



مدیریت تغییرات قراردادی در پروژه‌های EPC

فرایند یکپارچه + نکات حیاتی
(بر اساس اسنادی از AACE و PMI و Long International)

ارائه دهنده:

سید محمدرضا علوی پور

(PhD, PMP, CMIT)

CMAA Authorized Trainer

دانشگاه Illinois Tech آمریکا

What we will learn?

- ❑ Introduction
- ❑ Change Order Definition and Other Change Order-related Considerations
 - ❖ Change Order Definition
 - ❖ Change Management Defined
 - ❖ Demonstrated Elements of a Change and Change Order
- ❑ Change Order Procedures

What we will learn?

☐ Change Management Process

1. Identification of Potential Change to Contract
2. Contractor Submits Change Order Request to Owner
3. Owner Evaluates Contractor's Entitlement to Change
4. Contractor Revises or Cancels Change Order Request, or Disputes Owner's Change Order Request Rejection
5. Prepare the Proposed Change Order
6. Owner Reviews Proposed Change Order
7. Owner Decision to Approve or Request Further Discussion
8. Owner and Contractor Negotiate Change Order
9. Agreement Reached on Change Order
10. Parties' Decision to Revise, Cancel or Dispute PCO
11. Revise Proposed Change Order
12. Change Order Cancelled
13. Contractor Prepares Claim
14. Claim Submitted by Contractor to Owner
15. Finalization of Formal Change Order
16. Change Order Execution

What we will learn?

- ☐ Change Management Document Control
- ☐ Change Management Related to Scheduling
 - ❖ Guidelines
 - ❖ Scope Change – Identification and Documentation
 - ❖ Delays – Identification and Documentation
 - ✓ Prospective Time Impact Analysis
 - ✓ Claims Avoidance and Monitoring
- ☐ Appendix: Sample Change Management Template
- ☐ Final Notes:
 - ❖ Conclusion
 - ❖ Other References
 - ❖ Contributors



2. Contractor Submits Change Order Request to Owner (Box 2)

☐ Change order backlog

- ❖ It is **advantageous to both** the owner and the contractor that potential Change Orders on a project are processed in a fair, equitable, and timely manner.
- ❖ The failure to do so most often results in an **increased probability** of extended disputes and claims between the owner and the contractor.



2. Contractor Submits Change Order Request to Owner (Box 2)

☐ Change order backlog

- ❖ A **significant amount** of Change Order backlog, in terms of quantity and value, is **indicative** of a project that is in **trouble**.
- ❖ The backlog is typically attributed to
 1. Above-average submission of change order **requests** by the contractor and/or
 2. Owner's inability or reluctance to promptly process the potential change orders.

2. Contractor Submits Change Order Request to Owner (Box 2)

☐ Change order backlog

- ❖ A large backlog of **unresolved potential Change Orders** generally falls into one of the following categories:

1. **UNDISPUTED**

- ✓ Includes potential Change Orders that
are **not in contention** and
their **processing** is delayed because of inadequate
administrative support, procedures, or funding.

2. Contractor Submits Change Order Request to Owner (Box 2)

☐ Change order backlog

- ❖ A large backlog of **unresolved potential Change Orders** generally falls into one of the following categories:

2. **DISPUTED**

There are **two reasons** for a potential Change Order to be disputed.



2. Contractor Submits Change Order Request to Owner (Box 2)

❑ Change order backlog

- ❖ A large backlog of **unresolved potential Change Orders** generally falls into one of the following categories:

2. **DISPUTED**

- ✓ In the first case, the owner and the contractor are **unable to come to an agreement** that

the **scope of work** that is identified in the potential Change Order

actually **represents a change** to the contract scope.



2. Contractor Submits Change Order Request to Owner (Box 2)

☐ Change order backlog

- ❖ A large backlog of **unresolved potential Change Orders** generally falls into one of the following categories:

2. **DISPUTED**

- ✓ In the second case, the owner and the contractor both **agree that the work scope** is a change to the contract scope of work,
but are unable to agree on the value or cost of the potential Change Order and/or its time impact.



2. Contractor Submits Change Order Request to Owner (Box 2)

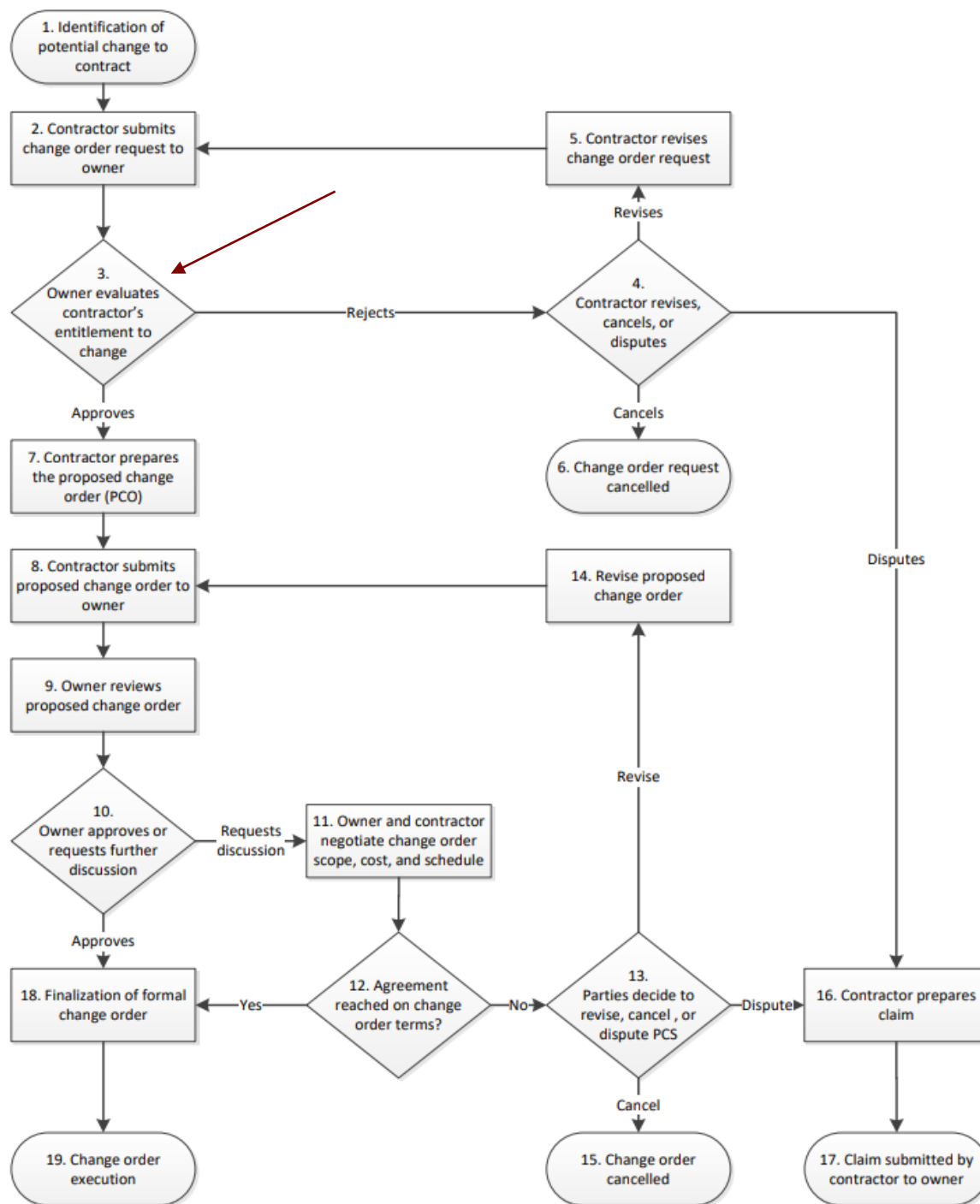
☐ Change order backlog

- ❖ A large backlog of **unresolved potential Change Orders** generally falls into one of the following categories:

2. **DISPUTED**

For potential Change Orders that are **disputed**, the approval and compensation may be **delayed**.

The issues, if they are ignored or unresolved, can later **become claims**.





