Update on ASPE's Education Board

By Kevin Miller, chairman of the Education Board

The Education Board of ASPE is charged with providing educational opportunities to the members of ASPE. To meet this charge, the Ed Board oversees three Estimating Academies each year. The Estimating Academy that most ASPE members are aware of is held in conjunction with the annual convention that is held in July. The other Estimating Academies are held in the spring and fall and are jointly sponsored with AGC. This past fall's Estimating Academy was in Atlanta and in the spring of 2007 it will be in San Antonio, TX. The summer Estimating Academy will be in Park City, UT.

Topics for the Park City Estimating Academy include Conceptual Estimating, Escalation, Construction Contracts, etc. Hopefully, by the time you read this, a complete schedule will be posted on the Education Board's website, <http://www.aspeeducation.org>. Select the 2007 Estimating Academy link.

To better understand the needs of the members of ASPE, the Ed Board conducted a survey this past year. While several thousand emails were sent, only 281 members chose to respond. This is a typical response rate for surveys, and we appreciate all members that took the time to respond and provided feedback on how we could better meet their needs. If you would like to view the responses to the survey, go to <http://www.aspeeducation.org> and click on the Survey Report link.

From the survey a couple of needs became very clear. First, members prefer to attend Estimating Academies at a local or regional location. To assist in this area the Ed Board is currently working on placing the presentation materials from past Estimating Academies on-line. Be aware however, not all the presentations will be available, only the presentations where the

original presenters have agreed to have the presentation posted. The chapter presidents will be able to access these presentation materials and use them to host local estimating seminars.

Second, the timing of the Estimating Academy at convention is one of the least preferred times of the year. We are investigating possibly not holding an Estimating Academy with the annual convention in July 2008. From the survey, most people would prefer the Estimating Academy some time in the January through March time. While no decision has been made, it is one option that we are examining.

Another project that we are working on is to make many of the technical papers published in *Estimating Today* available online to all members of ASPE. While this project is the early stages, it is our hope to make this happen as soon as we can.

The Education Board consists of a representative from each of the five regions of ASPE. The Northeast rep is Dexter Murphy, the Southeast rep position is currently vacant. If you would have interest in serving as the Southeast rep, contact the Southeast ASPE governor and offer your services. The Central Plains rep is Ron Covarrubias, the Northwest rep is Kevin Miller, and the Southwest rep is Frank Young. We each would invite your input in how ASPE can provide educational opportunities for its members. We also invite those who would like to make presentation at future Estimating Academies to step forward and volunteer. ●



Project Feature

Centex at Work on New Emergency Operations Center

By Pam Hunter

Although Centex Construction in Plantation, Fla., was brought on to serve as construction manager for an approximately \$40 million new emergency operations center for Manatee County, Centex's lead estimator, Allen Messer, P.E. says that the job has run more like a design-build project from a sequencing perspective.

Although it will be a challenge to get such a complex project completed in such a short time frame, Messer is confident Centex will be up to the task. "Fortunately, that's an area that Centex excels at" he says.

"Because the design and construction schedule are so compressed, the early estimates had a lot of impact on the design," he says of the fast-track project. The team started early site work and long-lead material procurement based on the first two conceptual plans in July 2006. Major construction activities did not begin until the county approved the GMP on 20% Construction Documents in mid-September 2006. The facility needs to open, under a temporary certificate of occupancy, in July 2007 with a final completion in October 2007. The 100,377 square foot building will stand as a two-story structure that will house the county's emergency operations, traffic management operations and other divisions in a sturdy, weather-resistant building so that the county government could continue to operate if a significant hurricane or other disaster-related event were to sweep through the area.

Messer says he and seven senior estimators prepared two major bids. The first, at the 20% Construction Document stage, was particularly important because the county planned to decide to either go forward with the project or cancel it based on that initial estimate.

"Because it was still so early in the documentation phase, we had a lot of gaps to fill in," Messer recalls, "and of course we had to come up with an accurate price because they were going to make their go/no go decision on the project based on this early bid."

To be able to come up with accurate numbers for some of the trade work, Centex made preliminary selections on some of the subcontractors to get their input as early as possible. The pre-selected trades included steel, concrete and masonry, sitework, electrical, HVAC and plumbing.

Messer's estimating team divided the estimating work up by division to allow the estimators to work closely with the subcontractors in the different trades. That way, they could "get an intimate knowledge of what's on the plans and what's the owner's intent [and look at] what gaps are still there, and how are we going to fill those gaps?"

Centex submitted a price of \$39.5 million, which included more than \$1.5 million in accepted value engineering. At that point, Manatee County decided to go forward with the project.





At the next stage, with the 100% Construction Documents, the Centex team found that not all their recommendations for value engineering could be incorporated, due to additional user requirements. The estimating team went back and modified the estimate, taking into account the value engineering that hadn't been incorporated into the design yet, and also added in the value of the additional work requested by the owner. "The owner had actually increased its requirements for the emergency backup system and its peripherals, so it affected the electrical and mechanical systems dramatically," Messer says.

At press time, the estimating team was in the process of preparing a Guaranteed Maximum Price that includes those modifications.

Messer says Centex has been involved in working with the design team practically from the start. For example,

the design team considered adding a water storage tank to use as an emergency backup water supply to the fire sprinkler system. Centex made suggestions on how a storage tank could be added—if one was needed at all. "We were able to guide the team and give them a ballpark number for what the different scenarios would cost, and that allowed the team to make more informed decisions."

The design team opted to do away with the storage tank and rely instead on a loop system by the local utility company for redundancy. A well was provided for additional domestic water back-up.

Designing a roofing system on the building, which will need to withstand up to 200 mph winds, has been a challenge. The design team initially developed a system consisting of two layers of concrete, a very expensive system, Messer says. "We worked with a couple of our roofing subcontractors, in conjunction with the architect and the roofing manufacturers and came up with something that is going to be much more cost-effective."

The building will include nearly \$4 million of wiring for audiovisual systems, camera systems, electronic connections and all kinds of telecommunications systems, Messer says, which will all add to the complexity of the project.

