

**Creating a Fair Process
for Pricing Change Orders**
Greg D. Long
*President
Long Electric*

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1.5 Continuing Education Hours.**

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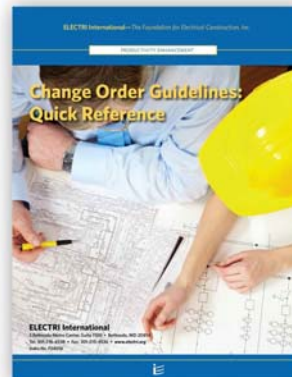
Purpose for this Session

- Present a systematic, standardized and fair process for the pricing of change orders
- Discuss opportunities to promote a standardized change order protocol that all Owners, Architects, Engineers, General Contractors and Subcontractors could adopt for all construction contracts

Learning Objectives

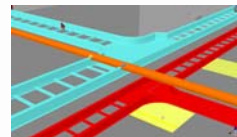
- Learn how to determine direct job costs
- Review the components and calculations for overhead and profit
- Learn how to document consequential cost claims
- Know where to go to find the literature that supports your CO requests

Change Order Documents



What is a Change Order?

- They are an essential part of every construction project
- They are typically issued by the owner or designer to the general contractor or construction manager to accommodate alterations to the original scope of work as defined in the contract documents.



What is a Change Order (contd.)

- A change order is defined as a written request, agreed to by the Architect, Owner and Contractor authorizing a change to the scope of work, contract sum and possible extension of time.

A201-2007 TEXT
<p>§ 7.2 CHANGE ORDERS</p> <p>§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:</p> <ol style="list-style-type: none"> 1 The change in the Work; 2 The amount of the adjustment, if any, in the Contract Sum; and 3 The extent of the adjustment, if any, in the Contract Time.

What is a Change Directive

- According to clause 7.3.1 of the AIA standard document A201-2007 and clause 8.2 of the ConsensusDocs standard document 200-2012, the owner may issue a written order directing a change in the work prior to agreement with the contractor on the adjustment, if any, in the contract price or the contract time or both.
- After a Change Directive has been issued, both parties must negotiate expeditiously and in good faith for adjustments to the contract price and/or the contract time, and then record this agreement in a Change Order.

Components of a Change Order

Direct Costs

- Labor
- Material
- Equipment
- Direct CO related expenses

Indirect Costs

- Overhead
- Profit

Consequential Costs

- Lost Labor Productivity
- Project Delays
- Other Costs

Direct Costs

- These are all of the costs that can be directly attributed to the change order request
- Direct Labor
 - List in detail
 - What productivity rates should apply?
 - What is included in the hourly rate?



Direct Cost

- Labor= Labor rate x Labor hours
- Labor supervision= Foreman x GF
- Project supervision= Project managers, Project engineer, Superintendent
- Material
- Subcontractors
- Equipment

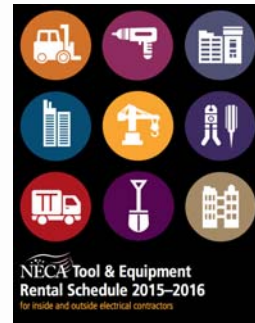


Table I.2: Sample Labor Burden Breakdown

(A) BASE WAGE		\$-
Taxable Fringes: Base Wage x (A)		
Vacation/Holiday	% or \$	\$-
Sick Pay	% or \$	\$-
Holiday Pay	% or \$	\$-
Others (specify):	% or \$	\$
(B) TOTAL TAXABLE FRINGES		\$-
(C) TOTAL TAXABLE WAGE	— (A+B)	\$-
Non-taxable Fringes: Applied to Base Wage x (A)		
Health, Vision Insurance	% or \$	\$-
Life Insurance	% or \$	\$-
Accidental Insurance	% or \$	\$-
Pension / Retiree benefit	% or \$	\$-
Apprentice / Training	% or \$	\$-
Service Charges	% or \$	\$-
Others (specify):	% or \$	\$-
(D) TOTAL NON-TAXABLE FRINGES		\$
(E) TOTAL TRADE RATE	— (C+D)	\$
Taxes and Burden: Applied to Total Taxable Wage		
E.I.C.A. x (C)	% or \$	\$-
E.U.T.A. x (C)	% or \$	\$-
S.U.T.A. / M.E.S.C. x (C)	% or \$ (From SUTA Rates)	\$-
Workers' Comp. x (C)	% or \$ (From WC Rates)	\$-
Contractors' Liability Ins. x (C)	% or \$	\$-
Bonds Allowance x (C)	% or \$	\$-
Small Tools Allowance x (C)	% or \$	
Safety x (C)	% or \$	
Communication x (C)	% or \$	
Others (specify): x (C)	% or \$	
(F) TOTAL TAXES and BURDEN		\$-
(G) TOTAL LABOR RATE	— (E+F)	\$-