3. Owner Evaluates Contractor's Entitlement to Change (Box 3)

❑ Often a step is **added** in the change process **where the owner** is given the **opportunity to approve or reject** the change order request

before the contractor moves towards developing a formal change order.

❖ The purpose for the **owner's review** is to provide the **owner an opportunity to decide** whether the contractor has **entitlement** to the change.

✓ *That is, the owner or one of his representatives evaluate the details provided by the contractor concerning the change to ensure that the proposed scope change was not previously part of the contractor's scope of work and that it aligns with the intended purpose of the project.*

What happens then?



3. Owner Evaluates Contractor's Entitlement to Change (Box 3)

☐ If the **owner agrees** that the contractor is **entitled** to submit a change order proposal,

this step is typically where the **owner would determine**

whether the potential change is the **result of**

1. Being extra work,
2. Contingency,
3. Force majeure,
4. Etc.

Why is this important to the owner?

3. Owner Evaluates Contractor's Entitlement to Change (Box 3)

☐ This **decision is important** to the owner

as it often **identifies** the line item source

within its **internal budget** from which **funding for the change** will come.

What if the owner rejects?



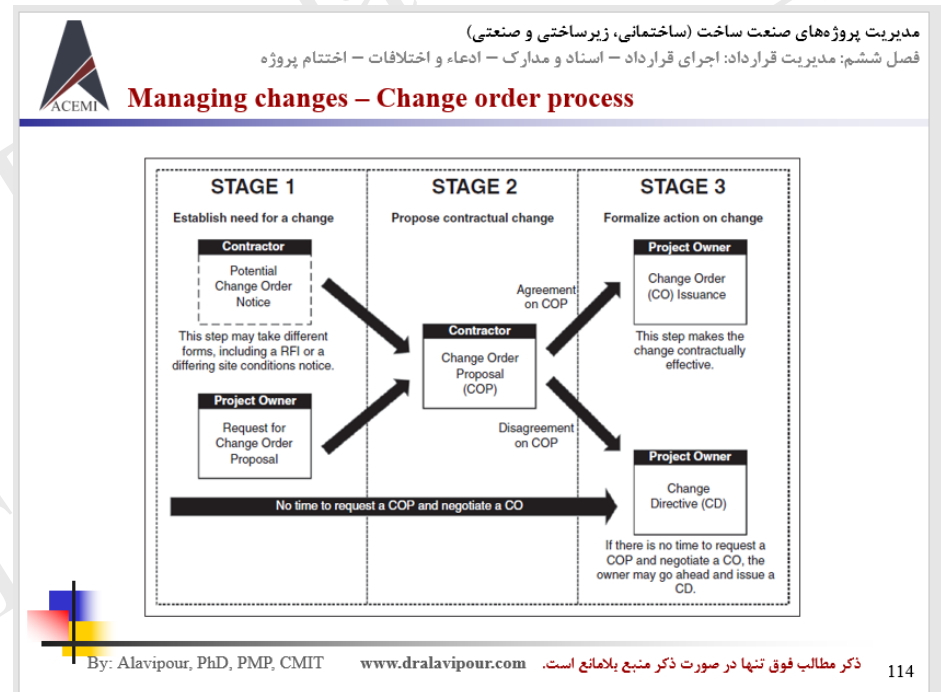
3. Owner Evaluates Contractor's Entitlement to Change (Box 3)

- ☐ If the **owner rejects** the change order request as submitted, the **contractor** may be **informed** as to whether **resubmission** of a modified version of the change order request will be considered.

What if the owner approves?

3. Owner Evaluates Contractor's Entitlement to Change (Box 3)

- ❑ If the **owner approves** the contractor's PCN or COR,
then the next step is for the **formal change order** to be prepared.



Can the work affected by a change be performed until a change order is executed?



3. Owner Evaluates Contractor's Entitlement to Change (Box 3)

- ❑ It is **common** in the construction industry that **work affected by a change cannot** be **performed until** a change order is executed.
- ❖ However, if the construction contract **does not state otherwise**, the **contractor may be allowed** to proceed with the changed work **before a formal** change order has been executed.

Should the owner respond to the notice?

3. Owner Evaluates Contractor's Entitlement to Change (Box 3)

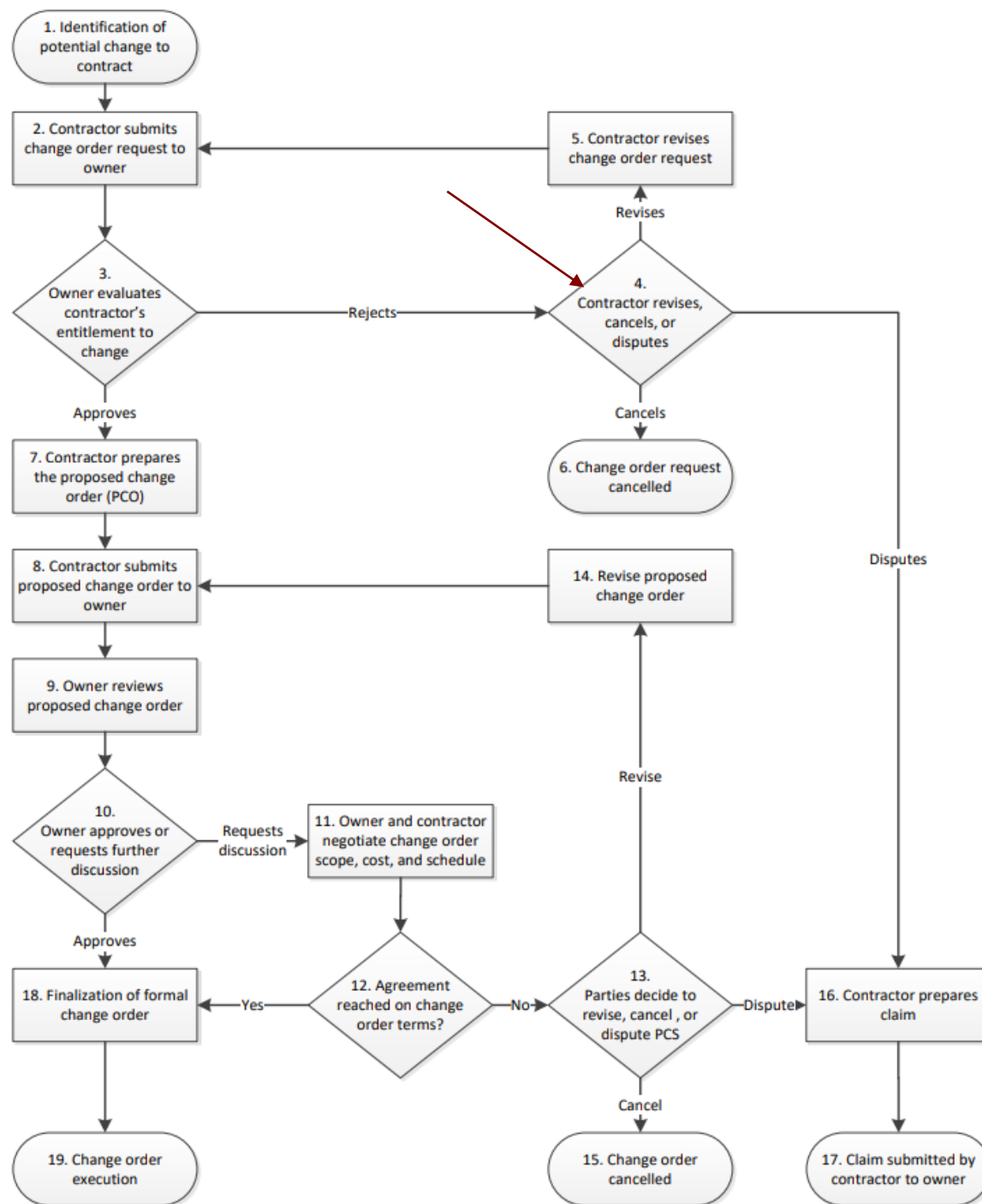
- ☐ **Sometimes**, submittal of a potential change notice from the contractor to the owner requires **no response** from the owner and **serves only** as a notification to the owner.

What if the change is directed by the owner?



