THE ACADEMY OF ELECTRICAL CONTRACTING

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CHANGE ORDERS
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The financial success or failure of the job often depends on the effectiveness of the change order system. General contractors, construction managers, and/or owners find it very easy to authorize subcontractors to perform additional work beyond the scope of the original contract.

However, unless the subcontractor has an effective change order system in place, they may not get paid for the change order work promptly and not receive the proper time extension required to perform the additional work.

Let us refer to the general contractors, construction managers, and/or owners, as simply the customers. Normally, what customers fail to realize, is that change orders to the original scope of work create a "disruption." If "disruptions" become too numerous, then the electrical subcontractor's original plan for manning the job with electricians, supervision, overhead, material and equipment, will be altered.

All change order work, when it increases the contract scope, results in cost and schedule impacts.

Paramount to commencing project change order work is prior recognition by the customer and electrical subcontractor alike, as to what format will be used to establish material pricing and labor units, establishing who has the authority to initiate a change order in writing, and the method of prompt payment for an approved change order.

The customer should be made aware of the following pricing information:

1. Refer to Exhibit A. The National Electrical Contractors Association Manual of Labor Units points out why change orders cost more.

2. Refer to Exhibit B which indicates how the R. S. Means Company handles the labor units of change orders. The Means estimating company further breaks change orders down into "Pre Installation" and Post Installation values."

Agreement must be reached with the customer concerning what labor units will be used in making change order estimates.

On a V. A. Hospital project which we recently completed, the General Services Administration of the Federal Government provided a format for our pricing change order work which clearly defines the importance of field supervision as a main component of "Field Overhead". (See Exhibit C)

Quite often in the private sector customers do not want to pay for field supervision .

On projects where there are no formal change order formats, Enterprise Electric Company has developed a change order format for firm price and time and material work with a page of explanations. (See Exhibits D, E and F)

Some of the do's and don'ts that might be included in an effective change order system are as follows:

1. The paperwork for change orders must be handled immediately. Don't let change orders stack up to be submitted later.

2. Do not start any change order work until it has been properly authorized in writing with a change order number.

3. Before starting any work, the change order cost should be agreed upon or method of pricing should be agreed upon.

4. Before starting the change order work, it must be perfectly clear that the work will be paid for promptly with the next requisition payment.

5. Avoid grouping several change order requests into one larger change order. This should prevent substantial time delays.

6. Change order work performed during one month should be billed before the end of the month and paid for before the end of the next month.

7. Change order work that has not been paid for in this reasonable time frame, should result in a 1½% escalation charge for each month thereafter.

8. From a legal standpoint, change order billing that is more than ninety days old constitutes a "breach of contract." When this happens, the electrical subcontractor should refuse to perform any more change order work until he is paid for what he is due.

9. When the delays become more serious, and the contract is breached, the electrical subcontractor have every right to pull all of his men off the job site. Hopefully, problems can be resolved before this drastic measure is taken.

10. Change order costs should not be subject to any retention.

11. The time and material costs of change orders should be monitored accurately.

12. Every change order estimate that results in a significant increase in the total scope of the work should be accompanied by a request for a time extension. Often the customer will deny the time extension. Having proper documentation will guard you against having to face additional costs in case the owner requires job acceleration and substantial overtime.

In conclusion, when project managers and/or field personnel keep detailed, accurate paperwork records of all change order work, potential disputes with owners, architects, engineers, and others will be minimized.

Jack F. Beck, Sr., P. E. was inducted into the Academy of Electrical Contracting last year. He is president of Enterprise Electric Company in Baltimore, Maryland and began working with them in 1954 after completing an electrical engineering degree. He has served the Maryland Chapter as President and Governor for several terms since 1974. In addition, he has served his chapter on many committees, for the longest periods on the Apprenticeship, Labor Negotiations, Architects & Engineers, and Labor Management committees.

EXHIBIT A

NECA Manual of Labor Units 1995-1996

WHY CHANGE ORDERS COST MORE

Don't be deceived by the illusion that all change orders make money. The majority have adverse impacts to the base contract' which in the long run can cause the contractor to experience detrimental conditions and higher costs. Some of these pitfalls are:

1) Excessive management time
2) Lower labor productivity
3) Interruption of job flow
4) Incorrect installation based on existing information
5) Rework of work already installed
6) Negative cash flow
7) Compressed job schedule
8) Extended overhead
9) Negative impact on base contract
10) Additional estimating costs
11) As Builts
12) Schedule revisions and updating
13) Expediting and handling changes
14) Restocking charges
15) Extended warranty

The best way to argue these pitfalls is to prepare an accurate change order estimate with (1) the real costs itemized in detail and (2) accompanying documentation outlining these costs. By use of the "Labor Adjustment Chart" on page 5 and other charts and information in this manual to strengthen your negotiating position, a pre-construction change order meeting should help you recover these hidden costs associated with change orders.