Although it will be a challenge to get such a complex project completed in such a short time frame, Messer is confident Centex will be up to the task. "Fortunately, that's an area that Centex excels at" he says. "It's going to be a very good-looking building with a lot of capabilities," he says. ●



Waste in Construction Estimating

By Walter Lemon, CPE, Chapter 54

All estimators have read the typical specification requirements for “attic stock.” That is, material that is to be turned over to the owner as part of the end of job requirements. This is material that the owner will faithfully store in his “attic” to be used as replacement for carpet, ceiling tile, VCT, paint, MEP components, etc. that get damaged or worn out due to normal wear and tear during the life of the building. But what about “waste” material? That is, material that gets “lost” during the normal wear and tear process of building the project. What

should an estimator “add” to the estimate to make sure the owner pays for this loss rather than the estimator’s company? Should anything be added? And if there is company policy to add a percentage of waste to the material, should there also be an “add” for equipment and labor to place/install the waste quantity?

Toward the end of every project, prior to the completion of the site concrete, landscaping and clean up, a visitor to a site will notice piles of left-over rebar, masonry, pipe, maybe a box or two of

plumbing fittings, hollow metal frames, damaged light fixtures or sub-panels, etc. Granted, some of the material could be the result of changes in which the material was deleted from the job after delivery.

However, how about that material that is not a result of a project modification? For instance:

Masonry:

A masonry estimator should include a percentage of material quantity in the estimate for broken and miss-cut (especially if the bond pattern and wall layout includes multiple angles) units. But what about delivery shortages, brick that is chipped in the plant but still delivered to the job, minor errors in the final piece order or small thefts for the home weekend projects.

Concrete:

The estimator for a concrete subcontractor should include overages for variances in foundation excavation, elevations differences in the final grade of slabs on grade base rock, line loss in pumping operations and even “yield” quantities in the delivery trucks.

Rough Carpentry:

Heaven help the estimator that only includes the quantity of wall studs at exactly 16-inches on center, plus one extra for each jamb and corner. There has to be overages included for the use PET studs for cripples and blocking in lieu of studs, bracing. Material will disappear for the weekend home projects, burn barrels to keep the workers warm and the decks for the job trailers.

Flooring:

An estimator must take into account carpet seaming requirements, room dimensions vs. standard mill dimensions for the carpet, boxes of VCT that will get corners “nicked” or damaged during off

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loading which in turn damages the tile, open boxes of material left out during the night or over weekends that will vanish, partial boxes of tile and base that will get left behind on one floor or in one building rather than moved to the next area of work.

The list of material which is “used” in a project, but not included in the final building of the project is endless. These “overages” or “waste” quantities are deducted from the contractor’s fee if not included in the original estimate. The obvious problem is: “How to quantify the loss?”

A rather simplistic way is to look at the cost of the material spent on similar projects vs. the cost of the material in the estimate. The estimator can then use the old “gut” feeling to determine if she/he needs to add more to the material budget. Unfortunately, many subcontractors and some generals do not have job cost tracking systems set up for their projects. Some companies have “warehouse” stock that they replenish as they need. For example, an electrician may have conduit, wire, fittings, etc. that is purchased in bulk and sent to jobs as ordered by the foreman. It is difficult for these operations to track the cost of common material from the estimate to the job.

However, a more realistic approach is to first acknowledge that every job is going to have extra material required above and beyond the requirements of the documents. Management must sit down and review whatever job cost records are available and decide on a percentage to be added to the material estimate. Maybe the percentage is based on the total material for the project. Maybe the percentage is different for different material.

Examples:

Concrete:

1. A percentage of material overage, by PSI strength, for foundations.
2. A percentage of material overage, by PSI strength, for slabs on grade.
3. A percentage of material overage, by PSI strength, for yield in actual

material delivered in the trucks.

All of the cubic yardage overages are then totaled and priced by unit price costs and the dollars are added to the estimate.

Painter:

1. A percentage of material overage, by paint on CMU.
2. A percentage of material overage, by paint on gypsum.
3. A percentage of material overage, by paint on steel joist.

The gallons are totaled and priced by the unit costs and added to the estimate.

The same philosophies must be used for the contractor doing reinforcing steel, carpentry, metal studs, ceiling tile, etc.

The next question management must address is if there is more material budgeted for the project, does that mean there is more labor and equipment hours spent placing the material. Or is the philosophy such that “Yes, we may be budgeting more material for the project, but the material is not going into the project, it is just going.”

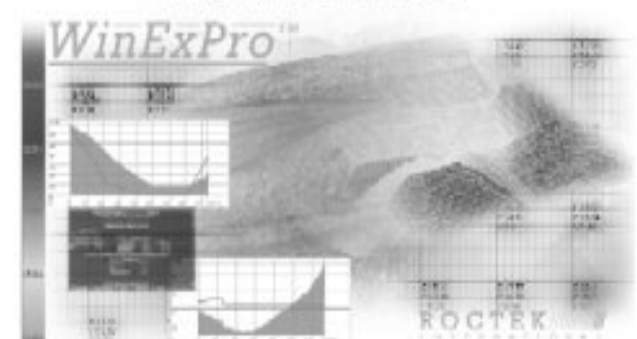
For some trades the second statement is true. For others, such as concrete, this is not so true. Maybe the foundation concrete was increased by 10%. That means that the estimator has budgeted more material for reasons listed above, and therefore there is a possibility that the material is actually going to be placed in the hole. However, maybe the foundation excavations are perfect and the trucks will actually delivering a

full 10 yards. Therefore, the “waste” will not go in the hole and the sub will increase the bottom line because the “waste” material will not be used. And there will not be an increase in labor and pump costs to place the “waste” material that was added to the estimate. And therefore pigs will fly.

This is a decision that must be discussed within each company and a standard estimating policy be established.

The purpose of this article is not to set forth hard and fast rules or solutions. After all I am writing about an “estimating process” and not an “exacting process.” The purpose, however, is to start a dialogue and decision-making process in companies to ensure that the profit line is maintained. We are not in the business to donate to the bottom line of the owners. We are in the business to make a fair profit for the company we work for. ●

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**By George Hague,
President & CEO
ConEst Software Systems**

Estimating Job Compression

How long will the job run? How many labor resources are needed? There is of course, an optimum duration and crew mix for every project and the estimate must consider the cost of the project and the individual contractor's ability to supply labor resources. Since any deviation from the job schedule invariably involves additional expense, it is vitally important for the estimator to know how to calculate the extra costs due to job acceleration. This information is frequently used to substantiate legitimate claims for additional compensation.

