Six Steps for Successful Change Order Management

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Abstract: The purpose of this article is to discuss sound change order management practices and strategies to resolve change requests that occur during a construction project. Change in the construction industry is inevitable, and it occurs to some degree during almost every construction project. Changes may be minor, such as requesting additional money for the purchase of a valve. Or, changes may be complex, such as requesting millions of dollars for schedule delays and labor productivity losses. This article identifies six steps for the parties involved in a construction project to implement as part of change order management prior to the start of construction, during project execution, and if resolution regarding a change is not reached, through the negotiation process. Following these steps can help ensure that changes are managed efficiently and effectively, which, in turn, can lead to the overall success of a project.

Key Words: Change order, construction, labor productivity, and schedule delays

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This article identifies six steps for the parties involved in a construction project to implement, as part of change order management. These need implemented prior to the start of construction, during project execution, and if resolution regarding a change is not reached, through the negotiation process.

Following these steps can help ensure that changes are managed efficiently and effectively, which, in turn, can lead to the overall success of a project.

- The first step in effective change order management is to fully understand the requirements of the contract, specifically what constitutes a reimbursable change, and the documents submitted requirements.
- The second step is to identify the change when it occurs. Change, according to the contract, can be defined as extra or additional work; defective or deficient plans or specifications; schedule delay or acceleration; unforeseen differing site conditions; or disruption to the work progress and methodology.
- Notification is the third element and is both an internal and external function.
- The fourth step is documenting the change with contemporaneous project records to verify the nature of the change and report the changed conditions.
- The fifth step is preparing the change order request and damage assessment in order to establish a link or cause-effect relationship between the party entitlement and the resultant damages or delays. The extent of change order preparation depends on the complexity and dollar amount of the change request. This article primarily addresses complex change requests and discusses, in detail, the various types of damage quantifications.
- The final step is to attempt to have all the parties resolve the change order request during the construction process, so budgets can be adjusted to reflect the change. If the parties cannot agree, then more costly change resolution options exist—mediation, litigation, or arbitration.

Six Steps to Managing Change

The failure to recognize and promptly manage change frequently costs the parties involved time and money.

The following steps provide a comprehensive approach to resolving project changes in a more cost and time efficient manner.

- evaluate the contract;
- identify the change;
- notify parties of change;
- document the change;
- prepare the change request; and
- resolve the change request.

Implementing these steps at the first sign of a change can help the parties spend less money and exert less effort to recover or pay for the costs associated with the change. As shown in figure 1, the parties can benefit by maximizing their efforts to resolve the changes during the construction project, rather than incurring the high costs associated with mediation,
arbitration, or litigation after the project is complete.

Step 1—Evaluate the Contract

One of the most important steps to successfully managing change is for the parties to thoroughly review and understand the contract requirements before the project starts.

By understanding the project delivery method, the project manager and other supervisory personnel can readily recognize and identify change and know what the contract considers a compensable change.

Additionally, the parties to the contract need to clearly understand the provisions regarding conflicts and discrepancies in the documents and other risks, such as evaluating the project site, which could affect the entitlement to recover funds associated with a change.

Figure 2 summarizes key contract provisions associated with identifying and processing a change.

It is paramount that the parties spend time developing and understanding the contract to avoid one-sided contracts. It is not uncommon for actions taken during the early phases of the project, that are not in accordance with the contract, to later become a source of disagreement.

When a construction contract dispute includes questions regarding the claimant's entitlement to extra time or money, one should ask the following questions.

- **Question**—Does the contract provide for additional time and/or compensation to the contractor or recovery of liquidated damages or other costs by the owner in the circumstances alleged by the claimant?

  **Response**—Examine all clauses that may entitle a party to additional time or money. Did the claimant contractually assume responsibility for the risk that is involved in the dispute? Look for any explicit acceptance of the risk for the costs now claimed. The owner is well advised to be temperate when acceptance of risk by the contractor is found in overly broad disclaimers or "exculpatory" clauses (e.g., blanket no-damages-for-delay clauses).

- **Question**—Are the claimed costs for matters that were inside or outside of the claimant's original scope or duties under the contract?