3. Owner Evaluates Contractor's Entitlement to Change (Box 3)

- ☐ If the change is **directed by the owner**, then **review of entitlement** is not necessary.
- ☐ For a **unilateral change** the **amount** for cost and schedule impact is determined by the owner and is not negotiated.



4. Contractor Revises or Cancels Change Order Request, or Disputes Owner's Change Order Request Rejection (Box 4)

- ☐ If the **owner** rejects a change order **request submitted** by the contractor, the contractor has **three options concerning** how it should proceed with the change request.

Those options are:

4. Contractor Revises or Cancels Change Order Request, or Disputes Owner's Change Order Request Rejection (Box 4)

a) Revise the Change Order Request & Resubmit (Box 5):

- ☐ There may have been a **particular detail** about the change request that **cause rejection** by the owner.
- ☐ The detail may be **small or a significant portion** of the change.
- ☐ The **owner may recommend** resubmitting the change request with the specified changes.
- ☐ The contractor, therefore, has the option to **make the recommended change**, and **resubmit the change request**.

4. Contractor Revises or Cancels Change Order Request, or Disputes Owner's Change Order Request Rejection (Box 4)

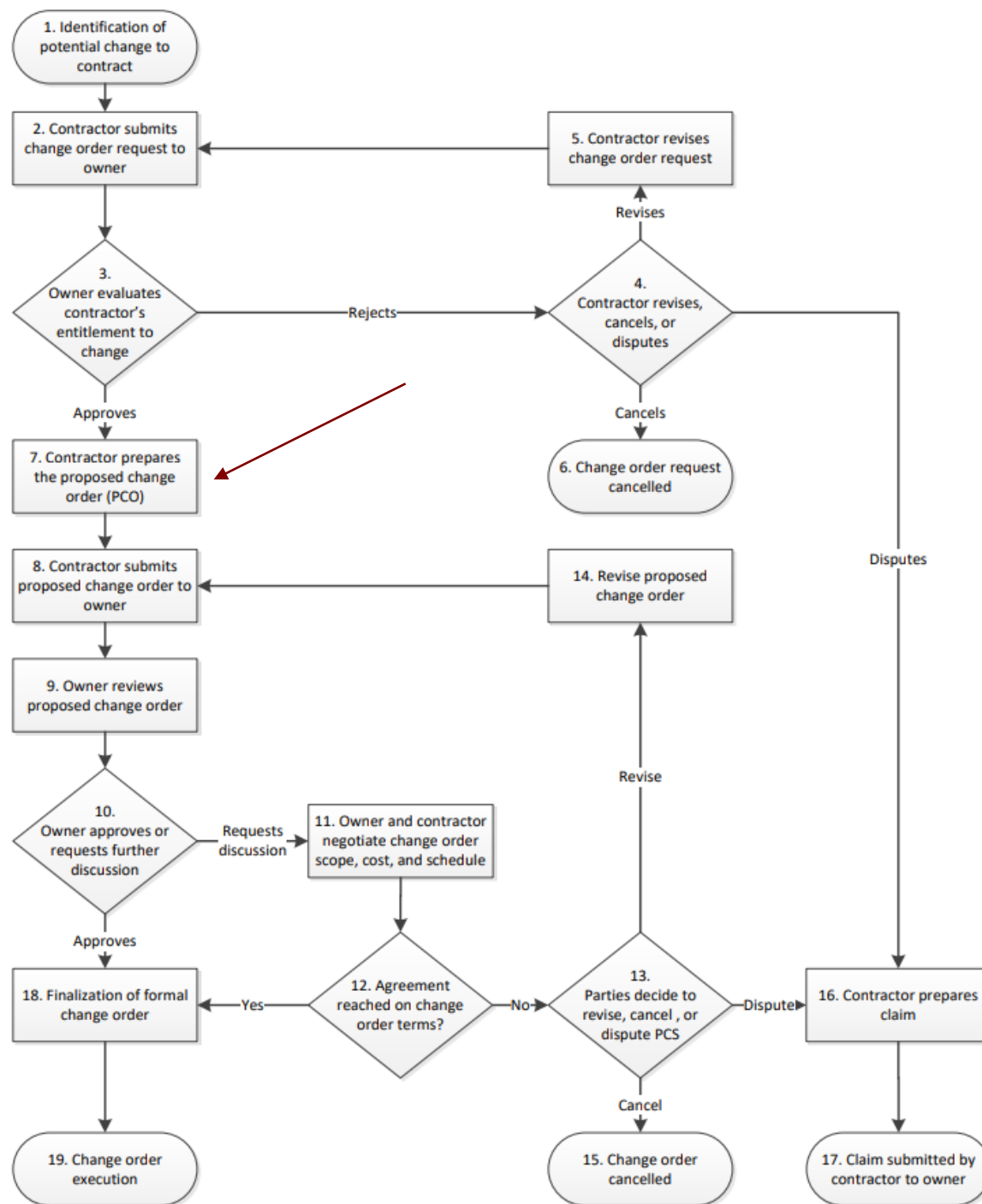
b) Cancel the Change Order Request (Box 6):

- ☐ Possibly as a result of **learning new facts** about the circumstances concerning the change request or for other reasons,
the contractor may choose to **cancel** the change request.

4. Contractor Revises or Cancels Change Order Request, or Disputes Owner's Change Order Request Rejection (Box 4)

c) Dispute Owner's Rejection:

- ☐ If it appears that the **owner is unwilling** to acknowledge the contractor's entitlement to a change,
the contractor has the **option** to prepare and submit a formal claim (Boxes 16 & 17).

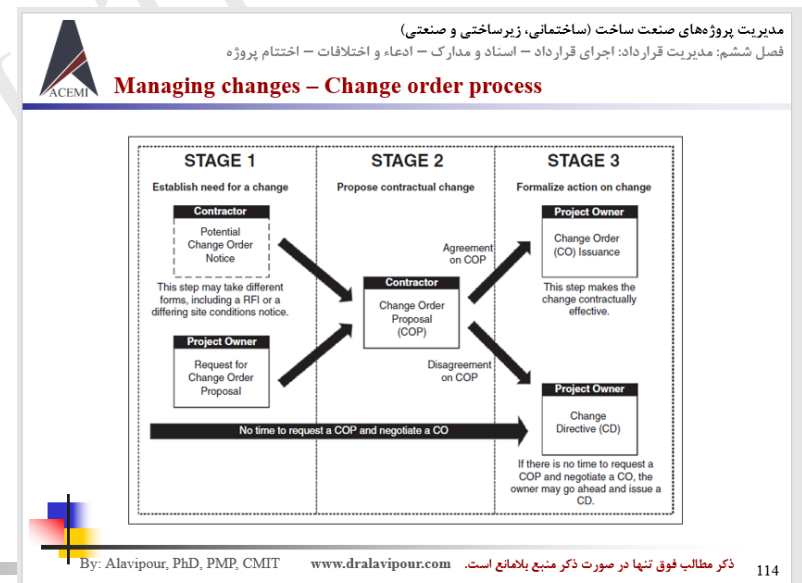




5. Prepare the Proposed Change Order (Box 7)

□ Once

1. COR has been initiated and **approved by the owner**, or
2. If the **owner has approved** the contractor's pricing estimate and schedule impacts in response to a directed change,
the **next step** for the contractor is to prepare a proposed change order document for the owner to evaluate.





5. Prepare the Proposed Change Order (Box 7)

☐ Factors resulting from change orders that influence a project's performance and costs

- ❖ The work for Change Orders can **necessitate** that the contractor **redirect** the labor, material, and equipment resources that were **originally** budgeted, scheduled, and designated to be used to support the **completion** of the tasks identified for the contract scope of work.
- ❖ As a result, the **contractor's plan** for completing the project may be **impacted**.
- ❖ The **factors from Change Orders** that may **affect the planned performance** of a project include the following:



5. Prepare the Proposed Change Order (Box 7)

☐ Factors resulting from change orders that influence a project's performance and costs

❖ ORIGINAL PROJECT SCOPE

- ✓ Change Orders can have a **combination** of direct, indirect, and cumulative impact on the **cost** and **schedule** to perform the original scope of work on a project.
- ✓ During the **later phases** of a project, the **impacts** that are the result of a change can become **even more significant and complex**.
- ✓ The **reason** for this is because during the later stages of a project, **construction is in full swing** and there are **more parties and elements engaged**.
- ✓ It also becomes **more difficult** and **less efficient** to implement a change as time progresses on a project.