Electrical contractors rarely analyze the effect of accelerated job duration and generally estimate work according to the time in hours the job will take to complete. It takes more, however, than just accurately estimating direct labor for a successful estimate. Experience and labor cost studies have taught us that when the job schedule is accelerated, the end result is greater job and labor costs. In most cases the electrical contractor does not have complete control of the work environment and is subject to delays caused by the workflow of other trades, and the numerous other influences that affect job progress. Unfortunately, delays happen and the standard procedure is to complete the work in fewer days.

Consideration must be given to the effects on duration of weather, labor market, efficiency of the general contractor, job conditions and the other subcontractors involved in the project. Delays naturally force acceleration of the later project phases. Too often,

allowances for compression of the work schedule are based on a superficial study of previous like jobs and past experiences. Having a sound method of estimating costs due to job compression can be a great benefit to contractors.

Bidding Process

When bidding projects that historically result in compressed schedules, the electrical contractors' best protection is to prepare the estimate based on the project's published construction duration period. If the bid documents do not specify job duration, request this information prior to presenting the final proposal. Include in your proposal a schedule of crew size for each phase of the project. Build a schedule that is realistic by calculating the actual number of workdays allowed by the project specifications *start* and *finish* calendar dates. When calculating workdays, remember to adjust for weekends and holidays when work is typically not scheduled. The project's construction duration is paramount when determining crew size requirements. There are computerized programs available that can help you develop this information. All estimating applications of substance should link to MS Projects, Primavera or ConEst JobTrac. All three applications provide the tools to develop the required data. It is the estimator's work to anticipate the job requirements and calculate the labor demand.

Effects of job compression

All of the procedures that go into a basic estimate apply when estimating job compression. Acceleration caused by change orders and missed project milestones result in loss of productivity. The ripple effect must be compensated for in the estimate. There are at least five cost considerations we will address here that impact the estimate.

Overtime or Shift differential: An accelerated basic contract, for the most part, requires overtime hours. The

affects are premiums that must be paid. In most cases this premium is time and one half the regular hourly rates; in some cases it will be double the regular hourly rate. The contractor might consider a second shift in lieu of overtime. By scheduling shifts, the overtime-premium costs may be reduced. Evaluate both solutions to determine the most effective method to implement. Remember that creating shifts requires additional mobilization of labor resources; and unless the resources are readily available, it will require borrowing from other projects. The downside of borrowing is the disruption of productivity to the other projects.

Overtime work affects labor costs far beyond the overtime premiums. Overtime schedules for prolonged periods substantially reduce productivity per hour worked because of physical fatigue and mental attitudes of workers.

Stacking of Trades: Delays and changes to a project always result in a continuing deterioration of the original contract schedule. What was planned as an orderly sequence of work becomes chaos and disruptive. The typical remedy is adding additional labor resources and crews. Trades become stacked within a physically restricted area, thus reducing the capability of all to work in an orderly and proficient manner. This disrupts the basic contract cost for the work and is one of the chief causes for contractor losses on construction projects.

Reassignment of Labor Resources:

When current work in progress is unexpectedly disrupted by a demand to expedite the completion of certain phases of work, this normally results in moving and adding resources to the accelerated tasks. There is a ramp up time for new resources to come up to speed with job conditions and requirements. Productivity loss occurs because there is no opportunity to plan an orderly effort and proceed smoothly

and efficiently.

Crew Size Inefficiency: Productivity is directly affected when it becomes necessary to mobilize additional labor crews or individual resources. One element of loss occurs during the mobilization process and while the resources become oriented to the job. Overloading of resources is another element that lends itself to inefficiency. Remember that every project has an optimum crew size, and placing more employees on a project can actually reduce productivity. As a general rule, the larger the crew size the lower the production rate. It has been said that a job that will take an electrician one hundred hours cannot be done with one hundred electricians in one hour.

Material Handling: Procurement and delivery of materials, equipment, etc, are effected by job acceleration. Timing is essential to maintain maximum productivity output. "The right material in the right quantities on the job at the right time" is not a saying to be overlooked.

Calculate Compression

Your job cost records quickly give you an idea of which types of projects and contractors cost you more. If a contractor inadequately executes schedules and lacks good, progressive project management skills, you'll bear the losses. A contractor that delays the project and runs up the cost should pay more for your services. Study the results of your previous projects so you can identify offending contractors!

From job costing figures, examine similar type projects to determine the percent of compression. This should be divided by type of job and contractors. Look for areas that required unscheduled overtime or phases that were overloaded with labor resources in an attempt to accelerate the schedule. Subtract the total of all compressed task estimated hours from the total of all compressed task actual hours. Determine the percent these additional hours represent to the total project by dividing the additional hours by the total job estimated hours times 100.

$$\frac{A-B}{C} \times 100$$

A = Total all Compressed Task Actual Hours
 B = Total all Compressed Task Estimated Hours
 C = Total Job Estimated Hours

Apply this percentage to your current estimate to increase the total job hours and compensate for compression.

In summing up all the costs, we find that the predominance of the expense consists primarily of labor. The supply and management of labor are the major functions of electrical contracting and the principal cost of doing business is made up of services designed to expedite labor resources. The supply of

material is only a secondary cost of contracting. Typically when an electrical contractor experiences loss on a project, it can be reduced to underestimating labor. Understanding how to compensate for costs incurred by job acceleration will reduce these losses.

Written by George Hague
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HOW TO ESTIMATE THE COST OF A COMMERCIAL FIRE ALARM SYSTEM

By Robert Tranford

DATE WRITTEN: MAY 25, 2004

The author is Robert Tranford. He obtained an Electrical Masters in 1981. He then founded and served as Chief Estimator and Lead Project Manager for Interstate Electrical Services, Inc. in Fort Lauderdale, Florida, a commercial and industrial electrical contractor. He served in this capacity for 19 years. His duties included transition from the traditional hand estimating method to software based estimating and database development. In October 2002, he passed the Florida General Contractors test and in September 2003 he finished the Construction Management Certification Program at a local university. He is now also involved in developing income property and full division estimating and consulting.

