

How to Estimate the Cost of General Conditions and General Requirements

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Section 1 Introduction

This technical paper will provide the reader with general knowledge and the approach on how to estimate all costs associated with general conditions and general requirements for a given project. Each project requires its own set of general conditions and general requirements that depend on multiple ingredients; most notable ones are size, duration, phasing and location of said project. It is key for an estimator to understand these “ingredients” when generating or estimating such costs as they are certainly one of the most important factors that determine the fate of a project. One of the misconceptions estimators often have when figuring such costs, is that they treat them as a percentage (%) of an overall cost of project; while this approach maybe acceptable for some repetitious small projects with known variables, for larger projects however, these costs must be identified and individually priced. No two projects with “identical costs” have the same general conditions and general requirements costs. In other words, general conditions and general requirements costs should NOT be “project cost” driven, but rather “project conditions” driven such as size, timeline, phasing and location.

Main CSI (Construction Specifications Institute 2010 MasterFormat) Division

Division 01 General Requirements & General Conditions

Main CSI (Construction Specifications Institute 2010 MasterFormat) Subdivisions

Subdivision 01 11 00 Pre-Construction Fee

Subdivision 01 31 00 Project Management & Coordination

Subdivision 01 32 00 Construction Progress Documentation

Subdivision 01 41 00 Regulatory Requirements

Subdivision 01 51 00 Temporary Utilities

Subdivision 01 52 00 Construction Facilities

Subdivision 01 54 00 Construction Aids

Subdivision 01 55 00 Vehicular Access & Parking

Subdivision 01 56 00 Temporary Barriers & Enclosures

Subdivision 01 71 00 Examination & Preparation

Subdivision 01 74 00 Cleaning & Waste Management

Brief Description

The author will provide a detailed approach on estimating and developing general requirements and conditions for a project. The process begins with the Construction Estimator getting him or herself familiarized with the project's existing conditions and site constraints. This task can be achieved by visiting and inspecting the site, studying the plans and specifications and understanding owner's needs, as well as the intent and scope of work proposed by the Architect/Engineer (A/E) team. Once the aforementioned established and scope of work is prepared, the estimator will work closely with Operations (mainly the Project Manager & Superintendent) on developing two major components: (a) the project schedule or timeline (with a pre-determined start and finish dates) which addresses in details all items such as bid procurement, sub awards, construction activities, milestones and phasing (if required), and (b) the project logistical plans which show locations of temporary facilities & access needed to achieve project objectives. These two components are critical in developing general requirements and conditions for a project. It is always a good practice to prepare the general

requirements & conditions costs after all trade costs have been compiled and estimated. This approach will help the estimator account for items that are required to support trades work.

The assumption made in preparing this paper is that the subject project is an existing Public School Hall located in Northwestern Connecticut seeking to construct a new single story 10,000 SF front & back additions and completely renovate an existing 2-story 30,000 SF facility which houses administrative offices, a lecture hall, a cafeteria, a kitchen and the library (no classrooms). Construction will occur while the Hall is partially occupied (i.e. Phased Project). It has also been assumed that the school has retained a Construction Manager to provide pre-construction and construction services.

Section 2 Types of Methods of Measurements

Estimating general requirements and conditions for a project entails computing multiple components, including, but not limited to: (a) Pre-Construction Fee (by Hours), (b) Field Personnel (by Hrs, Day, Week or Month), (c) Permit, (d) Insurance and Payment & Performance bond (by %), (e) Temporary Heat, Power & Lighting (Misc.), (f) Temporary Fencing (by LF), (g) Temporary Covered Sidewalk (by LF), (h) Temporary Partitions (by VSF), (i) Winter Protection (by VSF), (j) Temporary Scaffolding for all Trades (by VSF), (k) Temporary Access Roads (by HSF), (l) Layout & Survey (by Day), and (m) Cleaning (by HSF or Hours).

HSF = Horizontal Square Foot; VSF = Vertical Square Foot; LF = Linear Foot

Pre-Construction Fee consists of the following services, (a) producing estimates throughout various stages of design documents development; (b) offering value engineering ideas should the cost exceed the budget; and (c) providing constructability review of the design documents. Another type of fee is called Construction Fee, which is usually a percentage of the overall project cost. This fee usually applied as a % to the bottom line when all costs (trade costs, general requirements costs & contingencies) have been compiled and accounted for. Billable Field Personnel hourly rates are usually a combination of the employee's base salary, benefits, overhead and profit. These rates are typically provided by the Accounting Department. Permit cost rates are usually obtained from the Building Department which varies from town to town. Insurance is usually provided by the insurance firm; however, rates may vary depending on the project insurance requirements which are typically included in project specifications. These requirements must be provided to the insurance agent to determine the rate to be used. Similarly,

payment & performance bond rates can be provided by the bonding company. These bond rates are often generated from a pre-established formula depending on the size of the project.