  **Response**—Examine relevant plans and specifications, referenced standards, special provisions and general conditions of the contract, and if necessary, the clause stating the order of precedence of documents. Do not overlook pre-bid addenda and bid conference meeting minutes. Evaluate what the parties should have reasonably expected when entering the contract.

- **Question**—Did the claimant perform its scope or duties in accordance with the contract, or did the problem arise from the claimant’s deviation from the contract documents?

  **Response**—In summary, the parties need to understand the rules of the contract prior to and during contract execution in order to identify change situations and remedy potential change request disputes.

Step 2—Identify the Change

The second step in successful change order management is to identify the change, which can be defined as any anticipated or actual deviation from the contractual scope, schedule, or price/budget/cost. One of the most common problems on a project is the contractor's, owner's, or owner’s representative's failure to recognize project change.

There are essentially five types of changes. These include the following.

- extra/additional work;
- defective or deficient plans and/or specifications;
- schedule or workforce delay and acceleration;
- differing site conditions; and
- schedule or workforce disruption.

- Notice requirements
- Contract time provisions
- Provisions regarding conflicts, errors in documents
- Submittal procedures
- Claims/dispute provisions
- Site evaluations
Change Type 1—Extra/Additional Work

Before contractors issue proposals requesting additional money from owners, they need to ask themselves if a change for extra/additional work is a directed change, with an issued formal change order, or a constructive change.

A constructive change is defined as any conduct by an owner that is not acknowledged by a formal change order, but which requires the contractor to perform work that is not mandated by the contract, such as altering the contractor's methodology, quality, or scheduling of work.

Change Type 2—Defective/Deficient Plans/Specifications

When defective or deficient plans and/or specification issues arise, owners should evaluate the contract language, as it may shift the responsibility to the contractor.

The contract may contain a disclaimer regarding the accuracy and completeness of the contract documents, or it may require the contractor to field check dimensions.

Specifically, the contract may require the contractor to meet certain performance specifications rather than a particular design. Additionally, the contractor may be viewed as an expert in its field who should possess the requisite knowledge to determine if the specifications are defective.

Change Type 3—Schedule or Workforce Delay and Acceleration

Contracts can be very specific regarding the types of compensable delays allowed, thus it is important to review the contract for no-damages-for-delay clauses which typically bar the recovery of delay damages.

If the contract has a no-damages-for-delay clause, the contractor may still be eligible for compensation if the delays were not contemplated by the party, were caused by fraud or bad faith, were of such unreasonable duration that contractor abandonment would be justified, or were caused by active owner interference.

Other time-related changes include acceleration and constructive acceleration. While acceleration costs, such as additional labor or overtime premiums can be covered by a formal change order, constructive acceleration efforts are not.

Change Type 4—Differing Site Conditions

Differing site conditions are another type of change generally addressed in the contract. If changes resulting from differing site conditions are barred by the contract, then evaluate alternative contract support such as directed changes to the work, constructive changes, defective or deficient plans and/or specifications, or misrepresentation.

Change Type 5—Schedule or Workforce Disruption

Another type of change is disruption. This may be caused by a delay, directed or constructive change, lack of action, or a number of other factors. These can include workspace overcrowding or defective owner-supplied equipment.

Disruption increases the level of difficulty in performing the work and the cost of performance. Be aware, however, the damages resulting from disruption can be difficult to quantify and prove, as they involve labor productivity, material costs, and/or workmanship issues.

Step 3—Notify Internal and External Parties

Notification is the third element in effective change order management. Early notification allows the construction team and owner the opportunity to more effectively control costs and mitigate schedule impacts.

Prompt notice is generally a contract requirement; however, if it is not, contractors should still promptly notify the owner of any conditions encountered, such as unforeseen site conditions, regardless of whether there will be a forthcoming change order request.

Lack of notice can be a strong defense for owners, and owners should be given an
opportunity to seek the most economical course of action in response to a change. This is particularly true if the contractor encounters a constructive change or constructive acceleration. In this situation, the contractor should notify the owner, in writing, that the instruction is considered a change.