EXHIBIT B

1996
MEANS ELECTRICAL
CHANGE ORDER
COST DATA

8th Annual Edition

PRE-INSTALLATION
CHANGE ORDERS COST DATA

This section contains cost data for electrical change order work that occurs **before** the actual installation (new construction) has begun, but **after** the contract documents have been completed and, possibly, after the crews have been formed and material purchases made. For change order work that occurs after the original installation is substantially complete, see the "Post-Installation Change Orders" section.

These costs are categorized according to the CSI MasterFormat by division, subdivision, and line number. This numbering system is explained in Detail in "How to Use the Unit Price Pages." The meaning of each column (Crew, Daily Output, Labor-hours, Unit, Material, Labor, Equipment, Total, Total Including O & P) is also discussed at the beginning of this book in "How to Use the Unit Price Pages."

The unit prices in this Pre-installation Change Orders section are for change order **additions** to the base contract.

In most cases, change orders resulting in a deduction or a credit reflect only the bare costs. The contractor retains the anticipated overhead and profit based on the original bid.

EXHIBIT B

(Page 2 of 2)

POST-INSTALLATION CHANGE ORDERS COST DATA

This second cost data section contains prices for change order work that occurs **after** the original installation is nearly or entirely complete. These costs are generally higher due to additional complications, such as the need for immediate crew changes and/or increases, and rush material orders.

As with Pre-installation Change orders, the Post-installation Change Order costs allow for the additional expense of the actual change order work, but do not include demolition, or the disposal of any removed materials. Such additional work must be determined for each project.

For change order work that is to be performed **before** the original installation is substantially complete, see the Pre-installation section.

For more information on the numbering system used to organize this data and for a detailed explanation of the components that comprise this cost information, see "How to Use the Unit Price Pages."

The unit prices in Post-installation Change Orders are for change order **additions** to be base contract.

In most cases, change order resulting in a deduction or a credit reflect only the bare costs. The contractor retains the anticipated overhead and profit based on the original bid.

EXHIBIT C

GENERAL SERVICES ADMINISTRATION

FORMAT FOR PRICING CHANGE ORDER WORK

(FROM GSA PROPOSAL ESTIMATE FOR CONTRACT MODIFICATION) (#NAVFAC 4330/43)				
SUBCONTRACTOR'S WORK				*REVISIONS COMMENTS*
11 Direct Materials				
12 Sales Tax on Materials _____% of Line 11				
13 Direct Labor				
14 Ins.Taxes & Fringe Benefits_____% of Line 13				
15 Rental Equipment				
16 Sales Tax on Rental Equip_____% of Line 15				
17 Equipment Ownership & Operating Expenses				
18 TOTAL (ADD Lines 11-17)				
*19 FIELD OVERHEAD * SEE PAGE 2 OF 2*				
20 SUBTOTAL _____				
21 Home Office Overhead 3% of Line 20				
22 PROFIT _____% of Line 20				
23 SUBTOTAL (ADD Lines 20 & 22)				

EXHIBIT C

GENERAL SERVICES ADMINISTRATION

PRICE EVALUATION

FORM N62477-92-R-3078

* Field overhead will be evaluated as a percent markup and NOT a direct cost to the change proposal. Field overhead costs cover indirect costs incurred on this project that are chargeable only to this contract and include costs incurred at the job site incident to the performance of the work, such as the costs of superintendence, timekeeping, clerical work, engineering job site supervision, project manager, superintendent, general foreman, CQC staff, field engineer, secretaries, tool shed keeper, temporary facilities, contractor's office, utilities, storage sheds, supplies, office supplies, temporary protection and/or maintenance, dust control, noise control, winter protection, barricades (rented), haul road, clean-up, progress reports, equipment, superintendent's truck, truck for clean-up, and fringe benefits for supervisory and administrative personnel.