5. Prepare the Proposed Change Order (Box 7)

- ❑ Factors resulting from change orders that influence a project's performance and costs

❖ LOSS IN PRODUCTIVITY

- ✓ The contractor will **evaluate**
 1. **How** the work for the change will be **performed** and
 2. **What effect** that this added work will have on the **original contract scope of work**.
- ✓ If the work related to a change places the **contractor's labor and equipment resources** in competition with the original project scope of work,
the performance of project work may be **adversely affected**.



5. Prepare the Proposed Change Order (Box 7)

- ❑ Factors resulting from change orders that influence a project's performance and costs

- ❖ LOSS IN PRODUCTIVITY

- ✓ The **Construction industry Institute** notes that
“on projects with less than six percent of hours spent on changes, productivity was better than planned.”
- ✓ Conversely, when **more than six percent** of **planned hours** were spent on changes, productivity was **worse than planned**.



5. Prepare the Proposed Change Order (Box 7)

- ❑ Factors resulting from change orders that influence a project's performance and costs

- ❖ SCHEDULE INTERFERENCES

- ✓ The contractor should consider whether the work defined for a **change** will have any **effect** on
the sequence and duration of the activities in the contract schedule.
- ✓ If the activities on the schedule's **critical or near-critical** paths are impacted by scope changes,
the **contract completion date** of a project may be extended
unless **acceleration** of the work is **performed**.



5. Prepare the Proposed Change Order (Box 7)

- ❑ **Factors resulting from change orders that influence a project's performance and costs**

- ❖ **SCHEDULE INTERFERENCES**

- ✓ The **dates for contractual milestones** may also be affected by the additional work scope.
- ✓ **Disruptions to the schedule** from a Change Order may result in **additional costs**,
irrespective of any change to the **completion date**.



5. Prepare the Proposed Change Order (Box 7)

- ❑ Factors resulting from change orders that influence a project's performance and costs

- ❖ SUBCONTRACT IMPACTS

- ✓ The contractor **notifies** and **shares** with its subcontractors, the **documentation** for each potential Change Order affecting a given subcontractor's work.

Who should evaluate cost and schedule impact?



5. Prepare the Proposed Change Order (Box 7)

- ❑ Factors resulting from change orders that influence a project's performance and costs

❖ SUBCONTRACT IMPACTS

- ✓ Based on this information, the **contractor instructs** its **subcontractors** to fully evaluate the **cost** and the **schedule** impact that a potential Change Order may have on their contract work scope.
- ✓ This information is **then incorporated** into the **Change Order documentation** that is submitted by the contractor to the owner.



5. Prepare the Proposed Change Order (Box 7)

- ❑ Factors resulting from change orders that influence a project's performance and costs

❖ CUMULATIVE IMPACT OF MULTIPLE CHANGES

- ✓ The **contractor** must evaluate the collective impact that Changes Orders have on the contractor's resources, including its
 - o Administration,
 - o Field supervision,
 - o Labor,
 - o Equipment,
 - o Schedule,
 - o Site congestion,
 - o Etc.



5. Prepare the Proposed Change Order (Box 7)

- ❑ Factors resulting from change orders that influence a project's performance and costs

- ❖ CUMULATIVE IMPACT OF MULTIPLE CHANGES

- ✓ As the **number of Change Orders** becomes more **prevalent** and the **performance of the work** related to the Change Orders becomes **more compressed**,

the **contractor's planned productivity** for performing the original contract work scope can **become diminished**.

Therefore, it is important that the contractor assess the collective impact that the numerous change orders may have as the project progresses.

What does it include?



5. Prepare the Proposed Change Order (Box 7)

- ❑ Factors resulting from change orders that influence a project's performance and costs

- ❖ CUMULATIVE IMPACT OF MULTIPLE CHANGES

- ✓ This includes

identifying and appraising the **anticipated cumulative demands** that the extra work places on the **planned** work effort and resources.

What happens if we fail to do that?



5. Prepare the Proposed Change Order (Box 7)

- ❑ Factors resulting from change orders that influence a project's performance and costs

❖ CUMULATIVE IMPACT OF MULTIPLE CHANGES

- ✓ The **failure** to do so may **require the contractor** to file a claim at the **end of a project**
to **collect for the cumulative impact** from all the Change Orders.
- ✓ It is also important to note that the impact and effect of the Change Orders may be **more important than the number** of changes.



5. Prepare the Proposed Change Order (Box 7)

- ❑ Factors resulting from change orders that influence a project's performance and costs

- ❖ EXPOSED RISK

- ✓ **Contractors** should also take into account any **uncertainties** that may be **associated** with the revised work scope as part of the **assessment** of a potential Change Order.
- ✓ **Additional cost and time** should be added by the contractor to its cost **proposal submittal** for a potential Change Order as a **contingency** to compensate for the possible impact from these undefinable factors.

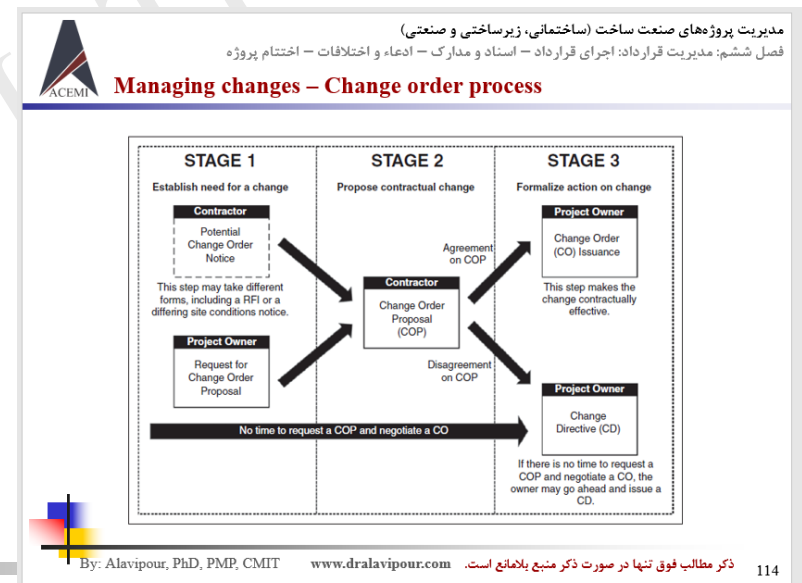


5. Prepare the Proposed Change Order (Box 7)

□ Once

1. COR has been initiated and **approved by the owner**, or
2. If the **owner has approved** the contractor's pricing estimate and schedule impacts in response to a directed change,
the **next step** for the contractor is to prepare a proposed change order document for the owner to evaluate.

What to include in PCO?





5. Prepare the Proposed Change Order (Box 7)

- ☐ The **proposed change order (PCO)** should contain or reference a detailed written narrative indicating:
- a) scope change, entitlement, causation for the change;
 - b) estimated cost; and
 - c) time impacts, along with the associated analyses.

*This step in the change management process often **cannot be completed until the contractor has acquired the necessary data and other information** associated with the change.*

What the scope of work portion of the PCO should primarily include?



5. Prepare the Proposed Change Order (Box 7)

a) The scope of work portion of the PCO should primarily include:

- 1) a **detailed description** of the scope of work of the change, including **references** to related drawings and specifications, owner requests, etc., and
- 2) a **comprehensive discussion** of what caused the change.



5. Prepare the Proposed Change Order (Box 7)

☐ a) The scope of work portion of the PCO should primarily include:

❖ The **proposed change order** scope of work document is a narrative that should be **organized** and **written** in **simple terms**.

❖ The **person writing** the scope of the potential change should be **cognizant** of the audience

that eventually could be **reading** the document, including attorneys and adjudicators.

✓ Therefore, work jargon and acronyms should be **avoided**

unless they are **clearly defined** in the document or contract documents.

What about price estimate of the change?



5. Prepare the Proposed Change Order (Box 7)

b) A price estimate of the change in scope should be included with the PCO.

