

# Change Order Protocol



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# Introduction

Change orders are a necessary part of every construction project. They are issued to accommodate changes to the construction contract, generally by the owner or consultants to the general contractor (GC) or the construction manager (CM). In most cases, the GC/CM, in turn, requests the related trades subcontractor to provide a change order quotation. A change order is defined as a written order, agreed upon by the owner, contractor and consultant, authorizing changes to the scope of the work, the contract sum, and the contract time.

Contractors are routinely asked to prepare change order proposals as part of the change order process. The single most common area of dispute in the change order process is its cost. Among cost-related disputes, items related to recoverable direct cost, overhead / profit percentages, and impact factors resulting in consequential costs constitute the vast majority of the impasses. Subcontractors presenting change orders face the double task of dealing with GCs/CMs in addition to owners/consultants

Once the decision to issue a contemplated change notice (or similar trigger) has been made, the next typical issue in disagreement is price and most often the labour component, being a direct cost, and the appropriate markups for overhead / profit.

Direct costs are easily identifiable and quantifiable. Overhead / profit costs are generally quantified as a percentage of the direct cost or of the total change order amount, albeit that percentage, as noted, is often a cause for debate. In addition, there is a third category of costs, known as consequential costs, beyond those costs beyond the obvious labour and materials costs, often arising due to impact or other factors. These are difficult to identify and quantify and, therefore, are a source of conflict and controversy when included in change order pricing.

Contractors must often address situations where they are not allowed to include in the change order all of their direct cost items and/or an appropriate percentage of overhead / profit. Additionally, most subcontractors believe that change orders are generally not profitable for them. That perspective, although likely honestly held, makes little sense, unfortunately. In addition to lack of adequate cost recovery, change orders often have a negative impact on the project's overall progress and budget due to their impact on rest of the project.

The primary purpose of this protocol is to develop guidelines that provide a systematic, standardized, fair process for the pricing of change orders for Ottawa contractors and other members of the local industry and to inform industry participants as to the considerations involved in pricing a change order and the need for appropriate markups for overhead and profit on change orders.

It is hoped that the templates/tables provided in these guidelines will be shared by contractors with other project stakeholders (owners, consultants). It is envisioned that the analysis presented in this report will serve as a helpful tool for reducing confusion and conflict among various project stakeholders<sup>1</sup>.

## The Problem

Industry members have communicated a series of problems associated with pricing change orders and in particular, limited availability for overhead / profit mark-up as provided for in tender documents. Members appear to believe that owner and consultants do not have a full appreciation as to the costs incurred in respect of pricing change orders.

This protocol is designed to address that situation and set out some of the considerations made by contractors and subcontractors in pricing change orders.

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<sup>1</sup> This document is largely premised on and relies heavily on the Change Order Guidelines for Electrical and Low Voltage Contractors. ELECTRI International, Michigan State University School of Planning, Design and Contractuction, Matt Syal, Joseph Diffendal and Daniel Duah, authors (2014). Full credit is provided to them.

# Purpose, Scope and Methodology

The main purpose of this protocol is to develop guidelines that provide a systematic, standardized, fair process for the pricing of change orders for the Ottawa construction industry and develop a platform for continuing consultation and education for OCA members on change management best practices. It is hoped that the first step to such a standardized process would be ensuring that all participants are aware of the actual costs involved in a change order process. This protocol identifies various costs categories and items, investigates overhead / profit practices, and identifies various impact factors and methods used to calculate associated consequential costs in that effort.

The ultimate goal is to have a document with input from contractors and contractor associations from Ottawa that has a two-fold effect:

first, continuing a discussion amongst OCA members on best practices for pricing change orders; and,

second, using this protocol as reference guide that can be referred to and incorporated by reference into contract documents and specifications or for qualifying ones bid submission or RFP submission thus providing a platform for a developing standard for the pricing and markup of change orders.