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1. INTRODUCTION

The intention of this paper is to provide an understanding of the detailed take-off method of estimating a commercial fire alarm system.

a. Main CSI Division

- C.S.I. Division 13 Special Construction
- C.S.I. Division 16 Electrical

b. CSI Sub Division

- C.S.I. Division 13850 Detection and alarm
- C.S.I. Division 16050 Electrical Materials
- C.S.I. Division 16100 Electrical Wiring Methods

c. Brief description:

A commercial fire alarm system is a group of electronic devices certified to work together to detect and notify the occupants and municipal emergency services of the likelihood of an emergency condition in a commercial building. The main component of a fire alarm system is the Fire Alarm Control Panel (FACP). From this control box, circuits extend into the building to monitor the initiation (detection) devices and to power the annunciation (signal) devices. When an initiation device detects a potential hazard, the FACP is signaled, the annunciation devices are powered, and a signal is sent to the monitoring company. Various other life safety occurrences must be initiated and controlled as noted in Section 7 Miscellaneous Pertinent Information below.

2. TYPE AND METHODS OF MEASUREMENTS

There are several methods for doing a fire alarm take off:

a. Dollars per square foot method: This method is the simplest and is generally used to double-check the final bid. In this method, a building similar in type, size and usage in which the actual fire alarm cost is known, has the dollar amount of the fire alarm divided by the square feet of the similar building to attain the dollars per square foot for the fire alarm. The figure is multiplied by the square feet of the building being bid. Adjustments must be made for location, date of previous bid, municipality and quality of the system. For example; it would be not be appropriate to compare the price of a small retail store with that of a high rise condominium or office tower without substantial adjustments. This method is appropriate for conceptual or a preliminary estimate.

b. Assembly price method: Once biddable drawings are available, it is appropriate to do a quantity take-off of the number of fire alarm devices. An assembly may be used assign an average cost to each for each specific type of device. This includes the device with all of the labor and material to install the device with all incidental items such as wire, conduit, boxes, etc. in a typical similar installation. This method is more accurate than Dollars Per Square Foot method but it does not consider specific job variances. It is used to establish a more probable cost in anticipation of firm quoted prices using the method below.

c. Detailed take off or "Sticks and Bricks" method: This is the most exact method but also the most time consuming. It is usually only done by the electrical or fire alarm contractor. In this method, a quantity take-off is done for all of the fire alarm quotable components and that is sent out for competitive quote to the fire alarm vendors. Then a detailed material item level quantity take-off is done of each

component required. Each component has a labor unit attached to it and then is extended. The fire alarm vendor quote is also added.

Most electrical contractors will use a combination of the above methods depending on time constraints, scope required to do the estimate, the workload of the estimator, and if there are detailed specifications that must be adhered to.

3. SPECIFIC FACTORS THAT NEED TO BE CONSIDERED THAT MAY AFFECT TAKE-OFF AND PRICING

a. Quantitative variance: The size of the job should have a direct impact on the overhead, direct supervision, and profit percentage expectations. If there is a considerable variance in the size of the jobs, the percentages should be reconsidered to be a larger on smaller jobs.

b. Geographic location: There are variations in requirements not just between states but also between municipalities. Some municipalities require a fire alarm annunciator panel (alarm panel with location indicator lights) at the front door to a commercial building. Some municipalities require a Knox Box. Some municipalities require the fire alarm installation, final test, and certification to be by a U.L. (Underwriters Listed) company, and possibly only by the company doing the fire alarm monitoring. Supply and demand places a premium on this service if required. Some requirements are only found in obscure but enforceable municipal ordinances. These may not be shown on the plan, or mentioned in the specifications, and may not even be caught at the permit plan review, but may be caught at the time of final inspection. Local experience is an advantage.

c. Seasonal effects: Temperature extremes and inclement conditions can result in reduced productivity if work is in an unprotected area. An obscure variation on seasonal effects is in a region that has a tourist season; travel time increases dramatically in certain localities.

d. New construction versus renovation: On a new construction job the fire alarm can be estimated like any other special system in Division 16. On a retrofit job some special conditions may occur. If the building is occupied, there may be restrictions on the access to the work area resulting in increased labor units or premium time. An occupancy adjustment factor should be used to compensate for the excess labor required when working in occupied areas. The standard labor units (for unoccupied areas) should be increased 50 to 100 percent. Also as a rule, anytime a fire alarm circuit is extended or altered, there must be a fire alarm permit pulled and the system must be recertified, an as-built drawing and new backup battery calculations done. This means that if one (1) new smoke detector is added, the cost could be \$1000.00. To add additional smoke detectors may just add \$150.00 each installed.

If adding an annunciation device, is the size of the battery

backup and power supply adequate? If not, additional batteries or an external power supply may be required.

If adding an initiation device on an existing zone, does that zone have the capacity to add another device? If not, an additional zone may be required.

If adding an initiation zone, is there room on an existing zone card for another zone?

If adding an additional zone card, will it fit in the panel or will an expansion panel be necessary. Of course, there are limitations to the maximum amount of devices a FACP is rated for.

4. OVERVIEW OF LABOR, MATERIALS, EQUIPMENT, INDIRECT COSTS, APPROACH AND MARK-UPS

a. There are several ways to install a fire alarm system.

1. The system can be:
 - a. Conventional or Hard Wired
 - b. Multiplex
2. The wiring method can be:
 - a. All conduit
 - b. Conduit stubs out of the wall into the ceiling for free wire point to point.
3. The circuitry can be:
 - a. Style A
 - b. Style B

b. The following are the tasks recommend for preparation of a fire alarm estimate by a self performing electrical contractor:

1. Upon receipt of a Request for Proposal (RFP), review the workload, and other factors the company policies and procedures state for making a decision to allocate resources to bid the project. Immediately reply and obtain the bid documents including addenda if applicable.
2. Upon receipt and logging in of the bid documents, do a preliminary plan flip and note inclusion of a fire alarm riser diagram, fire alarm specifications written on the plan, fire alarm symbol legend, and general scope of the job.
3. It is advantageous to start the scope letter early in the process. As any of the non-standard or special items needing clarification or specific inclusion or exclusion are found, they are put into the exclusion subheading of the proposal as a checklist. As each of these items are answered, clarified and included in the actual takeoff and bid, they are moved from the exclusions subheading to the inclusion side of the proposal. If the item is obviously answered in the plans and specifications, it is removed completely to simplify the scope letter. This serves as quality control in the bid process.
4. If there is a separate specification book containing