❖ The **estimate** should be well **documented and supported** with

- ❖ Drawings and specification references,
- ❖ Take-offs, vendor quotes,
- ❖ Labor hour quantifications,
- ❖ Unit costs, and
- ❖ Any other information

that will be helpful to the owner in understanding how the estimate was developed.

What other information the PCO should identify?



5. Prepare the Proposed Change Order (Box 7)

b) A price estimate of the change in scope should be included with the PCO.

- ❖ The PCO should also **identify**

how the actual costs will be incurred;

i.e., whether the cost of the change will be accrued as **fixed-price**, **reimbursable**, **unit price**, etc.

- ❖ If there are **time-related costs** that result from a forecasted delay to the project, those costs must be in **alignment** with any resulting time extensions requested.

How about the time extension?



5. Prepare the Proposed Change Order (Box 7)

c) If the end date of the contractor's schedule is forecasted to be delayed as a result of the change,

the **PCO** should include the number of resulting impact days for which it is requesting an **extension of time**.

Do we need delay analysis here?



5. Prepare the Proposed Change Order (Box 7)

c) If the end date of the contractor's schedule is forecasted to be delayed as a result of the change,

the **PCO** should include the number of resulting impact days for which it is requesting an **extension of time**.

- ☐ It is important that the **delay quantification** be **supported** by a delay analysis.
- ☐ The **most common** delay analysis methodology used to calculate an extension of time during a project that is in progress is the **time impact analysis (TIA)**.
- ☐ The delay analysis should be adequately supported and replicable so that the **owner is able to validate it**.

❖ *All data and information used to perform the delay analysis should be included and submitted with the PCO. AACE Recommended Practice 29R-03 is recommended as the guideline to choose the appropriate analytical approach.*

Methods for change order basis of calculation?



5. Prepare the Proposed Change Order (Box 7)

❑ Methods for change order basis of calculation

- ❖ The **pricing** for potential Change Orders can be developed using one of several methods.
- ❖ The **choice of method** can be established by the contract,
 1. From a post contract agreement between the owner and the contractor, or
 2. At the contractor's discretion.
- ❖ Each of the methods has **distinct advantages and disadvantages** that are dependent upon the nature of a project and the requirements specific to the given change.

The pricing is typically based on one of the following practices:



5. Prepare the Proposed Change Order (Box 7)

☐ Methods for change order basis of calculation

❖ UNIT PRICE

- ✓ Based upon the **unit price items that are approved** as part of a project's construction contract between the owner and the contractor.



5. Prepare the Proposed Change Order (Box 7)

❑ Methods for change order basis of calculation

❖ LUMP SUM

- ✓ The owner and the contractor **agree** that the added work scope, which is defined by the change, will be completed on a fixed price basis, including the costs of the **contractor's overhead and profit**.
- ✓ A **contractor** accepts the risks and liabilities that are associated with completing the extra work for an agreed to price when the extra work is completed using this method.

What is the choice of the contractor here?



5. Prepare the Proposed Change Order (Box 7)

❑ Methods for change order basis of calculation

❖ LUMP SUM

- ✓ To **ensure that adequate compensation** is included in the contractor's pricing for the proposed Change Order,
the contractor will include **additional costs for contingency**
to offset the risks and unknowns that it perceives to be associated with the added work scope.
- ✓ The **estimated costs** are then evaluated and negotiated between the owner and
the contractor to ensure that the **finalized cost** for completing the extra work is **fair and reasonable**.

How the value is calculated?



5. Prepare the Proposed Change Order (Box 7)

❑ Methods for change order basis of calculation

❖ TIME AND MATERIALS (T&M)

- ✓ In using this method, the **value of the scope** of the extra work that is identified for a potential Change Order is based on the actual direct expenses

for supervision, labor, materials, equipment, etc., that are incurred by the contractor.

- ✓ **Factors** are also included that address the **allowances** for the contractor's overhead and profit requirements.

- For many projects, the **provisions** for the contractor's overhead and profit factors are addressed in the **General Conditions section** of a project's specifications or in the Changes section of the Contract.

Who tolerates the risk?



5. Prepare the Proposed Change Order (Box 7)

☐ Methods for change order basis of calculation

❖ TIME AND MATERIALS (T&M)

- ✓ When the extra work for a potential Change Order is completed on a T&M basis, the **associated risks and liabilities** become the **owner's responsibility**.

When to use?



5. Prepare the Proposed Change Order (Box 7)

☐ Methods for change order basis of calculation

❖ TIME AND MATERIALS (T&M)

✓ The T&M method for basing the cost estimate is **often used**

1. If an **agreement** on the value of the extra work for a potential change order **cannot be reached** between the owner and the contractor or
2. If the **full scope** of the change **cannot be clearly defined** at the time that the change order is **identified** and
the **owner directs** the contractor to proceed with completing the work.



5. Prepare the Proposed Change Order (Box 7)

☐ Methods for change order basis of calculation

❖ TIME AND MATERIALS (T&M)

✓ Also, the **contractor** may opt to use the T&M method

if the **contractor** prefers **not** to assume the risks that may be associated with a potential Change Order.

<https://dralavipour.com/publications/construction-management-standards-of-practice>



What should be done next?



5. Prepare the Proposed Change Order (Box 7)

- ☐ The **proposed change order** may **add or subtract** scope, cost, and/or time from the contractor's contract.
- ☐ With the **creation** of the first proposed change order on a project, a **PCO record file** should be **started**.
- ☐ **Each PCO submitted** to the owner should be **identified** with a unique identification number for **tracking and identification** of supporting documentation.
- ☐ The **name** of the change order initiator should be identified on the **PCO document**.

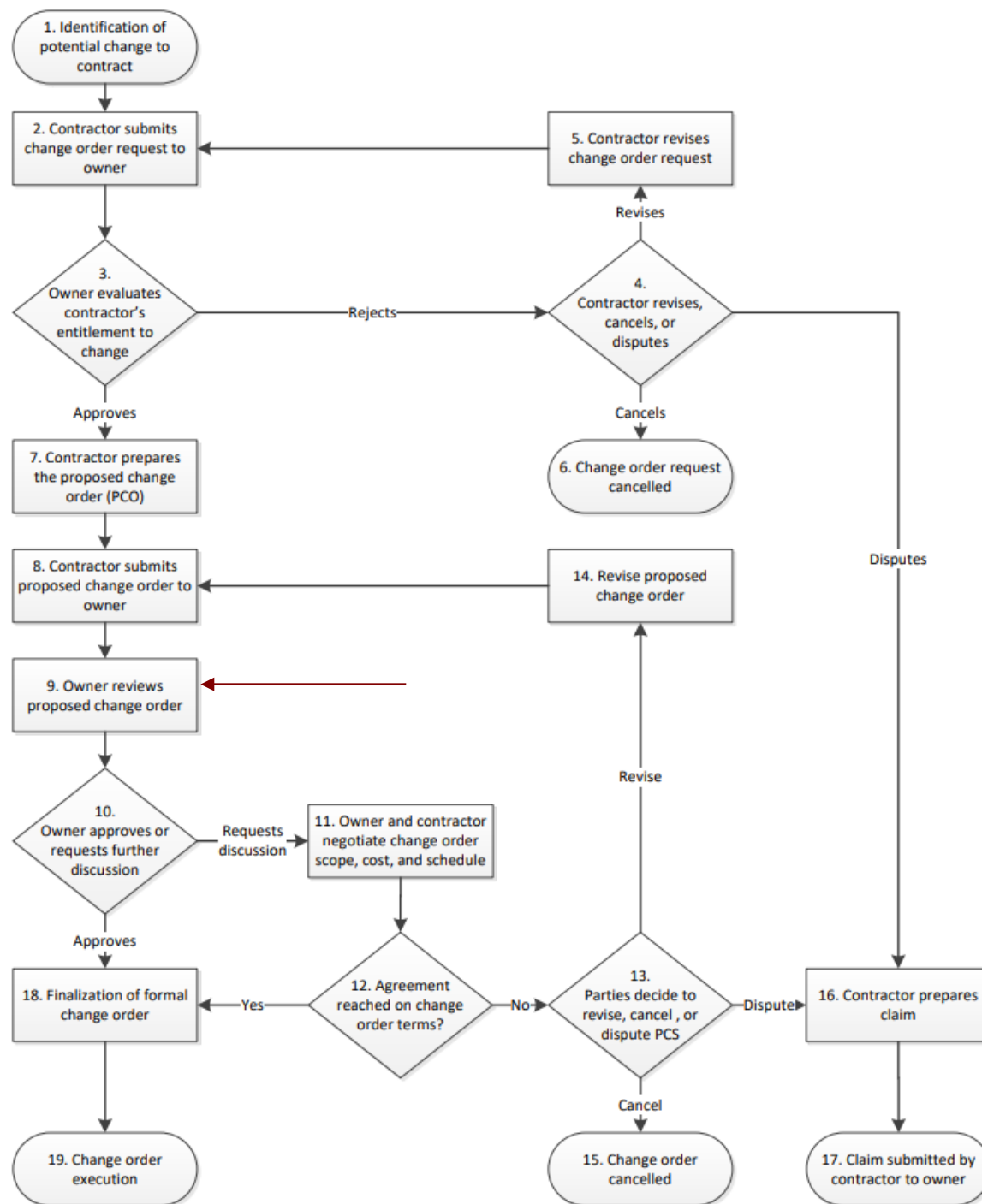
[illegible]