Temporary Utilities can usually be determined and taken off from the construction documents.

Temporary Barriers, Enclosures and Access are typically obtained and measured from the Logistics plan often prepared by the general contractor. Temporary Scaffolding is efficient up to sixty feet or five stories high; the first tier cost is relatively higher due to leveling and alignment.

When a general contractor or construction manager provides scaffolding for all trades as opposed to each trade providing their own scaffolding or boom lift, it is considered to be a cost savings approach. Another advantage to this approach is that it facilitates material installations by all trades. Some general requirements items may require rental for the duration of the project.

Examples of this may include construction trailers, dumpsters, temporary walk-in coolers & freezers, etc. For high rise buildings, tower or mobile cranes, material & personnel hoists need to be rented. These rental costs need to be included as well. There are also miscellaneous items that are considered to be part of the general requirements & conditions and must be included, such as temporary office equipment, furniture, supplies, computers, drinking water, coffee, mail, travel expenses, parking fees, photos, project sign, traffic control, OSHA protection railings/covers, small tools, protecting adjacent properties, snow removals, documents reproductions and project closeout. There are also overhead costs incurred by the Home Office that are usually associated with the project; these costs are mostly related to the Accounting Department staff who handle all project account payable & receivable. All said items will be illustrated during the process of assembling the estimating our general requirements and general conditions.

Section 3 Project Specific Factors to Consider in Takeoff and Pricing

Multi Phased Projects vs. Single Phased Projects

Multi-phased projects tend to have a longer duration than single phased projects. These also require setting up additional temporary measures to separate work zones from occupied spaces. Certainly, it should come as no surprise that the general requirements and general conditions for multi-phased projects will bear greater costs than the ones in single phased projects. More often than not, the owner requests pricing for both options to aid in decision making regarding whether it is better to stay in the facility during construction and endure the noise and inconvenience or relocate to a temporary facility away from construction activities. Obviously, the costs associated with the latter needs to be factored in, but need to be weighed against potential loss of revenue or productivity of employees if they work in a construction zone.

Site Accessibility, Maneuverability and Parking Availability for Construction Workers

It is generally agreed upon that a project in an urban setting presents more challenges than a project in a suburban or rural area when it comes to accessibility, maneuverability and availability of parking for construction workers. Projects in urban areas require additional general requirements items to be factored in. This may include sidewalk scaffolding bridges, police officers for traffic control and parking charges for construction workers. It is vital to communicate these concerns to the owner early on so he or she can make the necessary arrangements to accommodate and address said concerns.

Seasonal Effect on Work, Specifically Winter Conditions

It is impossible to accurately account for all weather related issues that may have a potentially negative impact on the project schedule. This may cause unnecessary delays and consequential financial implications. However, a primary expectation of the Construction Estimator, when reviewing the project schedule, is to consider the usual regional weather implications and factor in potentially additional time and costs based on these determinants. In regions known to have inclement weathers, one must not only consider the most obvious weather delays (snow and torrential rain) but the less obvious temperature related implications. This may include considerations about use of temperature sensitive materials (i.e. cement, asphalt etc.), for instance. Allocations for expected environmental considerations will avoid unnecessary and unexpected disputes with the owner over additional costs reimbursements.

Section 4

Overview of Labor, Material, Equipment, Indirect Costs and Approach to Markups

When computing general requirements and general conditions for a project, material quotes can be obtained from supply house. Rental rates can be obtained from equipment rental companies. Labor and equipment costs are calculated on a per hour basis. Additionally, project specific questions need to be answered; for example, is the project taxable? Also, when it comes to figuring out labor costs, is the project subject to prevailing wage rates or open shop rates? Are there any minority and/or gender business hiring requirements or goals that need to be met? Our general requirements and general conditions estimate are based on the following:

- 8-hour normal work day and 5-day work week (ie 40 hours per week)
- Labor rates assumed to include 30% Overhead, Fringes and Profit
- Material & Equipment costs assumed to include 10% O&P
- Owner will pay for all testing & inspection costs
- Project assumed to be Tax Exempt and subject to Prevailing Wage rates (said rates can be obtained from Department of Labor)
- Project construction cost is estimated to be at around \$12,000,000
- Pre-Construction Period: 60 days

Below are the Construction Manager's Personnel required with their billable rates:

Description	Hourly Rate (Incl. O&P)	Weekly Rate (Incl. O&P)
Project Director	\$135.00	\$5,400
Chief Estimator	\$120.00	\$4,800
Project Manager	\$90.00	\$3,600