- fire alarm details, read it and note any specific requirements or unusual items.
5. Proceed with the quantity take-off of the fire alarm devices, type by type, and enter onto a quantity take-off sheet (or even more efficiently directly into a computerized estimating program and then print the appropriate document). As each type of device is counted, highlight that symbol on the plan.
 6. Prepare and transmit a Request For Quote (RFQ) with the device quantity take-off sheet to the fire alarm equipment vendors. Note if a specific manufacturer or model is mentioned in the specifications because there may not be any negotiation on this point with the engineer or architect. In an existing building, there may exist fire alarm equipment to be reused and compatibility is required. A site visit may be necessary unless the type of system can be confirmed. On a publicly bid job the vendors may already have a set of job specifications. Because of the complexity of a fire alarm design, the engineer will occasionally have a fire alarm manufacturer's representative involved in the design phase of the job. It is not unusual for a manufacturer's representative to assist an engineer in initial design and specification. It also may be required to attach a set of specifications to the Request for Quote (RFQ) to the fire alarm distributor.
 7. Do a detailed quantity take-off of the conduit, boxes, wire, etc. (or the applicable assemblies) and enter on the quote sheet. This is done by drawing the conduit and boxes on the blueprint and labeling the conduit with the size of conduit, number, and type of conductors. Each conduit with like size and contents is then measured and tallied. Each box with similar mounting is counted separately and tallied. These are entered into a take off sheet.
 8. The material is then laborized.
 9. Provide any labor adjustments or additional line items required for general conditions or unusual circumstances such as limited accessibility of the job for deliveries, high ceilings, solid block walls, trenching, etc..
 10. The totals of the labor and materials are then transferred to the recap sheet.
 11. If the job is over 12' to the working height, a line item for equipment must be included for electric scissor lifts or scaffolding.
 12. When the Request for Quote response by the fire alarm equipment vendors are received, the quotes are compared, discrepancies adjusted for, and the final figure is entered on the Recap sheet.
 13. Sales tax is added to the materials and quoted items if not already included. Depending on the locality and business model involved, most electrical contractors, doing improvements to real property on a lump sum basis exclusively, will pay sales tax at point of sale for materials.
 14. If any allowance for special specifications is required,

enter them.

15. If any direct costs such as fuel, parking, concrete cutting etc. are required, enter these.
16. Add direct supervision / project management fees if applicable.
17. Permits, overhead, profit, and bond fees if required, are added for a grand total.
18. In a competitively bid job, the proposal should be properly scoped to the plans and specifications only, to keep all bidders equal. Any engineering discrepancies found or additional requirements noted, should be conveyed as a Request For Information (RFI). Until there is some directive, it should not be included in the base price. They may be proposed as alternate adder or deductions at the discretion of the contractor.

5. SPECIAL RISK CONSIDERATIONS

A fire alarm system is a life safety issue. A special liability insurance rider may be required for installing fire alarm systems over and above the standard liability insurance carried by an electrical contractor.

It is very likely that the fire alarm plan will require revision after submission for permit to the Authority Having Jurisdiction (AHJ) for plan review. This is a point of frustration for the electrical contractor as well as the general contractor. It is common to bid to the plans and specifications, get the job and before the job even breaks ground, have engineering revisions and change orders. During the permitting process, the fire alarm plan must be approved by not only the electrical plan review inspector, but also by the fire inspectors. The changes occur because of the differences in opinion and interpretations that the Authorities Having Jurisdiction (AHJ) have. Of special concern is there are not just inspectors from the local jurisdiction, but also state fire inspectors and elevator inspectors that have different codes that require adherence. The fact that the fire alarm system is part of "life safety" and that society in general so profoundly litigious suggests a challenge to balance a competitive bid and satisfying everyone's requirements fully.

6. RATIOS AND ANALYSIS TOOLS TO TEST THE FINAL BID

The average "rule of thumb" on an "average" commercial job is currently \$0.50 to \$1.00 per square foot for a "standard" fire alarm system. The anticipated total found by the "Assembly Method" will also lend confirmation to the final bid attained by the "Detailed Cost Method". As an electrical contractor I occasionally obtain turn key prices from the fire alarm vendors for comparison.

7. MISCELLANEOUS PERTINENT INFORMATION

It becomes economically more feasible to use a programmable system rather than a conventional (non-computer based)

system when more than approximately (4) initiation zones are required. This average number is being decreased all the time as technology and system packaging increases to the point that conventional system components will only be available for repair of this older (obsolete) technology.

To avoid warranty problems arising from multiple contractors being involved in the same discipline and to provide a general contractor with one point of contact and responsibility, the electrical contractor on a commercial project usually also installs the fire alarm system in conjunction with the electrical system. The advent of the Multiplex (computer based) fire alarm system, with the complexity of the programming and life safety certification requirements, has caused some electrical contractors to sub out at least that part of the installation to fire alarm specialty contractors who are certified in a specific manufacturer's equipment. On occasion, an electrical contractor will install the complete conduit system or conduit stub ups and subcontract the wire, installation and testing, while doing the complete tested system turnkey.

The fire alarm system equipment is generally quoted as a lump sum price. All of the accessories required should be listed as included to install the devices counted, even if the accessories are not specifically asked for. This price will vary by job size, equipment manufacturer, distributor, distributor pricing matrix, gross yearly amount purchased by the contractor, negotiated purchasing agreements and payment/credit history among other factors.

Other associated special systems may require interface or integration to the fire alarm system. These all require compatibility. For example, an emergency voice communication system may be part of the fire alarm system and not shown on the plan at all but mentioned in the specifications. This system can be used by firefighters in the event of an emergency to provide one or two-way communication between remotely located command centers in larger buildings. A smoke evacuation system provided and installed by the mechanical contractor for smoke extraction may require an interface control module to turn that system on and off and allow for testing. This may not be mentioned in the electrical (E) drawings but only in the mechanical (M) drawings. The elevators in a building also require emergency over-ride control by the fire alarm system. The elevators are recalled to the ground floor in the event of an alarm condition, for use by emergency personnel. Part of this system must include smoke detectors in the elevator lobbies at each floor to keep from opening the doors of an elevator into an area filled with smoke or fire. The elevators may be recalled to an alternate lower floor depending on the location and nature of the alarm. There are also smoke and heat detectors required at the top and bottom of the elevator shafts that may not be shown on the drawing. Another common engineering oversight is a smoke detector above the fire alarm panel itself. If access to the building is limited by a security system, this has to be overridden in an alarm condition. This may require a fire alarm interface or a device known as a Knox Box.