5. Prepare the Proposed Change Order (Box 7)

- ☐ Once the **contractor has completed** preparation of the **PCO**, it is **submitted to the owner** for consideration. (Box 8)

- ☐ It is recommended that the contract be reviewed concerning the **time the contractor is allowed** to prepare a proposed change order, as well as the **necessary steps** required to request additional preparation time to **gather data** or other necessary information.





6. Owner Reviews Proposed Change Order (Box 9)

- ☐ The **contract** between the owner and contractor allows the owner a certain, **but not always,**

specified amount of **time to review** the **contractor's PCO submittal** before responding to the contractor.

Why the owner needs this time?



6. Owner Reviews Proposed Change Order (Box 9)

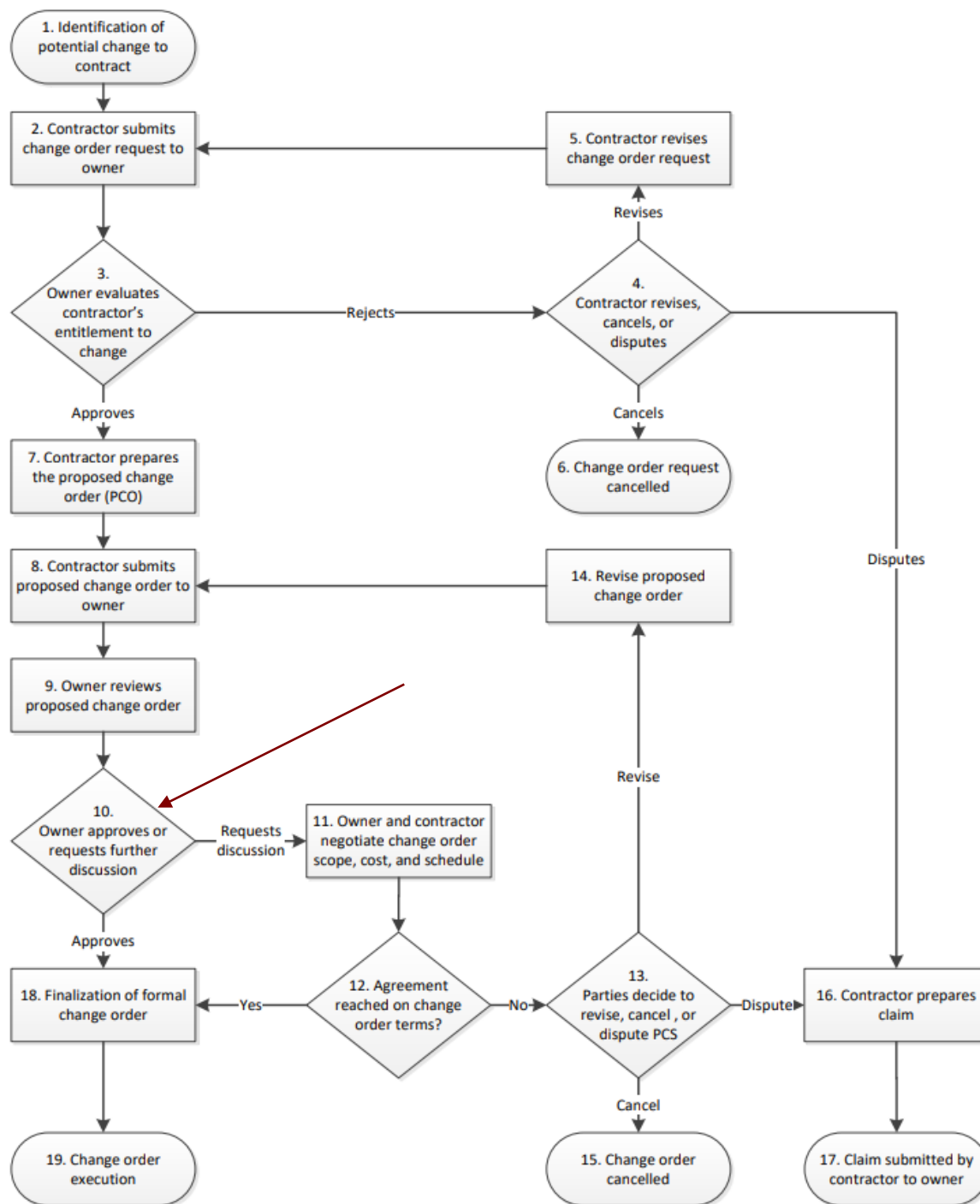
- ☐ The **time spent by the owner** is used to **verify** that
1. The **original scope** of the **change** and
 2. The **cause** for the change
 1. Has been **adequately explained**, and
 2. That the **cost** and **schedule analyses** are reasonable and supportable.

What if the owner needs more information?



6. Owner Reviews Proposed Change Order (Box 9)

- ☐ During this point in the process, the **owner may request** more information from the contractor in order to complete its review of the PCO.
- ☐ The **owner's requests** should be reasonable and **not meant** to extend the review time.
- ☐ The **contractor** should **respond** to the owner's requests in a **timely** manner.





7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ **After** the owner has

1. **Received the information** it needs concerning the PCO and
2. **Completed** its **review**,

the owner typically has three response options:

- a. **Accept** the PCO document as it is with no further questions or recommended revisions and proceed to **finalizing the change order** for signatures.

(Box 18)

7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ **After** the owner has

1. **Received the information** it needs concerning the PCO and
2. **Completed** its **review**,

the owner typically has three response options:

b. Meet with the contractor to

1. Discuss any questions or
2. Negotiate scope, cost or schedule aspects of the PCO

(Box 11).

This step may **occur less formally**; e.g. via phone call or email.



7. Owner Decision to Approve or Request Further Discussion (Box 10)

❑ After the owner has

1. **Received the information** it needs concerning the PCO and
2. **Completed** its **review**,

the owner typically has three response options:

- c. An **option seldom used by owners** at this point in the change management process would be to **reject the PCO** and make no **further effort** to **negotiate** the scope, cost or time impacts.

❖ This step is not **included in the process diagram (Figure 1)** since it is **not recommended**

after the **owner** has already recognized and approved **entitlement**.

How the owner should evaluate costs and time?

7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

- ❖ The owner must have **confidence** that the **contractor's assessment** of the costs to complete the extra work for a potential Change Order is **fair and reasonable**.
- ❖ There are **several actions** that the owner can undertake to avoid being overcharged.

What are those actions?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

❑ Evaluation and verification of costs

- ❖ The **owner's approach** in reviewing the proposed costs for a potential Change Order is **dependent** upon the method of calculation that was **used by the contractor** and **agreed** to by the owner in preparing the estimate.
- ✓ How the costs are reviewed and verified is determined by whether the costs were based on a unit price, lump sum, or a T&M type of estimate.

The requirements for evaluating estimates that are based on one of these three methods are discussed below:



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Unit price

- ✓ In many **construction bid forms**, the owner includes a listing of unit price items

that the contractor completes by filling in the **rates for each item** as part of its **bid proposal submittal**.