Superintendent	\$90.00	\$3,600
MEP Coordinator	\$80.00	\$3,200
Assistant Project Manager	\$72.00	\$2,880
Estimator	\$65.00	\$2,600
Accountant	\$55.00	\$2,200
Clerk	\$35.00	\$1,400

Below are the Trade's Personnel & Equipment required:

Description	Hourly Rate (Incl. O&P)
Laborer	\$39.00
Rodman	\$39.00
Laborer Foreman	\$43.00
Equipment Operator (light)	\$52.00
Carpenter	\$52.00
Carpenter Foreman	\$55.00
Plumber Apprentice	\$55.00
Surveyor	\$59.00
Rebar Worker	\$60.00

Plumber	\$70.00
Chief Surveyor	\$72.00
Electrician	\$85.00
Backhoe Loader	\$44.00

Material costs are generated by performing complete quantity takeoffs on construction documents and logistical plans. Additionally, the Construction Estimator should not be hesitant to include waste factors. Waste costs are ostensibly a small percentage of material excess factored in to facilitate ease of completion of a project (so that there is not a shortfall on materials available). Once the material list is developed, the estimator can either use up-to-date pricing in their database or contact supply houses for quotes. Either way, the estimator should not rely on historic pricing data, as these prices tend to fluctuate frequently even from month to month. In a fickle economy, the margin of variability may be quite significant and greatly negate cost saving efforts if the estimator is not up to date on pricing.

Usually all costs incurred by the Construction Manager (field staff & home office overhead staff) and his Subcontractors & Suppliers are called “direct costs”. However, there are also costs that are called “indirect costs”, said costs are usually incurred by a third party such as an insurance company (costs associated with liability, workman’s comp, umbrella coverage and sometimes builder’s risk, etc.), a bonding company (payment & performance bond), and building departments (building permit & education fees).

Once all of the above costs have been compiled and calculated, the management will have the final say as to what fee percentage or markups to include. Said decision depends on two things. The first is that the General Contractor (GC) has been hired and retained by the owner to act as the Construction Manager. If this is the case, then agreed upon fees or markups have been pre-established. The second is that the General Contractor is competitively bidding the project. If this is the case, then the GC needs to weigh in some factors during the bidding process, such as how many GCs are bidding? How busy is the GC? Are there any risks involved? How complete are the bid documents? How aggressive does the GC need to be because he or she wants the project to boost his or her portfolio? In short, when it comes to decision-making, there are a lot of factors to consider and the management usually relies on their subordinates when making such decisions. Therefore, Construction Estimators must assure they have covered all bases. It is imperative to review all of these issues prior to final submission to assure that all domains have been considered at every level.

Section 5 Special Risk Considerations

There are a number of factors that can have major cost impacts on the general requirements and general conditions. The most obvious, and potentially most costly one, is an underestimation of the project timeline. Extensions of a project are only acceptable if the time extensions are justifiable and reimbursable. This may include added work scope or extensions to design at the direction of the owner. Unexpected inclement weather may also add time to a project timeline and even when some weather influences have been previously already calculated in, a particularly lengthy period of unstable weather, or protracted electrical outages after a catastrophic storm will certainly not be predictable or within the control of the general contractor. If, however, delays do not fall into these categories, this will cause significant negative implications for project costs. The most common reason the general contractor faces delays is when one or more subcontractors underperform or under-staff the project causing derailment of the project timeline and will likely result in a cascade of delays to each phase of the project. These kinds of shortfalls are not reimbursed by the owner. Another major risk factor is having inadequate safety measures. The Project Superintendent needs to be competent and vigilant, making sure each day that all workers and temporary barriers are in compliance with OSHA (Occupational Safety and Health Administration) guidelines. Site Safety must be the number one priority for any general contractor, less due to concern for OSHA citation, but mainly out of a desire to avoid injury or even death, which will have potentially severe emotional and financial implications.