8. SAMPLE SKETCH



9. SAMPLE TAKE-OFF AND PRICING SHEET
 (UTILIZING A MULTIPLEX SYSTEM
 ALL IN CONDUIT)

Request for Quote

JOB: CPE Technical Paper

 Date DWG#:

QTY	Quotable Materials only DESCRIPTION	Material	
		ea	ext
13	Quote Pull Station	0	0
43	Quote Smoke Detector - PE	0	0
9	Quote HDetector -135 Rate of Rise	0	0
10	Quote Duct Detector	0	0
1	Quote Tamper Switch	0	0
1	Quote Flow Switch	0	0
8	Quote Horn Strobe	0	0
7	Quote Strobe	0	0
2	Quote Elevator Warning Light	0	0
10	Quote RTU Shut down Relay	0	0
10	Quote Remote Test Station	0	0
1	Quote Fire Alarm Panel addressable	0	0
1	Quote As-Built Drawing	0	0
1	Quote test and certify	0	0
1		0	0
1		0	0
1		0	0
1		0	0
1		0	0
1		0	0
1		0	0
1		0	0
1		0	0

Quotables raw cost this page **13000** without TAX

Take Off Sheet

JOB: CPE Technical Paper	\$23.4				
	Recap labor rate	5	SQ.FT	18950	O/H 12%
Date _____	including burden		Duration	1 month	Profit 7%

QTY	DESCRIPTION	LABOR hrs		LABOR FACT OR	Labor \$	Material		6% TAX	Line Item w. O/H+Profit
		ea	ext			ea	ext		
	Quotables Labor								
13	Quote Pull Station	0.4	5.20	1	\$ 121.94	0	0	\$ -	\$ 130.48
43	Quote Smoke Detector - PE	0.5	21.50	1	\$ 504.18	0	0	\$ -	\$ 539.47
9	Quote HDetector -135 Rate of Rise	0.4	3.60	1	\$ 84.42	0	0	\$ -	\$ 90.33
10	Quote Duct Detector	1.2	12.00	1	\$ 281.40	0	0	\$ -	\$ 301.10
1	Quote Tamper Switch	0.8	0.80	1	\$ 18.76	0	0	\$ -	\$ 20.07
1	Quote Flow Switch	0.7	0.70	1	\$ 16.42	0	0	\$ -	\$ 17.56
6	Quote Horn Strobe	1.1	6.60	1	\$ 154.77	0	0	\$ -	\$ 165.60
7	Quote Strobe	0.75	5.25	1	\$ 123.11	0	0	\$ -	\$ 131.73
2	Quote Elevator Warning Light	1.1	2.20	1	\$ 51.59	0	0	\$ -	\$ 55.20
10	Quote RTU Shut down Relay	1.4	14.00	1	\$ 328.30	0	0	\$ -	\$ 351.28
10	Quote Remote Test Station	0.4	4.00	1	\$ 93.80	0	0	\$ -	\$ 100.37
1	Quote Fire Alarm Panel addressable	8	8.00	1	\$ 187.60	0	0	\$ -	\$ 200.73
1	Quote As-Built Drawing	1	1.00	1	\$ 23.45	0	0	\$ -	\$ 25.09
1	Quote test and certify	1	1.00	1	\$ 23.45	0	0	\$ -	\$ 25.09
ea	100 Fire Alarm J-Box								\$ 28.10
1	100 Box 4" 2-1/8" Comb	0.3	30.00	1	\$ 703.50	0.33875	33.875	\$ 2.03	\$ 793.10
1	100 Blank Cover Plate	0.25	25.00	1	\$ 586.25	0.35	35	\$ 2.10	\$ 668.99
2	200 Screws	0.15	30.00	1	\$ 703.50	0.15	30	\$ 1.80	\$ 788.49
2	200 EMT SS Insul Throat Connector 3/4"	0.1	20.00	1	\$ 469.00	0.2431	48.62	\$ 2.92	\$ 559.76
ea	50 1/2" EMT w. 3#12								\$ 2.79
1	50 EMT Conduit 1/2"	0.045	2.25	1	\$ 52.76	0.3476	17.38	\$ 1.04	\$ 77.16
0.1	5 EMT Set Screw Coupling 1/2"	0.04	0.20	1	\$ 4.69	0.7766	3.883	\$ 0.23	\$ 9.64
3	150 1/C Copper THHN #12	0.006	0.90	1	\$ 21.11	0.08253	12.38	\$ 0.74	\$ 37.33
0.2	10 1 Hole Conduit Strap 1/2"	0.03	0.30	1	\$ 7.04	0.2	2	\$ 0.12	\$ 9.91

ea	2	EMT Set Screw Box Connector 1/2"	0.08	0.16	1	\$ 3.75	0.6103	1.2208	\$ 0.07	\$ 5.47
ea	1200	3/4" EMT w. 18/2 +16/2 FA wire								\$ 3.63
1	1,200	EMT Conduit 3/4"	0.05	60.00	1	\$ 1,407.00	0.5178	621.36	\$ 37.28	\$ 2,245.78
0.1	120	EMT Set Screw Coupling 3/4"	0.05	6.00	1	\$ 140.70	0.12205	14.646	\$ 0.88	\$ 168.00
1.01	1,212	Copper Fire Alarm Wire #16 2/C	0.016	19.39	1	\$ 454.74	0.35	424.2	\$ 25.45	\$ 991.97
1.01	1,212	Copper Fire Alarm Wire #18 2/C	0.012	14.54	1	\$ 341.06	0.3	363.6	\$ 21.82	\$ 798.12
0.1	120	1 Hole Conduit Strap 3/4"	0.035	4.20	1	\$ 98.49	0.35	42	\$ 2.52	\$ 155.42
ea	17	Fire Alarm J-Box w. 3/4 stub								\$ 36.13
1	17	Box 4" 2-1/8" Comb	0.3	5.10	1	\$ 119.60	0.33875	5.7588	\$ 0.35	\$ 134.83
1	17	Box Ring 2 Gang	0.1	1.70	1	\$ 39.87	0.2431	4.1327	\$ 0.25	\$ 47.58
2	34	Self Tapping Screws	0.15	5.10	1	\$ 119.60	0.05	1.7	\$ 0.10	\$ 129.99
5	85	EMT Conduit 3/4"	0.05	4.25	1	\$ 99.66	0.5178	44.013	\$ 2.64	\$ 159.08
2	34	EMT Set Screw Coupling 3/4"	0.05	1.70	1	\$ 39.87	0.12205	4.1497	\$ 0.25	\$ 47.60
2	34	EMT SS Insul Throat Connector 3/4"	0.1	3.40	1	\$ 79.73	0.2431	8.2654	\$ 0.50	\$ 95.16
10	170	Copper Fire Alarm Wire #16 2/C	0.016	2.72	1	\$ 63.78	0.35	59.5	\$ 3.57	\$ 139.14
10	170	Copper Fire Alarm Wire #18 2/C	0.012	2.04	1	\$ 47.84	0.3	51	\$ 3.06	\$ 111.95
ea	10	DD 6' flex								\$ 23.66
6	60	Flexible Steel Conduit 1/2"	0.04	2.40	1	\$ 56.28	0.3726	22.356	\$ 1.34	\$ 86.85
2	20	FSC Box Connector 1/2"	0.12	2.40	1	\$ 56.28	0.4406	8.812	\$ 0.53	\$ 70.72
12	120	Copper Fire Alarm Wire #18 2/C	0.012	1.44	1	\$ 33.77	0.3	36	\$ 2.16	\$ 79.02