Source: EM&R 2014, ME/NECA, Cost Studies

- **Material & Equipment**
 - List in detail
 - Price should be based on published trade prices or rental rate sheets

Table I.3 & 4: Direct Material and Equipment Costs Based on Overall Analysis

"Direct Cost - Material and Equipment" Template				
	Units	Unit \$	Comments	Total \$
3A & 4A. MATERIAL AND EQUIPMENT COST ITEMS - Allowed				
Materials				
Equipment and Rental				
Transportation of Material & Equipment				
Storage / Handling of Material & Equipment				
Temporary Facilities				
Inspection / Testing of Material & Equipment				
Small / Hand Tools (not owned by workers)				
Non-hazardous Waste Clean-up				
Restocking and Cancellation				

- **Other Direct Job Expenses**
 - List in detail

Table I.5: Direct Job Costs/Expenses Based on Overall Analysis

"Direct Cost - Job Costs / Expenses Related to CO" Template				
	Units	Unit \$	Comments	Total \$
5A. JOB COST / EXPENSE ITEMS - Allowed				
Bonds, Security and Project Insurance				
Sales Taxes				
Permit Fees				
Subcontractor Costs				
Job Office-related Operation Costs				
Licenses and Certifications				
Special Consultants' Fees				
Safety Measures and Equipment				
Water, Power, and Fuel Costs				
Mobilize and Demobilize				
Special Project Requirements (e.g., LEED)				
5B. JOB COST / EXPENSE ITEMS - Maybe / Depends				
Drawings, Documents and Printing				
Parking				
Shop Expenses*				
Guaranties and Warranties				

* May include shop labor, material procurements, handling, delivery, inventory control, equipment costs and maintenance, depreciation, utilities, rent, insurance, consumables, etc.

Overhead & Profit

- Overhead is all the costs required to run your company even if you have no work
 - Office rental, maintenance, utilities and expenses, office equipment and supplies
 - Officer’s and Office Salaries (estimators)
 - Property taxes, business licenses and auto insurance
 - Dues and subscriptions
 - Advertising and telephones

Sample Income Statement		Percent
Income (Contract Revenue)	\$ 1,295,678	100.0%
Cost of Construction		
Job Labor	426,956	33.0%
Job Material	264,987	20.5%
Job Sub-Contract	117,883	9.1%
Job Misc.	28,928	2.2%
Job Burden	91,544	7.1%
Total Cost of Construction	\$ 930,298	71.8%
Gross Profit	\$ 365,380	28.2%
General & Administrative		
Office Rent	12,000	0.9%
Office Utilities	1,200	0.1%
Equipment Expense	4,687	0.4%
Property Taxes	9,000	0.7%
Dues & Subscriptions	1,267	0.1%
Postage	568	0.0%
Advertising	2,356	0.2%
Legal & Accounting	1,567	0.1%
Office Salaries	125,890	9.7%
Estimators Salaries	87,900	6.8%
Total G & A	246,435	19.0%
Operating Profit	118,945	9.2%

Overhead (contd.)

- What is your Overhead Percent?
 - Overhead \$ / Total Company Sales \$

Company Revenue	Overhead	OH %
\$ 1,295,678	\$ 246,435	19%

- In fact according to Electri-International research doc F3405a that took an average from (12) different studies and publications the average turned out to be 19.16%

Overhead (contd.)