Enterprise Electric Company
Change Order Format

Exhibit D

Firm Price

Change Order Summary, C.O. No. _____

1) ***MATERIAL***

A	*Cost of Material*	*$ _____*
B	*Sales Tax @ _____%*	*$ _____*
C	*Freight @ _____%*	*$ _____*
D	*Shrinkage @ _____ %*	*$ _____*
	TOTAL MATERIAL COST	*$ _____*

2) ***SUBCONTRACT*** *$ _____*

TOTAL SUBCONTRACT *$ _____*

3) ***LABOR***

A	*_____ Journeyman Manhrs @ _____ per hour*	*$ _____*
B	*_____ Foreman Manhours @ _____ per hour @ _____ %*	*$ _____*
C	*_____ Gen.Foreman/Supt Manhrs @ _____ /hour @ _____ %*	*$ _____*
D	*_____ Material Handling Manhrs @ _____ per hr. @ _____ %*	*$ _____*
E	*_____ Drafting/Engineering Estimate Manhrs @ _____ per hour @ _____ %*	*$ _____*
	TOTAL LABOR COST	*$ _____*

4) **EQUIPMENT AND POWER TOOLS**

A	Equipment as listed	$ _____
B	Expendable tools & Supplies @ _____% of labor	$ _____
	TOTAL EQUIPMENT & TOOLS COST	*$ _____*

TOTAL DIRECT COST *$ _____*

MARK UP *$ _____*

TOTAL AMOUNT THIS CHANGE *$ _____*

Note: ***All Change Orders are based on Straight Time Rates unless shown otherwise.***
Extension of Time to contract if applicable ADD calendar day _____

Exhibit E

Time and Material
Change Order Summary, C.O. No. _____

1) MATERIAL

A	*Cost of Material*	*$ _____*
B	*Sales Tax @ _____%*	*$ _____*
C	*Freight @ _____%*	*$ _____*
	TOTAL MATERIAL COST	*$ _____*

2) TOTAL SUBCONTRACT *$ _____*

3) LABOR

A	*_____ Journeyman Manhrs @ _____ per hour*	*$ _____*
B	*_____ Foreman Manhours @ _____ per hour @ _____ %*	*$ _____*
C	*_____ Gen.Foreman/Supt Manhrs @ _____ /hour @ _____ %*	*$ _____*
D	*_____ Drafting/Engineering Estimate Manhrs @ _____ per hour @ _____ %*	*$ _____*
	TOTAL LABOR COST	*$ _____*

4) EQUIPMENT AND POWER TOOLS

A	*Equipment as listed*	*$ _____*
B	*Expendable tools & Supplies @ _____% of labor*	*$ _____*
	TOTAL EQUIPMENT & TOOLS COST	*$ _____*

TOTAL DIRECT COST *$ _____*

MARK UP *$ _____*

TOTAL AMOUNT THIS CHANGE *$ _____*

Note: *All Change Orders are based on **Straight Time Rates** unless shown otherwise.*
*Extension of Time to contract if applicable **ADD** calendar day _____*

Exhibit F

Change Order Format

(Definitions of Categories, Titles, and Sub-Titles for Exhibits D & E)

A) **Cost of Material:** This is the actual cost we expect to incur when we purchase the additional material. The costs used for major items of material, such as switchgear, lighting fixtures, etc are given to us by our suppliers as a "Quote" for the required material In all cases in which quotes are obtained copies of the quotes are available for the Customer's review. Miscellaneous material items, such as boxes, conduit, wire, etc. are priced by using the Trade Service Publications Electrical Pricing Manual. This manual is updated weekly and reflects the most current data available. Since most purchases on change orders are relatively small, we use the "broken carton" price for the items required in the change order. This is the wholesale price we expect to pay when material is purchased in small quantities.

B) **Freight:** This is the cost we expect to incur for freight on the shipment of materials to the job site. Most change orders do not have any single item of material that will allow the manufacturer to include freight as part of his listed selling prices. Therefore, we have to pay freight on any materials that do not meet minimum quantities to allow for the manufacturer to ship without added charges. The average cost we can expect to pay for freight is ____ % to _____ % of the material cost.

C) **Shrinkage:** This is the cost to allow for the theft and pilferage of stored material. It also takes into account the material damage prior to installation and the less than 100% utilization of purchased material (i.e., a 6' piece of conduit is used and 4' is thrown away).

D) **Journeyman Manhours:** The actual time it takes productive labor to install the work.

E) **Foreman Manhours:** Self-Explanatory

F) **Material Handling:** These are the non-productive manhours used to get the material to the workplace.

G) **Drafting/Engineering Estimate Hours:** This is the time spent by a person re-doing drawings for construction and As-Builts. Each time a change is issued, someone must update the drawings for construction and future use. Estimate hours reflect costs associated with estimating changes.

H) **Equipment:** Any equipment that is over $500 in value, is rented to the project. When this equipment is used in conjunction with a change order, each piece of equipment, when applicable, will be charged to the respective modification.

I) **Expendable Tools and Supplies:** _____ % of the cost of labor is used for the cost

J) **Mark-up:** Allows for overhead and profit.