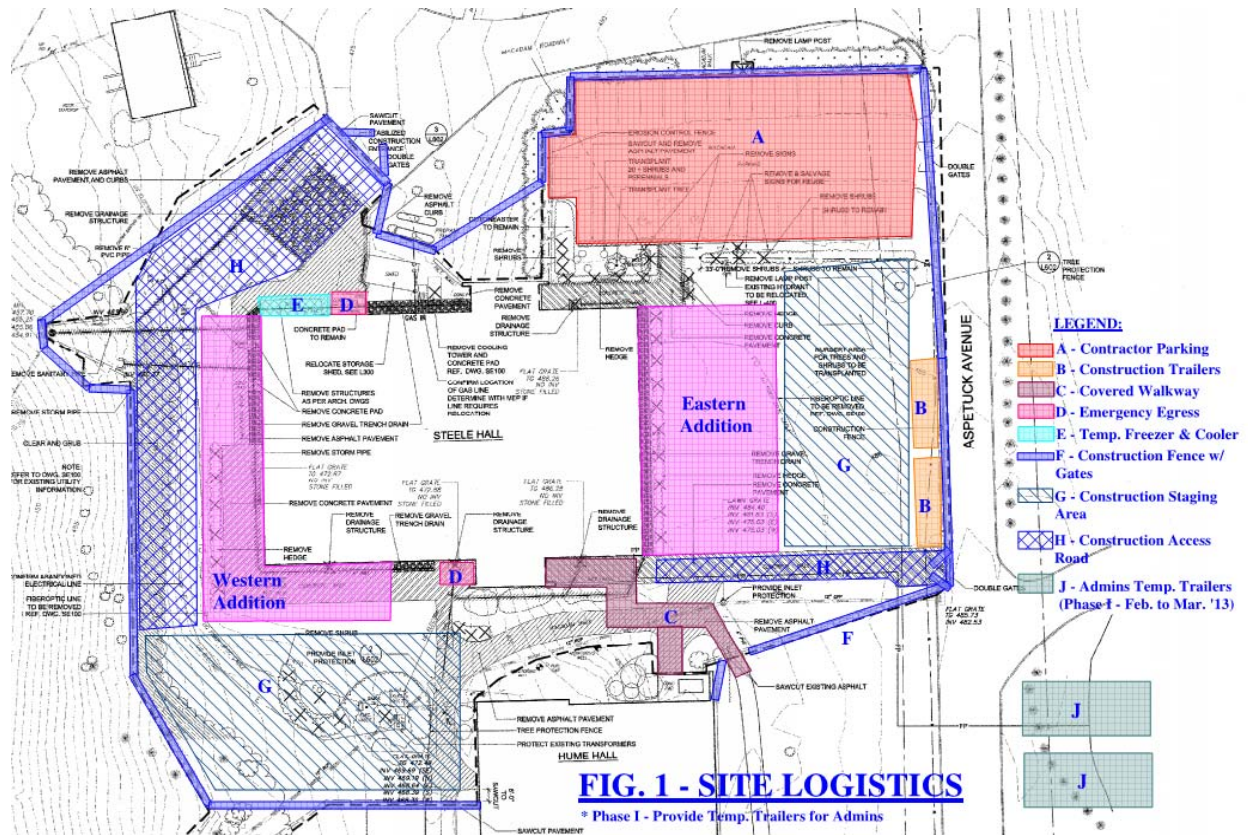
Section 6 Ratios and Analysis

As mentioned earlier in this paper, no two projects are alike nor would they have identical estimating approaches. Each project budgeted has its own unique estimating means and methods. A Construction Estimator must make every effort to stay ahead of the curve and have his or her hand on the pulse of the constantly shifting industry. Therefore, it is prudent to update cost databases regularly (quarterly, for example). A good strategy is also to save cost estimates & budgets for projects that have been deemed inactive or lost to competitors. This wealth of data can be considered invaluable and can help the estimator in preparing future estimates for similar projects.