Labor	
Hours	
Page	
Total	331.05
Material	
raw cost	
this page	1895.9

RECAP

Job:
CPE Technical Paper

Sq.Ft.
18950

Duration months
1

	MATERIAL	\$/Sq.Ft.
TAKE OFF SHEET 1	\$1,895.85	0.10
TAKE OFF SHEET 2		0.00
TAKE OFF SHEET 3		0.00
		0.00
		0.00
Material SUBTOTAL	\$1,895.85	0.10

	LABOR HOURS
TAKE OFF SHEET 1	331.05
TAKE OFF SHEET 2	
TAKE OFF SHEET 3	
	0

Hrs. Subtotal	331.046
Project Manager	7% 23.17
other	0% 0.00
TOTAL HOURS	354.22

QUOTED ITEMS		\$	
		-	0.00
		-	0.00
FIRE ALARM		13,000.00	0.69
		-	0.00
		-	0.00
Sales Tax	6%	\$893.75	0.05
Materials TOTAL		\$15,789.60	0.83

Avg. Labor Rate	\$16.75	\$ 5,933.17	0.31
Burden	40%	\$ 2,373.27	0.13
Gross Labor \$		\$ 8,306.44	0.44

Materials TOTAL		\$15,789.60	0.83
labor and materials subtotal		\$ 24,096.04	1.27
Other Direct Costs		\$ 606.02	0.03
		\$ 24,702.06	1.3

Other Direct Costs		\$ 606.02	0.03
Permit	2%	\$ 481.92	0.03
	0%	\$ -	0.00
Small tools	0.10%	\$ 24.10	0.00
Monthly Direct Costs	mo.		0.00
Field Office Trailer		\$ -	0.00
Utilities + Phone		\$ -	0.00
General Conditions		\$ 100.00	0.01
Storage Trailer		\$ -	0.00
truck expense		\$ -	0.00
Scissor Lifts		\$ -	0.00
		\$ -	0.00
		\$ -	0.00
		\$ -	0.00

net allowances			0
Overhead	12%	\$ 2,964.25	0.16
Profit	7%	\$ 1,936.64	0.1
gross allowances			0
Bond	0%	\$ -	0
		\$ 29,602.95	1.56

Avg. Labor Rate	\$16.75
Forman	\$21.00
Electrician	\$17.00
Electrician	\$17.00
helper	\$12.00

10. GLOSSARY

Annunciation circuit: This is the set of wires that power the alarm sounders and strobe lights.

“Conventional” or “Hard-wire” fire alarm: This was the first type of fire alarm system. In this type of system, each initiation zone has a designated pair of wires that extend from the FACP to each zone. This type of system utilizes a supervisory end of line resistor. The fire alarm devices and FACP is less than a programmable system but the conduit and wire is more. This type of system is becoming obsolete as the more versatile multiplex systems come down in price.

Style A, (NFPA Style Z): This wiring method consists of a 2 wire circuit starting at the FACP and extending into the building and connecting each device in turn around the building and returning to the FACP and the End of Line Resistor located there. This is commonly referred to as a 4 wire circuit (2 out and 2 back) In the strictest application of this system there is a conduit and wiring into each device and a separate conduit and wiring out of each device with the in and out conductors never in the same conduit. These conduits must be routed separately. The reasoning for this is total redundancy in case any one conduit becomes damaged; the system automatically isolates the damage and utilizes the undamaged conductors. This is also referred to as NFPA style D. Replaces the term Class A

Style B, (NFPA Style Y): This wiring method is not as strict as Class A. It has a remote E.O.L. normally placed at the last junction box at the end of each initiation circuit to provide supervision for that circuit in a conventional system. With this type of system a wiring fault will cause the system to go into trouble mode and protection will be lost on that part of the circuit and everything beyond that point. Replaces the term Class B

End of Line resistor (EOL): A resistor mounted in series with the circuit that provides the supervision for an initiation zone in a conventional fire alarm system. The electronics in the FACP monitor this resistor by maintaining a small current through it and monitoring it for stability. If it disappears (open circuit) or has an abnormal resistance or short circuit, it signals that there is trouble on the wires. Only the proper signal will initiate an alarm condition.

Fire Alarm Control Panel (FACP): The main component of a fire alarm system. This is the central point where the initiation and annunciation circuits get their power and where the alarm signal is receive from the initiation circuit.

Fire Alarm System: A group of devices that are integrated together in an approved or certified system whose purpose is to detect and alert the occupants of a structure to a perceived threat to life or property.

Free Wire wiring method: Where allowed by building codes and specifications, the conductors for a fire alarm system may be installed by a specifically approved cabling system without

the use of conduit. Note that even if this cable is used it is usually still required to sleeve the cable in conduit where not easily accessible for example from a wall mounted device box into the ceiling space.

Initiation circuit: The circuit that extends to the devices that initiate an alarm. At the end of this set of wires is an end of line resistor. Several examples of initiation devices are smoke detectors; pull stations, heat detectors, and sprinkler system flow switches. The initiation devices are usually grouped into areas or types called zones. An example of a zone may be “First Floor Smoke Detectors”. In the event of an emergency this would decrease the time it takes the fire department has to locate a fire in a large building.

Knox Box: This box is located on the outside of a building that contains a way to access the building in an emergency. The fire department has a master key that will access the box to gain entrance to the building in the event of an emergency. This is normally provided by the General Contractor because it may be of an architectural design but is usually included in the fire alarm price as an alternate adder allowance because it may only be noted in the Fire Alarm drawing or specifications.