Should it include also a contingency?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Unit price

- ✓ These **unit price rates** are typically inclusive of the **total estimate** of direct and indirect costs, including the contractor's overhead, profit, contingency, etc.
- ✓ Therefore, the **construction contract** between the owner and the contractor will include the **unit prices** that were proposed by the awarded contractor.

What the owners need to do here?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Unit price

✓ For **validating** the costs of a proposed Change Order,

the **owner** needs to

1. **Verify** the material quantities that the contractor is **reporting** for the extra work and

2. **Compare** the unit prices that the contractor has **applied** to the material quantities with those unit prices that are **identified** in the contract.

o The **proposed** change order **unit prices** should be the same as the unit prices that are **included in the contract**.



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

- ✓ The **owner** should **prepare** an independent cost estimate of the scope of work for each potential Change Order.
- ✓ This cost estimate should be **detailed** and **comprehensive** in format because it is used as the basis for **comparing** and **validating**
 1. Material quantities,
 2. Labor production rates, and
 3. Pricingthat are **proposed** in the **contractor's submittal** for the potential Change Order.

Does the owner need to prepare independent estimate?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ **Lump sum**

- ✓ If possible, the **independent cost estimate** should be completed in advance of receiving the potential Change Order pricing from the contractor so that a **review** can be completed without delay.

How this independent estimate should be prepared?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ **Lump sum**

- ✓ The **owner's independent cost estimate** should be based on
 1. Current market rates and costs as well as
 2. Those **rates and costs** that may be specifically established in the contract documents.

The direct and indirect costs should take into account the following:



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ WAGE RATES

- If a project is **supported** by union craft labor, the current hourly rates are generally available for the location specific to a project in a **published format or on the Internet**.
- The **rates that are used** in developing the **independent estimate** need to be inclusive of
 - payroll burdens,
 - fringe benefits,
 - taxes, and
 - insurance.

What if these rates are not included?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ WAGE RATES

- If it is **apparent** that these rates do **not include** those provisions, a factor of **approximately 30 percent** can be added.

What other items may need to be considered?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ WAGE RATES

- o However, **consideration** must also be given to **other elements** that may be required for a project and which may increase the cost of labor, such as
work schedule (i.e., overtime work),
per diem and transportation allowances,
etc.

How to base the estimate for permanent material?

7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ MATERIAL COSTS

o For its estimate, the contractor will generally **base the unit costs** of the **permanent materials** on

1. Actual invoiced costs, or
2. Quoted costs

that are **solicited** from the material vendors and suppliers.

- This information, however, is **often not made available** to the **owner**.

What are the options for obtaining this information?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ MATERIAL COSTS

o The options for obtaining this information are to either

1. **Contact and request the information directly** from vendors or suppliers, or
2. Base the unit material costs on the **current rates that are published** in a cost guide, such as R.S. Means, Lee Saylor Construction Cost Index, Page, Richardson Process Plant Construction Estimating Standards, etc.

Do we need to consider allowance here?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ MATERIAL COSTS

o If required, **additional allowances** for

1. Handling,
2. Shipping,
3. Storage,
4. Tariffs, and
5. Duties

should also be considered and appropriately accounted for where required.

How to estimate equipment costs?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ EQUIPMENT COSTS

o The contractor commonly will use

1. Its **corporate rates** for owned equipment or

2. Rental rates on leased equipment

as the basis for the estimated equipment costs.

o The **owner** usually will **not have access** to the rates that the contractor used

unless such **rates are included** in the contract.



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ EQUIPMENT COSTS

- As an **alternative**, equipment rental firms can be contacted directly and the rates for the equipment solicited.
- Also, estimating publications such as R.S. Means address the average monthly, weekly, daily, and hourly rental rates for many equipment items and the hourly operating cost for each.

How about subcontract costs?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ SUBCONTRACT COSTS

- If the work or part of the work for a proposed Change Order is to be **completed by a subcontractor,**

the **contractor will often attach a copy** of a subcontractor's quotation or estimate.

- The **contractor** will apply an additional percentage to a subcontractor's price to cover the **contractor's costs** for

- Supervision,
- Administration, and
- Profit.



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ SUBCONTRACT COSTS

- If the extra work **delays the contract schedule**, the contractor may also request additional compensation to cover the extended overhead on a project.
- The **owner's approach** to evaluating a subcontractor's costs for labor, materials, equipment, overhead and profit should follow the **same process** that the owner uses in verifying the reasonableness of the contractor's costs.

How about small tools and consumables?

7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ SMALL TOOLS AND CONSUMABLES

✓ The contractor normally includes an **allowance** to **offset** the replacement cost for

1. Small tools and
2. Purchase of construction supplies and consumable items.

How about small tools and consumables?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ SMALL TOOLS AND CONSUMABLES

✓ This **allowance** is most often calculated as

1. A **percentage** of the total direct labor cost, or
2. A **cost per man hour** basis.

How about overhead and profit?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ OVERHEAD

- o To cover the costs of the contractor's home office and field management and overhead,

the contractor will include a **cost allowance** that is based on the **actual financial requirements** for the corporate and the field offices.

- The percentage, as a factor of the total direct cost for the extra work, **varies** between contractors and projects.

Percentages between 8.0 percent and 15.0 percent are usually considered reasonable.



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Lump sum

✓ PROFIT

- The contractor's profit, as a **percentage** of the sum of the total direct and indirect costs, should be within a **reasonable range**.
- Typically, the contractor's profit on change order work is **not expected to exceed 10.0 percent**, and could be lower.

How about time and materials?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Time and materials

- ✓ For extra work that is completed on a T&M basis, the **contractor's unit rates and markups** for overhead and profit that are applied to the **contractor's actual costs** for Change Orders are based on either

- 1) the **rates** that were solicited during the bidding phase of a project and included as part of the project's construction contract between the owner and the contractor, or
- 2) the **unit pricing and markups** that were negotiated between the owner and the contractor **following the award** of a construction contract.

When and how to report the work?

7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Time and materials

- ❖ At the **completion** of the work for a Change Order,
the contractor will **submit the copies** of the daily work reports for
the extra work to the owner
as part of the contractor's monthly payment request submittal.

What the reports should document?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Time and materials

❖ These reports document the **actual**

labor, material, and equipment resources

that were **expended** by the contractor on an hourly or daily basis to complete the extra work scope that is defined by the Change Order.

Do we need invoices?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation and verification of costs

❖ Time and materials

✓ In addition to the daily work reports,

the owner can **request** that the contractor **submit as backup**,
copies of the invoices from its

1. Subcontractors,
2. Material vendors, and
3. Suppliers

that were involved in supporting the work for the Change Order.

How about evaluation of the time?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation of the time impact

❖ The **contract schedule** for a project may be impacted or delayed by the work involved in completing a Change Order.

1. If the extra work is determined to be **non-critical** as a result of the absorption of the total float on the affected activities, the completion date of the contract schedule will **remain unchanged**.
2. However, if the changed work is found to **extend or delay** the completion of activities that are on the **critical path** of the schedule, the completion date of a project will **slip from the planned date**.

When evaluating the potential time impact for Change Orders, consideration should be given to the following:

Independent analysis for time?

7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation of the time impact

❖ It is important for the **owner to complete an independent analysis** of the contract schedule for a project to

1. **Identify** the **activities** that are **affected by the proposed changed work** and
2. **Verify** whether the scope of work for a potential change order **impacts the schedule** and the **contract completion date**.

Cumulative impact?



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation of the time impact

- ❖ Consideration should also be given to the cumulative impact of multiple Change Orders on the contract schedule,
which could affect the **labor productivity** of the unchanged work and delay its completion.



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation of the time impact

- ❖ The **timely identification** of potential issues and delays on projects permit the development of recovery schedules that may help to **mitigate some** or **all** of the potential delay.