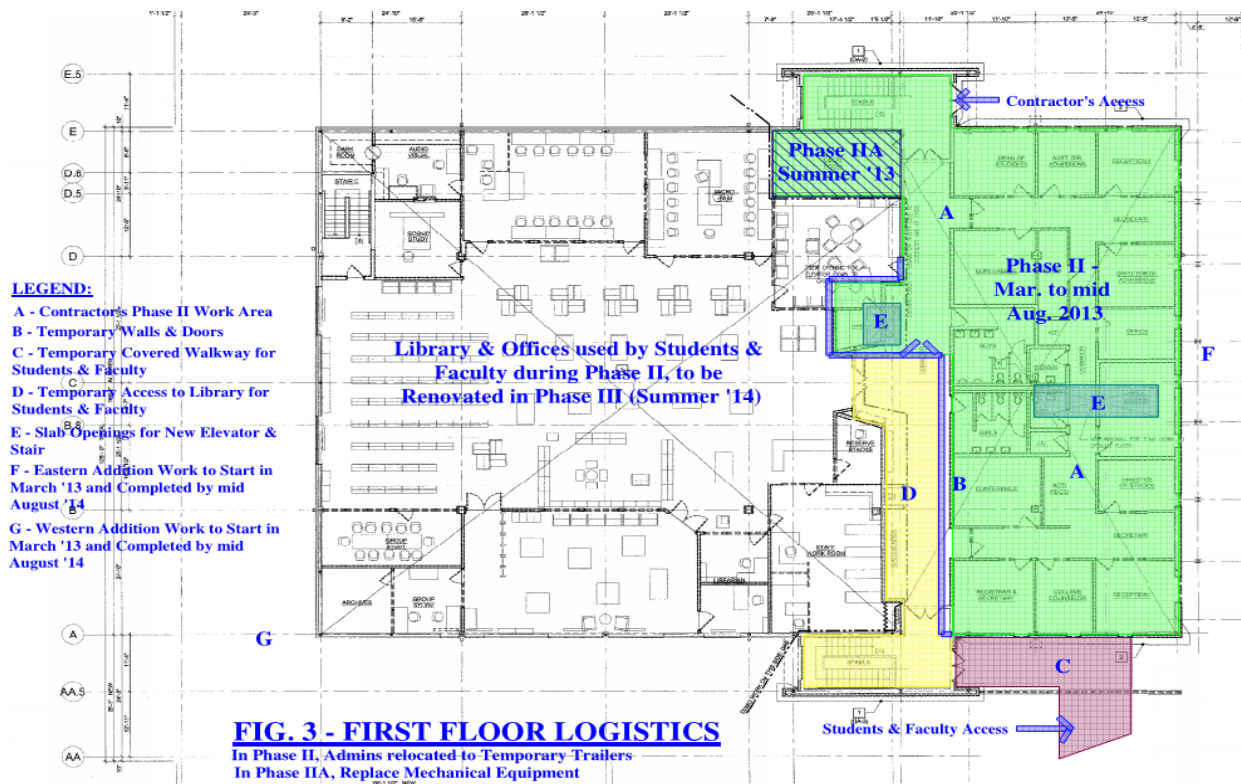
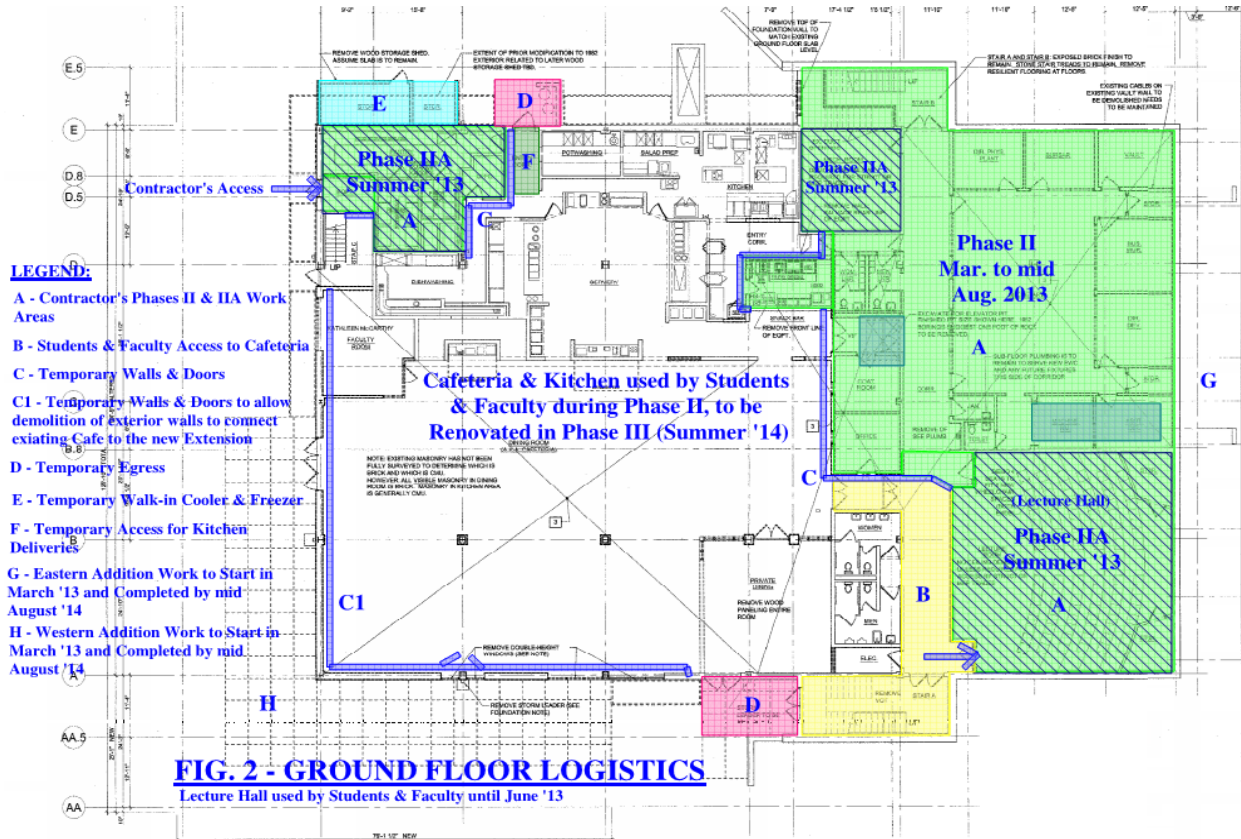
Section 7 Miscellaneous Pertinent Information