- Now for the Quiz
 - What would you add as a percent to a Change Order that had a \$15,000 cost of Labor, Material and Direct Cost to recover that 19% Overhead?

All Direct Costs		\$ 15,000
OH %	19%	\$ 2,850
Total with OH		\$ 17,850
Overhead Recovery		16%

Overhead (contd.)

- What is the correct % when applying to all Direct Costs?
 - OH % / (1- OH%)
 - 0.19 / (1- 0.19)
 - 0.19 / 0.81
 - 23.5%

All Direct Costs		\$ 15,000
OH %	23.5%	\$ 3,525
Total with OH		\$ 18,525
Overhead Recovery		19.0%

Profit

- Profit is generally defined as the amount of money a company makes after accounting for all costs and expenses (including overhead)
- What is a reasonable Profit
 - Somewhere between 5% and 10%?

Profit (contd.)

- Using our overhead example the calculation for profit is:
- Profit % / (1- Profit %)
- 0.05 / 0.95
- 5.3 %

All Direct Costs		\$	15,000
OH %	23.5%	\$	3,525
Total with OH		\$	18,525
Markup	5.3%	\$	982
Total with Markup		\$	19,507
Profit			5%

Consequential Costs (Impact Factors)

- These costs are incurred due to time and scope changes, which may impact overall project costs or duration
- It is important to include these potential costs on the Change Order with quantification and documentation
- There is substantial literature and case studies available to backup these factors

What are these Factors?

- Labor productivity factors
 - May decrease productivity or increase labor hours
- Added cost factors
 - May increase change order costs
- Project & Field condition factors
 - May cause project delays

Labor Productivity Loss

- Stacking of Trades
 - Operations take place within physically limited space with other contractors resulting in inability to locate tools, increased loss of tools and additional safety hazards
 - Loss ranges 10% / 20% / 30%
- Overtime
 - Lowers work output and efficiency through physical fatigue and poor mental attitude
 - Loss ranges 10% / 15% / 20%

Impact Factors (contd.)

Table III: Impact Factors and Productivity Loss Percentages

Factors	% of loss if condition is:		
	Minor	Average	Severe
<i>1. Stacking of Trades</i> Operations take place within physically limited space with other contractors. Results in congestion of personnel, inability to locate tools conveniently, increased loss of tools, additional safety hazards and increased visitors. Optimum crew size cannot be utilized.	10%	20%	30%
<i>2. Morale and Attitude</i> Excessive hazard, competition for overtime, over-inspection, multiple contract changes and rework, disruption of labor rhythm and scheduling, poor site conditions, etc.	5%	10%	15%
<i>3. Reassignment of Manpower</i> Loss occurs with move-on, move-off men because of unexpected changes, excessive changes, or demand made to expedite or reschedule completion of certain work phases. Preparation not possible for orderly change.	5%	10%	15%
<i>4. Crew Size Inefficiency</i> Additional men to existing crews "breaks up" original team effort, affect labor rhythm. Applies to basic contract hours also.	10%	20%	30%
<i>5. Concurrent Operations</i> Stacking of this contractor's own force. Effect of adding operation to already planned sequence of operations. Unless gradual and controlled implementation of additional operations made, factor will apply to all remaining and proposed contract hours.	10%	20%	30%
<i>6. Dilution of Supervision</i> Applies to both basic contract and proposed change. Supervision must be diverted to (a) analyze and plan change, (b) stop and replan affected work, (c) take off, order and expedite material and equipment, (d) incorporate change into schedule, (e) instruct foreman and journeyman, (f) supervise work in progress, and (g) revise punch lists, testing and start-up requirements.	10%	15%	25%
<i>7. Learning Curve</i> Period of orientation in order to become familiar with changed condition. If new men are added to project, effects more severe as they learn tool locations, work procedures, etc. Turnover of crew.	5%	15%	39%