## What Comprises the Costs of a Change Order?

By their very appearance, it is easy to believe that a change order is simply: labour + material + markup. However, there are a myriad of considerations that go into direct costs associated with labour and material, indirect costs and other impact factor / consequential costs. Change order costs can be broken down into three major categories

- Direct Costs
- Indirect Costs / overhead / profit
- Consequential Costs due to Impact Factors
- Each of the above-noted cost categories and their subcategories as shown in

Figure 1.

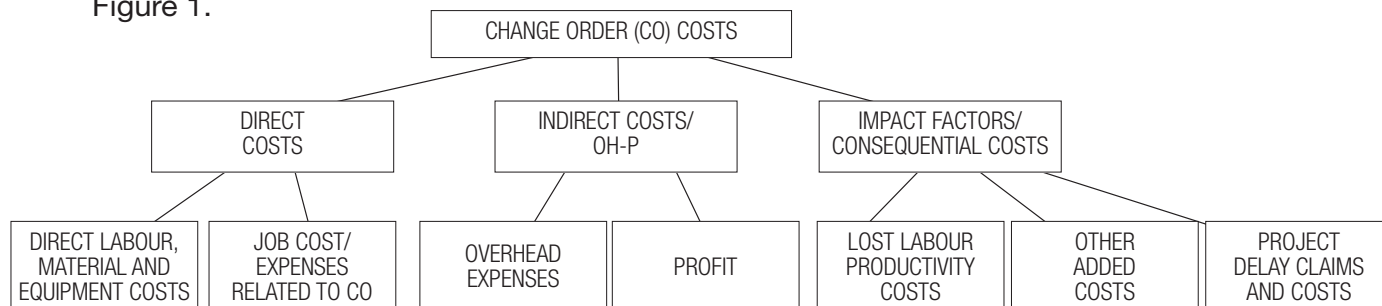


Figure 1: Cost Categories for a Change Order (CO)



# Change Order Templates

The following templates can be helpful for contractors and subcontractors for preparing change orders and, more importantly, for other industry participants, and most notably for consultants and owners, in assisting in and understanding what comprises the “price” in a change order.

The tables are to illustrate factors a contractor or Subcontractor must consider when pricing a change order.

Table 1 provides a summary change order template. Subsequent tables provide details of some of the rows in the summary table.

**TABLE 1: SUMMARY CHANGE ORDER TEMPLATE**

## SUMMARY CHANGE ORDER TEMPLATE

### I. DIRECT COSTS\*

1. Labour (per attached breakdown)
2. Labour Burden (per attached breakdown)
3. Material (per attached breakdown and quotes)
4. Equipment (per attached breakdown, quotes and/or rental schedule)
5. Related Job Costs/ Expenses (per attached breakdown)

Subtotal: A

### II. INDIRECT COSTS

1. Overhead % (modified to use as % of total direct costs, per attached calculations)

(A X %): B

Subtotal (A+B): C

2. Profit %

(C X %): D

### III. CONSEQUENTIAL COSTS (per attached breakdown and justification OR reserve the right to submit later)

1. Lost Labour Productivity Cost (add to direct Labour cost OR provide separately here)
2. Other Added Costs (add to direct job costs/expenses OR provide separately here)
3. Delay Days and Costs (provide here OR indicate to provide later)

Subtotal: E

Total Change Order Cost: C+D+E

TABLE 2 DIRECT DIRECT LABOUR COSTS BASED ON OVERALL ANALYSIS

**“DIRECT COST – LABOUR” TEMPLATE**

	Units	Unit \$	Comments	Total \$
I A. LABOUR COST ITEMS- Allowed				
Labour Wages and Burden *				
Supervision and Related Field Office Personnel				
Room , Board and Travel Allowance (if contemplated by contract terms)				
Supervision (other than foreman)				
Change Order Preparation and Processing				
LABOUR COST ITEMS- Maybe / Depends				
Estimating and Expediting				
Main Office Personnel in Project Offices				