Being organized is one of the most important estimating traits that every Construction Estimator should have regardless of how many years of experience he or she possesses. One must consider when preparing estimates to always cross check your math, keep a record of how you arrived at costing a certain item and save subcontractors and suppliers quotes. When bidding a project, in addition to understanding the scope of work, the Construction Estimator must familiarize him or herself with bid submission requirements. Said requirements can be readily found in the “Instructions to Bidders” section located in front portion of the project specifications. These requirements usually are very explicit and must be adhered to; otherwise the bid will be considered noncompliant and subjected to rejection.

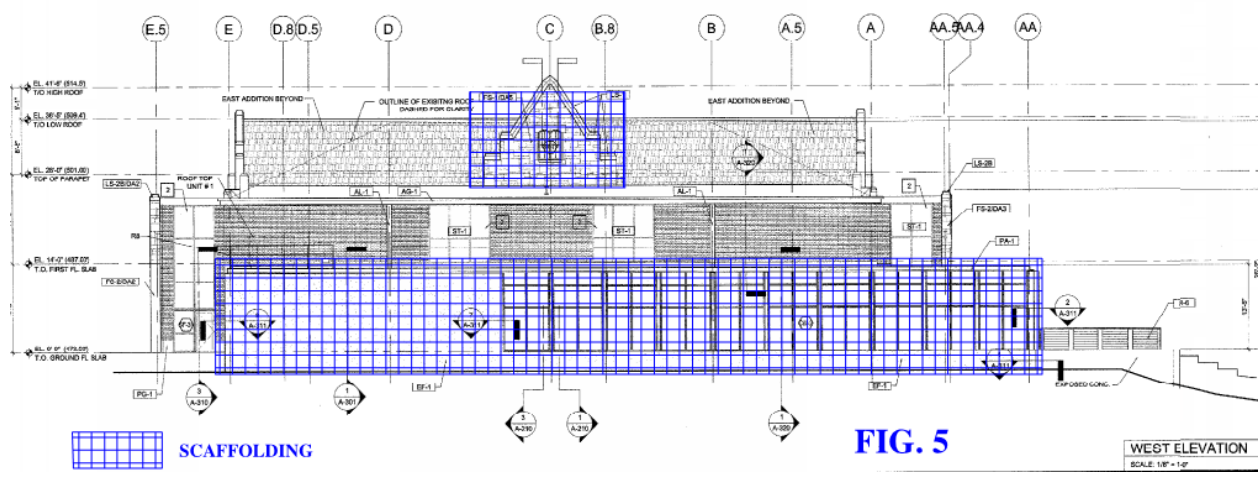
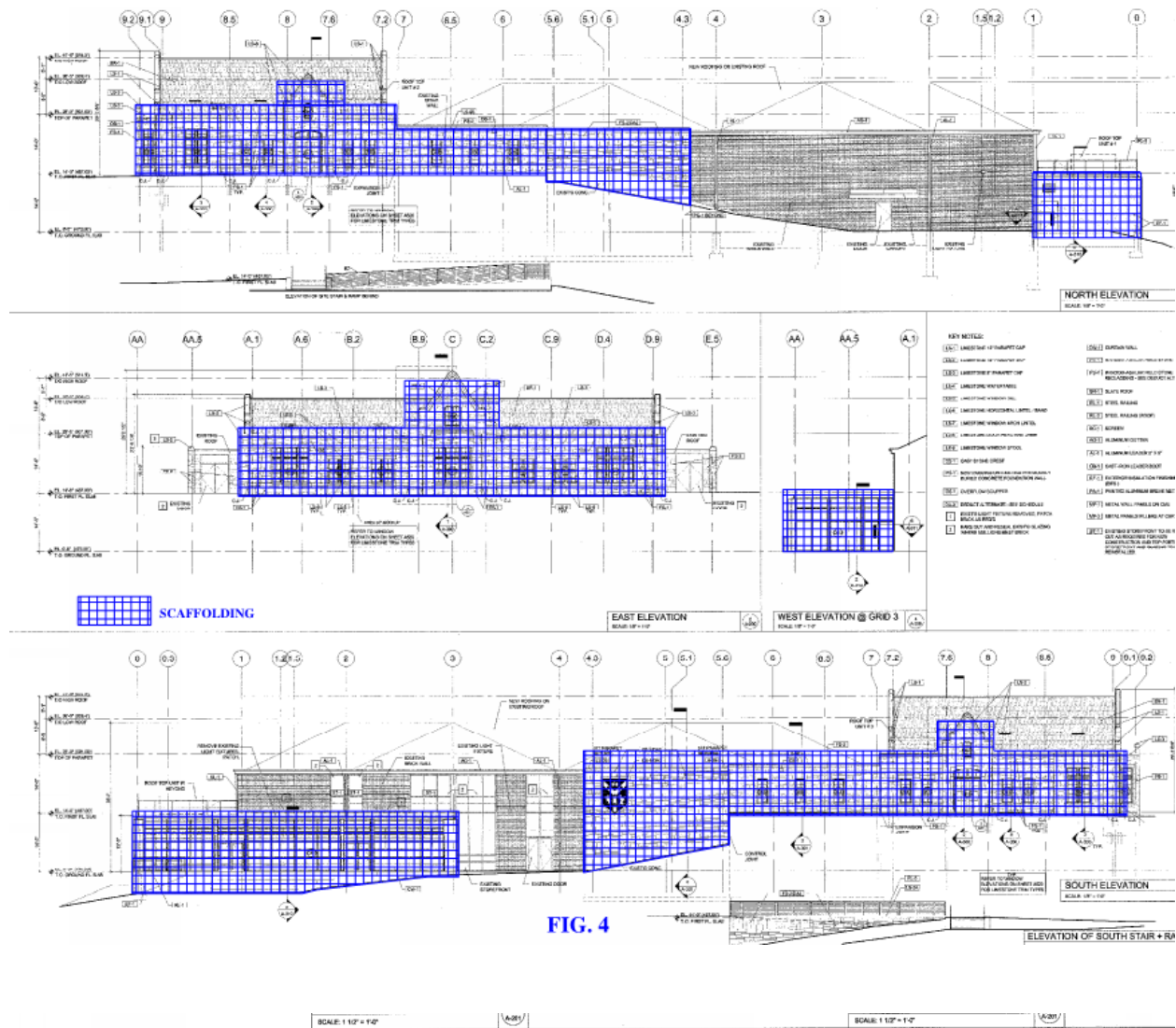
Section 8 Sample Plans or Sketches