Anticipate critical issues as early as possible. Since changes can be rejected solely on the failure to meet contractual time limitations, internal and external notices should be sent promptly without waiting for quantification of time or costs. Timely notice and exchange of information promotes prompt change order resolution.

**Step 4—Document the Change**

Documenting the change is a vital construction management function. The most important point about documentation is that it needs to be created consistently and methodically throughout the project in a timely manner.

If a company does not have contemporaneous project records, the cost of compiling suitable information regarding the change may be costly.

A comprehensive documentation system is a key element in resolving change requests; it provides the data necessary to obtain an equitable resolution when disputes arise. This documents the occurrence of events and the causes of problems.

If the construction team cannot resolve the change order request during construction, then it is possible that the owner and contractor will resolve the dispute during the negotiation process.

Negotiations may be held months or years after the work was performed, and those performing the work may not remember details regarding the specific issues. Furthermore, courts and arbitrators tend to give more credence to contemporaneous written documentation than to testimony.

The discipline required for effective documentation requires the same type of management emphasis, instruction, repetition, and follow-up that construction professionals use to ensure that equipment is properly maintained, safe working practices are followed, and reports are submitted on time.

A minimum checklist of records for retention during and after the completion of a construction project includes the following:

- the original estimate, with all data upon which it is based;
- photographs;
- the site investigation report;
- engineering drawings;
- the contract and other legal documents;
- engineering calculations;
- diaries;
- quality control/quality assurance records;
- daily reports;
- procurement/purchasing records;
- project correspondence;
- equipment assignment and use records;
- meeting minutes;
- timesheets;
- schedules;
- requests for information;
- cost and financial reports; and
- updated specifications

These documents should specifically cite if planned operations are delayed, prevented, or changed in nature. Documents from other parties need to be reviewed carefully for accuracy. Errors or omissions should be promptly corrected in writing.

It is critical to have regularly updated schedules at various intervals to identify and quantify the schedule effects of a change. The importance of accurate cost records cannot be overemphasized, as contractors are generally required to demonstrate that they actually incurred the costs because of extra work, delays, or disruptions.

When extra work is identified and separable, the associated costs, including labor and material costs, as well as equipment use, should be recorded under separate cost codes established specifically to quantify them.

**Step 5—Prepare the Change Request and Damage Calculation**

Different types of changes require different types of supporting documentation and analysis.

Change requests prepared in the field for single issues, such as the purchase of additional material, are prepared differently than complex, large change requests involving multiple issues.

While the preparation of field change requests is important, the following discussion primarily focuses on complex
change requests. Since the development of these change requests can involve a significant amount of time, the party should first provide notification that a detailed change request is forthcoming via a field change request. This field change request should state that the cost and schedule impact is under analysis.

Change requests should follow the contract requirements and be prepared in a professional manner, well-organized, and neatly presented for review. Additionally, change requests should effectively use graphics and numbers to communicate the desired information to the intended audience. Also establish a link or cause-effect relationship between the entitlement and the damages.

The following elements should be included.

- Factual history with key documents and correspondence;
- Entitlement using contract provisions, industry standards, legal statutes, and equity concepts; and
- Damages using various calculation methods.

Factual History

Using key documents and correspondence is helpful in establishing a factual history regarding the change. Creating a timeline of events or using the project schedule, if possible, is also advisable. It can illustrate the events leading up to the change, as well as any events occurring after notification of the change.

A timeline illustration can also introduce a more complex analysis, such as the schedule delay analysis, as shown in figure 3.

In figure 3, the timeline communicates, on a summary level, the project delays and resultant acceleration efforts that were encountered because of various party delays, disruptions, and scope changes.

Contractual Entitlement

A common weakness in change requests covering complex issues is the absence of provable linkage between the causes of changes and their effects. Knowledge of the contract is invaluable in establishing entitlement to damages, and

DAMAGE CALCULATION

Lump Sum or Unit Price

There are different methods used to calculate damages. Change orders may be priced by a contract agreed-upon lump sum price or unit price. If changes are to be calculated by unit prices and the estimated quantities have significantly changed, then the contractor may be entitled to a price adjustment for the performance cost increases. However, the contractor needs to prove that the nature or character of the work significantly changed.