*\*Note: use Labour rate and burden on a journeyman basis unless specified otherwise*

TABLE 3: SAMPLE LABOUR BURDEN BREAKDOWN

<b>(A)</b>	<b>BASE WAGE</b>		\$-
<b>Taxable Burdens: Base Wage x ( A )</b>			
	Vacation/Holiday	% or \$	\$-
	Sick Pay	% or \$	\$-
	Holiday Pay	% or \$	\$-
	Others (specify):	% or \$	\$-
<b>(B)</b>	<b>TOTAL TAXABLE BURDENS</b>		\$-
<b>(C)</b>	<b>TOTAL TAXABLE WAGE</b>	<b>(A+B)</b>	\$-
<b>Non-taxable Burdens: Applied to Base Wage x (A)</b>			
	EHT, WSIB, EI, CPP, RST on H/W	% or \$	\$-
	Life Insurance	% or \$	\$-
	RRSP / Retiree benefit	% or \$	\$-
	Apprentice / Training	% or \$	\$-
	Service Charges	% or \$	\$-
	Others (specify):	% or \$	\$-
<b>(D)</b>	<b>TOTAL NON-TAXABLE BURDENS</b>		\$-
<b>(E)</b>	<b>TOTAL TRADERATE</b>	<b>(C+D)</b>	\$-

TABLE 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				
3B & 4B. MATERIAL AND EQUIPMENT COST ITEMS - Maybe/ Depends				

TABLE 5: DIRECT JOB COSTS/EXPENSES BASED ON OVERALL ANALYSIS

**“DIRECT COST – JOB COSTS / EXPENSES RELATED TO CO” TEMPLATE**

	Units	Unit \$	Comments	Total \$
<b>5A. JOB COST / EXPENSE ITEMS – Allowed</b>				
Bond, 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 (eg., LEED)				
<b>5B. JOB COSTS / EXPENSE ITEMS – Maybe / Depends</b>				
Drawings, Documents and Printing				
Parking				
Shop Expenses*				
Guaranties and Warranties				

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

TABLE 6 OH PERCENTAGE BASED ON OVERALL ANALYSIS

Change Order OH as % of Total Price	
Source	Average %
Industry Survey Responses (average)	
<p><b>*This OH % is for applying to total Change Order amount. Convert this %s for applying to total of Direct Costs by using the formula and example below:</b></p> <p><b>(% for Direct Cost) = (% for total CO amount)/(1 - % for total CO amount)</b></p> <p><b>e.g., If the OH% is 20% on the total CO amount of \$100</b></p> <p><b>then the OH % for the Direct Cost of \$80 = <math>0.20/(1-0.20) = 0.20/0.80 = 0.25</math> or 25%</b></p>	

*\* (Based on this formula the above-noted OH of 19.16% of total CO amount should equal 23.70% of Direct Cost)*

TABLE 7 SAMPLE OVERHEAD COSTS BREAKDOWN

**SAMPLE OVERHEAD COSTS BREAKDOWN**

ITEM	% OF SALES/REVENUE
<b>MAIN OFFICE OPERATIONS:</b>	
Personnel: salaries, benefits, bonuses, etc.	
Office Utilities: telephone, internet, gas, electric, water, etc.	
Office Equipment: computers, data, photocopy, fax, etc.	
Office Furniture	
Education and Training	
Company-wide Safety	
Initiative Business	
Licenses	
Corporate Business Insurance	
Legal Fees, Accounting and Royalties	
Advertising and Marketing	
Autos and Auto Insurance	
Storage and Equipment Yard	
Shop Operations	
Dues and Subscriptions	
Rent or Mortgage	
Property Taxes	
Other Corporate Overhead	
<b>PROJECT-RELATED:</b>	
Estimating (not related to CO)	
Scheduling (not related to CO)	
Timekeeping (not related to CO)	
Other Project-Related OH	
<b>TOTAL OVERHEAD PERCENTAGE*</b>	<b>%</b>