The schedule is broken up into three phases. This figure illustrates the temporary measures needed to facilitate building the additions and renovating the existing Hall. Phase I (Feb. 1 to Mar. 1, 2013) entails setting up the temporary measures and the relocation of Administration to temporary trailers (J) across the street. The school in this instance is willing to turn the administrative area & faculty parking over to the contractor, work from temporary trailers and park across the street where an existing parking is available. However, the school will still have access to the library, lecture hall, cafeteria and kitchen during construction, hence the temporary covered walkway (C). The work on both front and back additions will continue throughout all three phases (Mar. 1, 2013 to mid Aug. 2014, i.e. 17.5 months).



Figures 2 & 3 (shown in the previous page) illustrate the renovation work required during Phase II (Mar. 1 to mid Aug. 2013) and Phase IIA (Summer 2013). The aforementioned phases require separating the spaces under renovation from occupied spaces. This entails installing temporary walls, a temporary covered walkway and providing all necessary life safety measures. Phase 3 (Summer 2014) is the last phase where the library, cafeteria and kitchen will be renovated and ready for occupancy (along with the additions) beginning of school year 2014.



Figures 4 & 5 illustrate the installation of temporary scaffolding for all trades.

Section 9 Sample Take-off & Pricing Sheet

It is always a good practice to break down takeoffs by material, labor & equipment. This will help the Construction Estimator determine the Crew's Daily Productivity Rate (Labor Hours / Unit) for certain activity.