Delay Damages

Delay damages are another change order option and generally require a schedule analysis to prove delay periods and associated entitlement. Compensation may include a schedule extension, extended general condition costs and home office overhead, idle equipment costs, and escalation.
In addition, the contractor may assert consequential damages such as lost profits on other work.

Calculating extended home office overhead costs for delay damages is not as well defined as calculating specific equipment or project-specific costs incurred because of standbys or delays.

Because home office costs are incurred for all projects that the company is performing, it is impossible to determine which home office costs are associated with each project. Therefore, the industry standard for determining home office costs associated with delays is to use a formula.

The most accepted formula is the Eichleay formula, which attempts to allocate the contractor’s overhead costs on a prorated basis based on each particular project’s billings, as compared to the overall construction billings [1].

There are several steps associated with calculating the additional home office overhead costs using this formula. The steps include equations 1-3.

Although the Eichleay formula has been challenged in some cases, it is the preferred method for determining overhead costs allocable to project standbys or extended project duration. Alternative methods of determining home office overhead costs are not discussed in this article.

**Labor Productivity Losses**

Productivity loss calculations, another form of damage calculation, address worker overruns associated with overtime, scope change, poor site conditions, and other construction labor interferences. These disruptions and impacts not only affect the changed work, but also the basic scope of work.

There are numerous factors that can potentially impact productivity on the project; including, but not limited to, the following:

- acceleration;
- overtime;
- additional labor;
- premium costs;
- disruptions;
- extra work/rework as a result of design changes;
- loss of momentum;
- learning curve to perform new tasks;
- inefficiencies if the crew is required to perform work that it is not adequately trained to perform;
- demobilization/remobilization costs and downtime;
- overcrowding if a crew is moved to another area where other work is being performed, thus impacting the original contractor and the relocated contractor;
- stacking of trades;
- lack of adequate supervision; and
- potential rework depending on the work/damage done by another contractor or specialty contractor.

Productivity losses can be calculated using industry studies such as the Mechanical Contractor’s Association of America (hereafter MCAA), Business Roundtable, Construction Industry Institute (hereafter CII), or National Electrical Contractors Association (NECA), as references; internal productivity and worker staffing records; or the measured mile method.

Extended overtime studies, such as those conducted by the MCAA and the Business Roundtable, are usually referenced when determining the additional costs associated with overtime. Figure 4 illustrates the overtime impacts included in these studies.

As shown in figure 4, the effects of overtime can be substantial with respect to reduced productivity over extended periods of time. Productivity and inefficiency impacts as a result of excessive overtime can be because of a variety of factors including, but not limited to, the following:

- worker fatigue/loss of motivation;
- increased absenteeism;
- additional field overhead expenses;
- loss of rhythm/loss of momentum;
- crowding/stacking of trades; and
- additional shift costs.

Productivity and efficiency losses of 20 percent to more than 30 percent are often experienced as a result of extended overtime. This can result in severe labor
cost increases totaling millions of dollars on larger projects.

If the owner requests that the contractor accelerates the work and performs extended overtime, then the owner should be responsible for these costs. However, if the contractor elects to perform this acceleration as a result of late or delayed work through no fault of the owner, then the contractor will most likely incur these costs.

In addition to overtime productivity impacts, disruptions can be caused by the following items:

- re-engineering/construction rework;
- late/deficient engineering;
- project management changes and turnover;
- equipment and material delivery delays;
- limited labor personnel; and
- late approval of engineering/changes.

The impacts of these disruptions are typically calculated using industry standard impact studies, including CII and MCAA. Figures 5 and 6 show some of the industry standards used to calculate these impacts and disruptions [4].

These studies can provide an effective approximation of productivity impacts which can be applied to actual work-hours to estimate lost productivity.

In addition to these industry standards, there are other ways to allow for disruption inefficiencies. The parties can agree that certain inefficiencies will be included in the change order, the impacts can be based on historical data, or experts can be used to determine inefficiency impacts as a result of disruptions.