“Multiplex”or “Addressable”or “Programmable” fire alarm system: In this system, the FACP is microprocessor controlled. Each of the initiation devices is programmed with a unique code or address (hence the addressable system). The FACP is programmed to send a digital signal or query to each device every few seconds over the wires to ask each device individually what its status is. Each device must respond. This supervisory activity is called polling the devices. If a device does not respond within a few queries, a trouble notification is sent to the monitoring company with specific details of the occurrence. Some programmable systems are intelligent enough to detect slight variations during polling that are indicative of dirty or failing devices. When an alarm condition is detected, the specific location and details are sent to the monitoring company as well as a local alarm being activated. This type of system requires much less labor and material to install but the initial cost of the fire alarm devices and FACP is more than conventional systems.

Request For Quote (RFQ) / Request For Pricing / Request For Proposal (RFP): Document sent to a distributor, subcontractor, or other supplier for pricing on a specific list of line items. These are used interchangeably depending on which area of the country, company standard or management system is being used.

Zone: This is a way of grouping like fire alarm devices by location or other logical division. The reason for using zones is to expedite the quick understanding of the location of an alarm or fault condition. An example of this in a conventional system would be a zone labeled “First Floor East Smoke Detectors”. In a multiplex system each initiation device could be thought of as a zone because each has a unique address. An example of this would be a trouble signal from the “ First Floor East Men’s Room Vestibule needs maintenance”.

Economic Outlook Good, Construction Forecasters Say

By Pam Hunter

Despite the widely publicized and much decried slowdown in residential construction that has taken place in recent months, construction economists are fairly optimistic about the construction outlook overall for 2007.

Ken Simonson, chief economist for the Associated General Contractors, says, "I think the year 2007 is going to be a very positive one for non-residential construction as a whole, although probably not as strong as we have seen in 2006."

Jim Haughey, chief economist for Reed Construction Data, predicts that total U.S. construction activity will increase 5.3% in 2007. He says that although residential investment will decrease by 0.9% in 2007, total non-residential building put-in-place will increase 12.5% in 2007 and 7 or 8% in 2008. Non-building (heavy engineering) work will increase 11.19% in 2007, he says.

Robert Murray, McGraw-Hill Construction's vice president of economic affairs, predicts that total construction will decrease 1% to \$668 billion in 2007, largely as a result of the softening of the single-family housing market.

Although he predicts a slight decline in total construction activity, Murray is optimistic about prospects for construction activity outside the market for single-family homes. In his 2007 *Construction Outlook*, he estimates that total contract value for the non-residential market will increase 6% in 2007. "Murray says that if single-family housing construction were excluded from the total, "the dollar amount of construction activity in 2007 would be up 3%."

Murray predicts that the contract values for office buildings and educational facilities will both increase 9% in 2007. However, he also predicts that the total contract value for stores and shopping centers will decline by 3% in 2007.

Highway construction had a good year in 2006, largely as a result of the 2005 passage of the highway reauthorization bill, which increased funding for federal highways. Haughey says there was a "surge of construction starts" following the passage of the highway bill. Highway and transportation projects will have increased by 10% in 2006 by year's end, Haughey says, and that level will most likely be maintained in 2007 and 2008.

However, Jack Basso, chief operating officer for the American Association of State Highway and Transportation Officials, cautions that the increasing costs of construction materials, coupled with inflation, are having a negative impact on how many highway and transportation projects can move forward. "Inflation is going to continue to erode our ability to deliver even the program we have today unless we have a turnaround to mitigate that," he says.

Basso suggests that improvements in technology and innovative financing mechanisms might help over the long term, but what

...article continued on page 24

Table 2

**U.S. TOTAL CONSTRUCTION SPENDING
(BILLIONS OF U.S. CURRENT DOLLARS)**

	Annual Figures			
	Actuals 2005	2006	Forecasts	
			2007	2008
New Residential (% change in year to previous year)	488.8 15.1%	501.0 2.5%	492.9 -1.8%	478.2 -2.9%
Residential Improvements*	141.7 9.3%	156.8 3.0%	171.3 9.2%	185.3 8.2%
Non-residential Building	317.2 7.5%	309.4 3.3%	402.5 12.0%	435.3 8.1%
Non-building (heavy engineering)	175.9 5.2%	203.1 14.9%	234.7 11.2%	248.9 10.7%
Total	1,143.6 10.2%	1,219.3 6.6%	1,396.7 5.9%	1,347.7 4.4%

*Residential improvements include remodeling, renovation and replacement work.

*Actuals: U.S. Census Bureau (Department of Commerce) (put-in-place investment figures).
Forecasts and table: Reed Construction Data.*

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is really needed is “a national consensus on the impacts of the various economic conditions and what types of investment changes we can make” with solid data to support those changes.

Simonson says the energy and power markets in the United States present significant potential for the next several years. “We have tremendous activity now in the planning stage, some of it in the ground, and I think a lot to come in many regions in the country.”

The high price of natural gas and oil is driving utilities to pursue new sources of gas within the United States, in many cases offshore, and alternative forms of energy, such as wind power or cleaner coal technologies. Projects will range from new pipelines to new electrical transmission lines to ethanol and biodiesel refineries to power plants. Moreover, simply the growing electricity needs of the national will drive activity in this market, Simonson says. “I think there will be quite a building binge all over the country.”

Haughey predicts that power-related construction put-in-place will increase 13.5% in 2007, and 16% in 2008.

The health care market is another area that is expected to see continued growth, Simonson says. “The hospital industry all around the country is trying to catch up with technological changes that have really revolutionized the way patients are admitted, diagnosed, treated or operated on or recover,” he says. “Hospitals at the same time are both consolidating and expanding or closing obsolete facilities and trying to open new ones in the newer population centers.”

Haughey predicts that health care put-in-place construction will increase 17.8% in 2007 and 13.1% in 2008.

Pam Hunter is a freelance writer based in Silver Spring, Md.

For more information related to the construction outlook, visit www.buildingteamforecast.com. ●

In Memoriam — Jim apRoberts



Jim and daughter Linda at the 2006 50th Anniversary Convention, July, 2006, in Garden Grove, CA

ASPE loses early member of the Los Angeles Chapter #1.

Jim apRoberts, 98, passed away on December 17, 2006.

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