Factors	% of loss if condition is:		
	Minor	Average	Severe
<i>8. Errors and Omissions</i> Increases in errors and omissions because changes usually performed on crash basis, out of sequence or cause dilution of supervision or any other negative factors.	1%	3%	6%
<i>9. Beneficial Occupancy</i> Working over, around or in close proximity to owner's personnel or production equipment. Also badging, noise limitations, dust and special safety requirements and access restrictions because of owner. Using premises by owner prior to contract completion.	15%	25%	40%
<i>10. Joint Occupancy</i> Change causes work to be performed while facility occupies by other trades and not anticipated under original bid.	5%	12%	20%
<i>11. Site Access</i> Interferences with convenient access to work areas, door man-lift management or large and congested worksites.	5%	12%	30%
<i>12. Logistics</i> Owner furnished materials and problems of dealing with his storehouse people, no control over material flow to work areas. Also contract changes causing problems of procurement and delivery of materials and re-handling of substituted materials at site.	10%	25%	50%
<i>13. Fatigue</i> Unusual physical exertion. If on change order work and men return to base contract work, effects also affect performance on base contract	8%	10%	12%
<i>14. Ripple</i> Changes in other trades' work affecting our work such as alteration of our schedule. A solution is to request, at first job meeting, that all change notices/bulletins be sent to our Contract Manager.	10%	15%	20%
<i>15. Overtime</i> Lowers work output and efficiency through physical fatigue and poor mental attitude.	10%	15%	20%
<i>16. Season and Weather Changes</i> Either very hot or very cold weather.	10%	20%	30%

Bringing it all Together

- We have taken off a complete list of material and labor that will be needed to complete the change request
- Priced the material and applied the appropriate labor productivity column
- Listed all of the other direct costs
- Applied the appropriate OH and MU
- Listed all of the appropriate Labor Factors and other consequential costs

LONG ELECTRIC CO.
 630 Airpark Road, Suite A
 Napa, CA 94558
 T: 707.252.3512 - F: 707.252.8340 - CSL# 560809

CHANGE PROPOSAL

Client Address:

ACT Construction
 124 12th St
 San Jose

Change Proposal # 30
 Date: 8/1/2015
 Project Name: Actual Tower
 Project Number: 05-456 Actual Tower
 Page Number: 1

Work Description

Fred Stirele has requested two additional 15A outlets in Room 3A along the north wall

We reserve the right to correct this quote for errors and omissions.
 This quote covers direct costs only and we reserve the right to claim for impact and consequential costs.
 This price is good for acceptance within 10 days from the date of receipt.
 We request a time extension of 3 days.
 We will supply and install all materials, labor and equipment as per you instructions on CGN #30.

Itemized Breakdown

Description	Qty	Net Price U	Total Mat.	Labor U	Total Hrs.
#12/2C SOLID CABLE MC - STL ARMOR	40	922.50 M	36.90	17.40 M	0.70
3/8" CONN SADDLEGRIP DC FOR FLEX / AC-90 / MC	4	83.49 C	3.34	6.00 C	0.24
NMC OR M24C SUPPORT TO WOOD OR MTL STUD	2	48.21 C	0.96	5.00 C	0.10
CABLE/CONDUIT ANTI-RATTLE SUPPORT FOR MTL	8	33.77 C	2.70	4.00 C	0.32
B2-1 RED WIRE CONN	4	13.48 C	0.54	6.00 C	0.24
4x 1 1/2" SQ BOX COMB KO W/ FLUSH MTL STUD BF	2	1,238.91 C	24.78	23.00 C	0.46
4" SQ 1G PLASTER RING 5/8" RISE	2	592.49 C	11.85	2.50 C	0.05
GROUND SCREW W/ INSUL #12 LEAD	2	318.20 C	6.36	3.00 C	0.06
#6x 1/2 WAFER HEAD SHEET MTL SCREW	12	4.05 C	0.49	1.50 C	0.18
1G DUPLEX REC PLATE - PLASTIC IVY	2	49.28 C	0.99	2.70 C	0.05
15A 125V DUP REC - IVY (SQ)	2	1,602.00 C	32.04	15.00 C	0.30
Totals	80		120.95		2.70