Courts prefer the measured mile method to calculate productivity loss. The measured mile calculation compares the production rates of an un-impacted time period to an impacted time period for the same work activity. The un-impacted time period serves as the baseline to determine the productivity loss for work that was inefficiently performed.

**Total Cost or Modified Total Cost**

Two additional damage calculation methodologies are total cost and modified total cost.

Total cost is where the contractor claims the entire cost overrun as the consequence of the changed condition. To assert total cost, the contractor should pass the following validity test.

- the contractor’s costs are accurate and reasonable;
- the contractor’s bid was reasonable and contained no errors;
- the contractor was not responsible for the cost overrun, and no other way exists to reasonably calculate the contractor’s damages.

The modified total cost approach is used when the total actual cost incurred on
the project is less than the estimated cost to perform the job. This is under expected circumstances, or if there is a need to adjust the difference for any of the contractor's own faults on the project, such as a bid error or faulty work.

In summary, a complex change request should embody the factual history surrounding the issues and then link the contractual/legal entitlements with the appropriate damage calculation. Spending time and resources to prepare the change request in a professional and well-organized manner should increase the party's ability to persuade and obtain compensation.

Step 6—Resolve the Change Request

Resolving the change request and obtaining final approval or agreement by all of the parties is the final stage of the process and is perhaps the most frustrating.

For cost benefits, both parties should strive to resolve the change request during construction at the negotiation level, as arbitration and litigation are expensive and time consuming. The owner will likely be looking for offsets and mitigation, which can reduce or eliminate the change request.

Some areas that can be shared as risk include the following.

- Concurrent delay in which both parties are responsible for delays—In cases of concurrent delay, neither party is entitled to compensation for delay costs (contractor delay damages or owner liquidated damages), as both parties are at fault. Figure 7 illustrates concurrent delay by the owner and contractor.

- Delays beyond the control of both parties—Such delays may excuse the offending party from liability for delay damages under many contracts. Was the cause of delay beyond the fault and responsibility of both the owner and the contractor, such as an action of government?

- Excessive expenditure by the claimant or a failure to mitigate the damages—This may be caused by the claimant planning or managing the situation poorly or by the claimant's performance of unnecessary work.

- Determination of the degree of fault attributable to each party—The claimant's entitlement is unclear or debatable, so that damages may be split.

- Prior settlement, release, or waiver of the claim, typically by the contractor—A waiver is the intentional release, relinquishment, or surrender of a known right. This will most commonly happen when change orders are resolved and paid on the basis of direct cost, and the language of the change order bars a later case for delay or disruption impacts.

If the parties cannot agree on the resolution of the change request during construction, then they may proceed to formal negotiations. One of the most important decisions in negotiation is deciding who will attend. Depending on the parties' current relationship status and ultimate goals, owners and contractors need to decide between using the project management team, company managers, or outside consultants.

It is more important, though, to enter the negotiations with the right mind-set. Each party needs a member who knows how to effectively present the position or identify incentives or needs for the other party.

The negotiation team should be aware of the situation from a factual, financial, and legal standpoint. Furthermore, patience is critical, as the negotiations can linger for weeks, months, or years.

Members need to deal with roadblocks, such as the opposing side not having qualified or prepared representatives present, rather than becoming discouraged or ignoring the roadblocks. And, finally, if settling the dispute is the number-one priority, then both parties need to be willing to compromise.

All construction projects, even the best-planned projects, will experience change, and there will be costs, impacts, and disruptions associated with implementing the change.

One of the keys to managing change is to be knowledgeable about pricing change orders and understand the potential for changes to have additional impacts beyond the direct cost of the change.

By understanding and including these costs in early change order pricing, both the owner and the contractor can have a full appreciation for the true costs and impacts associated with changes and can limit conflict and claims later in the project. Furthermore, by understanding and implementing these change management steps, the chances of the parties resolving the outstanding change orders more effectively and efficiently during the construction process greatly increase.

If these six steps are implemented in a timely manner, the parties are more likely to resolve the changes during the project as opposed to during mediation, arbitration, or litigation, which is the most costly option for all parties involved.

REFERENCES

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