For example, to determine the labor & equipment costs per SF associated with building 4" thick temporary construction access road, the following will apply:

Crew & Equipment needed to construct temporary road at a rate of 5,000 SF/Day:

1 Equipment Operator @ \$52 per Hour X 8-hr/day = \$416 per day

1 Foreman @ \$43 per Hour X 8-hr/day = \$344 per day

3 Laborers @ \$39 per Hour X 8-hr/day = \$936 per day

1 Backhoe @ \$44 per Hour X 8-hr/day = \$352 per day

Daily Crew Labor Hourly Cost will equate to Total Daily Labor Cost \$1,696 divided by Total Daily Crew Hours 40 hrs = \$42.40 per Labor Hour. Similarly, Crew Equipment Hourly cost will equate to \$8.80 per Labor Hour

Productivity Rate = Total Crew Daily Hours (40 hrs/day) divided by Daily Output (5,000 SF/day) = 0.008 Hours per SF

Labor Cost per SF = Daily Crew Labor Hourly Cost X Productivity Rate = \$42.40 X 0.008 = \$0.34 per SF

Equipment Cost per SF = Daily Equipment Hourly Cost X Productivity Rate = \$8.80 X 0.008 = \$0.07 per SF

Takeoffs from Logistics Plans:

<i>Construction Fencing</i>	<i>1,200</i>	<i>LF</i>
<i>Double Gates</i>	<i>2</i>	<i>EA</i>
<i>Covered Walkway</i>	<i>150</i>	<i>LF</i>
<i>Construction Access Road</i>	<i>7,900</i>	<i>SF</i>

<i>Temporary Walls</i>	5,300	<i>SF</i>
<i>New Slab Openings Protection</i>	120	<i>LF</i>
<i>Scaffolding</i>	11,500	<i>SF</i>
<i>Temporary Water</i>	75	<i>LF</i>
<i>Temporary Sewer</i>	75	<i>LF</i>

Refer to pages 26 through 28 for Pricing Sheet

Section 10 Copy of Topic Approval Letter from ASPE Certification Board



**American Society of
Professional Estimators** **CERTIFICATION**

Mailing & Administrative Office:
2525 Perimeter Place Drive, Ste. 103 • Nashville, TN 37214 • 615-316-9200 • Fax 615-316-9800 •

Summary Certification Cycle/Topic Acceptance Form

August 15, 2012

Candidate Number: 0712032 Chapter Number: _____ Region: NE

Workshop Completed by: **September 30, 2012** Selected workshop format: **Online**

Technical Paper Topic: HTETCO General Conditions and General Requirements

Technical Paper Due Date: **December 15, 2012.**

Late papers are subject to penalty of score as stated in the "Technical Paper" booklet.

Testing: **Schedule test dates during the month of March, 2013. If submitting Q&P in lieu of DST, The complete set of questions and problem will be due by March 31, 2013.**

Provide the Society Business Office with proctor information and schedule test dates 15 business days prior to testing.

Certification Discipline: 1.4 General Construction

Contact Email Address: paulshamas@yahoo.com

Online Workshop link: **http://cei2.com/SCRIPT/805/scripts/serve_home**

Online Workshop User ID: CB72 Online Workshop Password: 812cp

I agree to the selected topic and will prepare my technical paper according to the format stated for the ASPE Certification Program.

I will meet the deadlines for the completion of the workshop, submittal of my technical paper, and testing. If I do not meet these deadlines, I understand that this certification cycle will terminate and I will need to submit a new application.

I have read the above information and by signing below agree to meet the requirements of the ASPE Certification Program and adhere to the guidelines of the program.

Signature: _____

Date: _____

*Please retain a copy of this form for your records and technical paper. Return this form to the Society Business Office
Fax: 615-316-9800 or email tanya@aspenational.org*

Section 11 Terminology-Glossary

Construction Specifications Institute (CSI) 2010 MasterFormat:

CSI is a national association dedicated to creating standards and formats to improve construction documents and project delivery. The organization is unique in the industry in that its members are a cross-section of specifiers, architects, engineers, contractors and building materials suppliers. The CSI's MasterFormat is the most widely used standard for organizing specifications for building projects in the U.S. MasterFormat organizes information by work results (materials and methods) with the primary purposes of organizing specifications and detailed cost information. MasterFormat is normally used from design to construction.

Prevailing Wage Rates:

In government or state contracting, a prevailing wage is defined as the hourly wage, usual benefits and overtime, paid to workers, laborers, and mechanics within a particular area.

Prevailing wages are established by State & Government agencies (such as Department of Labor) for each trade and occupation employed in the performance of public work. Prevailing wage regulations are an important element in ensuring that public construction projects do not destabilize the local construction industry, in leveraging public works investments for supporting local economies and local governments, and in advancing other priorities such as workforce development. The most well understood need for prevailing wages is to prevent the public sector's large expenditures and strict competitive bidding requirements from destabilizing local and regional construction markets. By taking wages out of the equation, prevailing wages

organize competition around quality, productivity, and efficiency without touching off a “race to the bottom” as contractors underbid one another by lowering the rate of pay earned by their workers. The goal is that, with everyone playing on a level field, contractors seek to maximize their workers' output and their own ability to manage work better than their competition. (*Ref: Wikipedia*)