Summary

General Materials		120.95
Material Tax	(@ 7.000 %)	8.47
Total Material		129.42
JOURNEYMAN	(2.70 Hrs @ \$52.00)	140.40
Supervision @ 12.5%	(0.34 Hrs @ \$55.00)	18.70
SAFETY @ 3.5%	(0.09 Hrs @ \$52.00)	4.68
CLEAN UP @ 4.0%	(0.11 Hrs @ \$52.00)	5.72
GUARANTEE @ 3.0%	(0.08 Hrs @ \$52.00)	4.16
ESTIMATING	(0.50 Hrs @ \$55.00)	27.50
TRAVEL TIME	(0.25 Hrs @ \$0.00)	0.00
Total Labor		201.16
Total Material & Labor		330.58
PARKING (per Day)	(1.00 @ 0.00 @ \$8.25 + 0.000 % + 0.000 % + 0.000 %)	8.25

ORIGINAL

CHANGE PROPOSAL	Change Proposal # 30
	Date: 8/1/2015
	Project Name: Actual Tower
	Project Number: 05-456 Actual Tower
	Page Number: 2

Summary (Cont'd)	
ELECTRIC GOLF CART (per Day)	(1.00 @ 0.00 @ \$45.00 + 0.000 % + 0.000 % + 0.000 %) 45.00
Subtotal	383.83
Overhead (@ 23.500 %)	90.20
Markup (@ 5.300 %)	25.12
Total Markups	115.32
Final Amount	\$499.15

CONTRACTOR CERTIFICATION

Name: Don Corde

Date: <date>

Signature: _____

I hereby certify that this quotation is complete and accurate based on the information provided.

CLIENT ACCEPTANCE

Change Proposal #: 30

Final Amount: \$499.15

Name: _____

Date: _____

Signature: _____

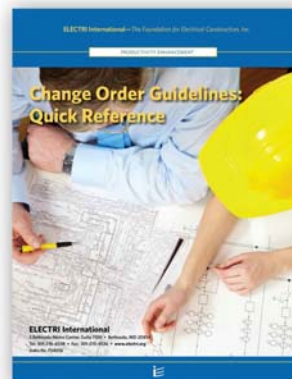
Change Order #: _____

I hereby accept this quotation and authorize the contractor to complete the above described work.

Key Takeaways

- Owners are as unsure about change order related issues as are contractors
- Contractors should think of OH and Profit percentages as they relate to the total change order amount
- Most consequential / labor factor costs can either be included as part of directly recoverable costs or as a separate category
 - The burden is on the contractor to detail and substantiate the calculations

Change Order Documents



Change Order Protocol

- Greater Toronto Electrical Contractors Association
- The Master Insulator's Association of Ontario, Inc.
- Mechanical Contractors Association:
 - British Columbia
 - Canada
 - Hamilton
 - New Brunswick
 - Ontario
 - Saskatchewan, Inc.
 - Toronto
- Ontario Refrigeration & Air Conditioning Contractors Association
- National Trade Contractors Coalition of Canada
- Toronto Construction Association
- Toronto Sheet Metal Contractors Association

Change Order Reform Next Steps

Collaborate with:

- National Electrical Contractors Association
 - Sheet Metal & Air Contractors Association
 - Mechanical Contractors Association
 - American Subcontractors Association
 - United Contractors Association
 - Associated General Contractors of America
 - American Institute of Architects
 - Construction Financial Management Association (CFMA)
 - Financial Accounting Standards Board (FASB)
- Share with Colleagues and Customers

Referenced Sources

- Electri-International publication F3405a Change Order Guidelines
- Electri-International publication F3405b Change Order Guidelines
- AIA A201 (2007)
- ConsensusDocs 200 (2012)
- EJCDC C-700 (2007)
- CCDC 2 (2008)
- CFMA (2013)
- RS Means (2013)
- FASB

Questions

Up Next: Interactive Break in the Cibolo Canyon Ballroom

- TravelFit
- Workout Challenge
- Tips & Tricks for Taming Your Inbox
- 5 Ways to Keep Hackers Away From Your Personal Info

Don't forget to fill out the online evaluation at www.necanet.org/NNSurvey2017