*\*If applying as % of direct costs, convert it by using  $(this \%)/(1-this\%)$*



# Examples of Impact Factors and Consequential Costs

Consequential costs are incurred when the timing and the scope of change order work affects the cost of the change order and/or overall project cost or duration. The factors affecting these costs are often referred to as impact factors. These factors are particularly important for trade contractors who are expending the labour costs and therefore being impacted by impact factors on productivity. Their work is considered labour-intensive and a majority of these factors have negative impacts on labour productivity. The two most important issues related to impact factors and associated consequential costs are their timely identification and, next, their quantification and inclusion in the change orders.

This section identifies major impact factors and discusses common methods/techniques to calculate their costs. It uses literature review, case studies, surveys input from claims consultants and relevant court cases in an attempt to define impact factors and associated consequential costs.

**TABLE 8 POTENTIAL IMPACT FACTORS BY CATEGORIES**

<b>Labour Productivity-related Factors</b>	<b>Added Cost Factors</b>	<b>Project and Field Conditions-related Factors</b>
<i>(may decrease productivity or increase Labour hours-can be used to add to Labour hrs.in the change order or submit as separate claim)</i>	<i>(may increase change order costs-can be used to add cost to the change order or submit as separate claim)</i>	<i>(may cause project delays-can be used to indicate potential delay on the change order and then, later submit a delay claim)</i>
Stacking of Trades Morale and Attitude Reassignment of Manpower Crew Size Inefficiency Concurrent Operations Dilution of Supervision Learning Curve Errors and Omissions Beneficial Occupancy Joint Occupancy Site Access Logistics Fatigue Ripple Effect Overtime Season and Weather Changes Aggravation & Stress Interference & Disruptions Down or Idle Time Acceleration Working in Finished Areas Congested Drawings Suspension of Work Phasing and Sequence	Increased Contract Administration Cash Flow Interruption Delayed Retainage Release Lost Profits Increased Job cost Accounting Lost Opportunity Costs Reordering of Parts Premiums for Purchasing Materials Material Escalation Costs Supervision Time for Another Project Interest/Finance Charges Depreciation Canceled Contracts	Capacity Issues Altered Conditions Ripple Effect Cumulative Impact of Change orders Coordination Time Season and Weather Changes Phasing and Sequence

See <http://mcaottawa.com/wp-content/uploads/2021/05/2021-2022-CO-rate-Sheet-Metal.pdf>

TABLE 9 IMPACT FACTORS AND PRODUCTIVITY LOSS PERCENTAGES

FACTORS	% of loss if condition is:		
	Minor	Average	Severe
<b>1. Stacking of Trades</b> 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%
<b>2. Morale and Attitude</b> Excessive hazard, competition for overtime, over-inspection, multiple contract changes and rework, disruption of Labour rhythm and scheduling, poor site conditions, etc.	5%	10%	15%
<b>3. Reassignment of Manpower</b> 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%
<b>4. Crew Size Inefficiency</b> Additional men to existing crews "breaks up" original team effort, affect Labour rhythm. Applies to basic contract hours also.	10%	20%	30%
<b>5. Concurrent Operations</b> 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%
<b>6. Dilution of Supervision</b> 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%
<b>7. Learning Curve</b> 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%
<b>8. Errors and Omissions</b> 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%
<b>9. Beneficial Occupancy</b> 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%
<b>10. Joint Occupancy</b> Change causes work to be performed while facility occupies by other trades and not anticipated under original bid.	5%	12%	20%
<b>11. Site Access</b> Interferences with convenient access to work areas, door man-lift management or large and congested worksites.	5%	12%	30%
<b>12. Logistics</b> 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%
<b>13. Fatigue</b> 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%
<b>14. Ripple</b> 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%
<b>15. Overtime</b> Lowers work output and efficiency through physical fatigue and poor mental attitude.	10%	15%	20%

## ACKNOWLEDGEMENT

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