7. Owner Decision to Approve or Request Further Discussion (Box 10)

☐ Evaluation of the time impact

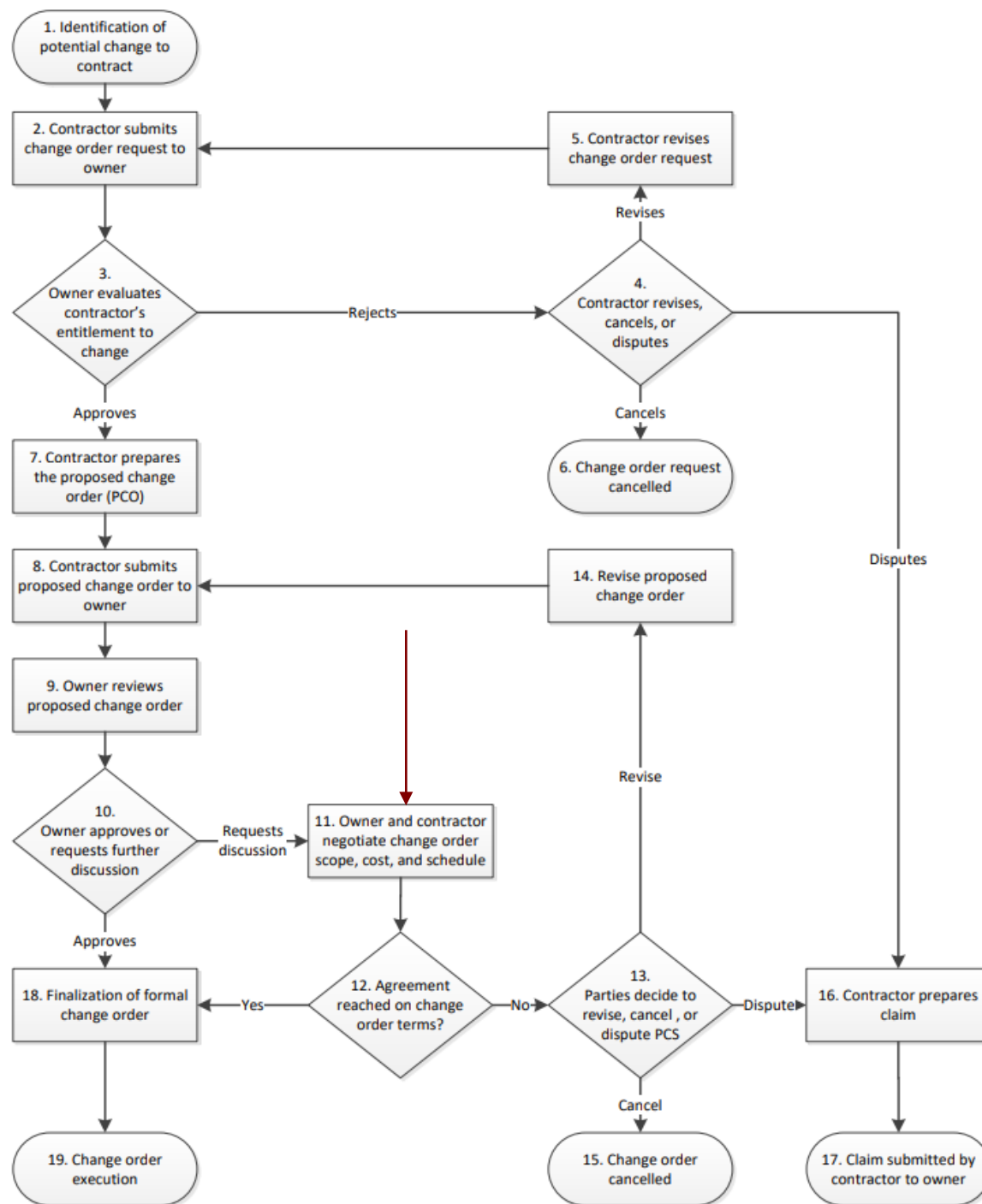
- ❖ The owner should consider **including a procedure** in the contract scheduling specification

that **defines the procedures** relative to

1. Preparation,
2. Format, and
3. Submittal

of the **contractor's schedule analysis** for **potential** Change Orders.

- ❖ The procedure should also address the approval process and the incorporation of the ratified revisions into the contract schedule.



8. Owner and Contractor Negotiate Change Order (Box 11)

- ☐ There will be times in which the **owner requires more explanation** concerning the PCO, and **exchanging emails** is no longer effective.
- ☐ The **owner's questions** may address
 1. Contractor's scope definition,
 2. Process by which it developed the pricing estimate, or
 3. How the time extension was determined.



8. Owner and Contractor Negotiate Change Order (Box 11)

- ❑ On many construction projects, there are **on-going scheduled change management meetings**

between the owner and contractor in which the agenda would **include PCO** that need face-to-face discussion.

- ❖ Typically, only the **more difficult PCOs are discussed**, and these meetings are meant to

1. **Resolve any unresolved** issues and/or
2. **Differences** in an expeditious manner.



8. Owner and Contractor Negotiate Change Order (Box 11)

Negotiations between owner and contractor may require a series of revisions to the PCO (see Box 13) and meetings to achieve an accord.



8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

- ❖ The **method** by which the Change Order was priced usually **dictates** the level of negotiation that may be required to resolve the additional costs and time.

8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

❖ UNIT COST

- ✓ If the work for the proposed Change Order proceeded on a Unit Cost basis, it is characteristic that the unit rates that are used were established on the project and **agreed** to prior to the start of the work for the Change.

What to focus here?

8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

❖ UNIT COST

✓ The negotiations for this type of change are then focused on

1. **Quantities reported** to be used by the contractor and
2. Whether the change **warranted an extension of time** to the project schedule.



8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

❖ TIME AND MATERIALS

- ✓ Similarly, for Change Order work to be completed on a Time and Materials basis, it is expected

that the unit hourly rates for **labor and equipment** for the project

have been **ascertained in advance of the start** of work for the Change Order.

The owner's approval is based on?



8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

❖ TIME AND MATERIALS

- ✓ Therefore, the **owner's approval** of the costs for the Change Order is based on a review of
 1. The **time card records** and
 2. Copies of **material invoices** presented by the contractor, and potentially, the **subcontractor invoices**.

Evaluate time in time and material to negotiate?



8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

❖ TIME AND MATERIALS

- ✓ The **schedule** for the project is also **evaluated to determine** whether the work for the **proposed Change Order** may have affected the completion of critical milestone dates or the overall project completion date.

How about lump sum format?



8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

❖ LUMP SUM

- ✓ If the proposed Change Order was priced on a **Lump Sum basis**, the **contractor's estimate proposal** is inclusive of the risk that is relative to completing the scope of work for the change.
- ✓ The **contractor** may also **consider** that the **estimate details** for the cost of the proposed Change Order are **proprietary**.

For this Change Order method of cost calculation, the elements for negotiations and resolution include the following considerations:



8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

❖ LUMP SUM

- ✓ The preparation of an **independent cost estimate** and a **schedule analysis** of the work scope defined by a potential Change Order by the owner are **advantageous**.



8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

❖ LUMP SUM

- ✓ If the **timing allows**, the **cost and time impact** of a potential Change Order should be established and settled upon **prior to proceeding** with the **start** of the work for a Change Order.
- ✓ Due to the **speed** at which projects progress and the urgency of completing the Change Order work, the **prospect of evaluating** the estimated cost and time impact in advance is **not always possible**.



8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

❖ LUMP SUM

- ✓ When the contractor's proposal is **prepared** during or following the **completion** of the work for a Change Order,

the **estimate** is generally based on the contractor's accounting of

1. Actual man hours expended,
2. Actual quantities of materials used, and
3. Actual operating hours for the construction equipment items utilized.



8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

❖ LUMP SUM

- ❖ Because the **estimate** is relying on the contractor's records,
the **owner's validation** can be **more difficult** than completing an
evaluation of the contractor's proposal
that was **prepared in advance** of proceeding with the
work.



8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

❖ LUMP SUM

- ✓ The **reason** for this difficulty is that the **contractor's records** may **not be made available** to the owner
 - if such **costs are co-mingled** with the base scope of work which is **paid** for on a lump sum or fixed price basis.
- ✓ If, however, they are **made available**, the records are **often not as complete** or comprehensive as they should be.
- ✓ Frequently, the process suffers because of **differing personalities** and from **heightened emotions**.

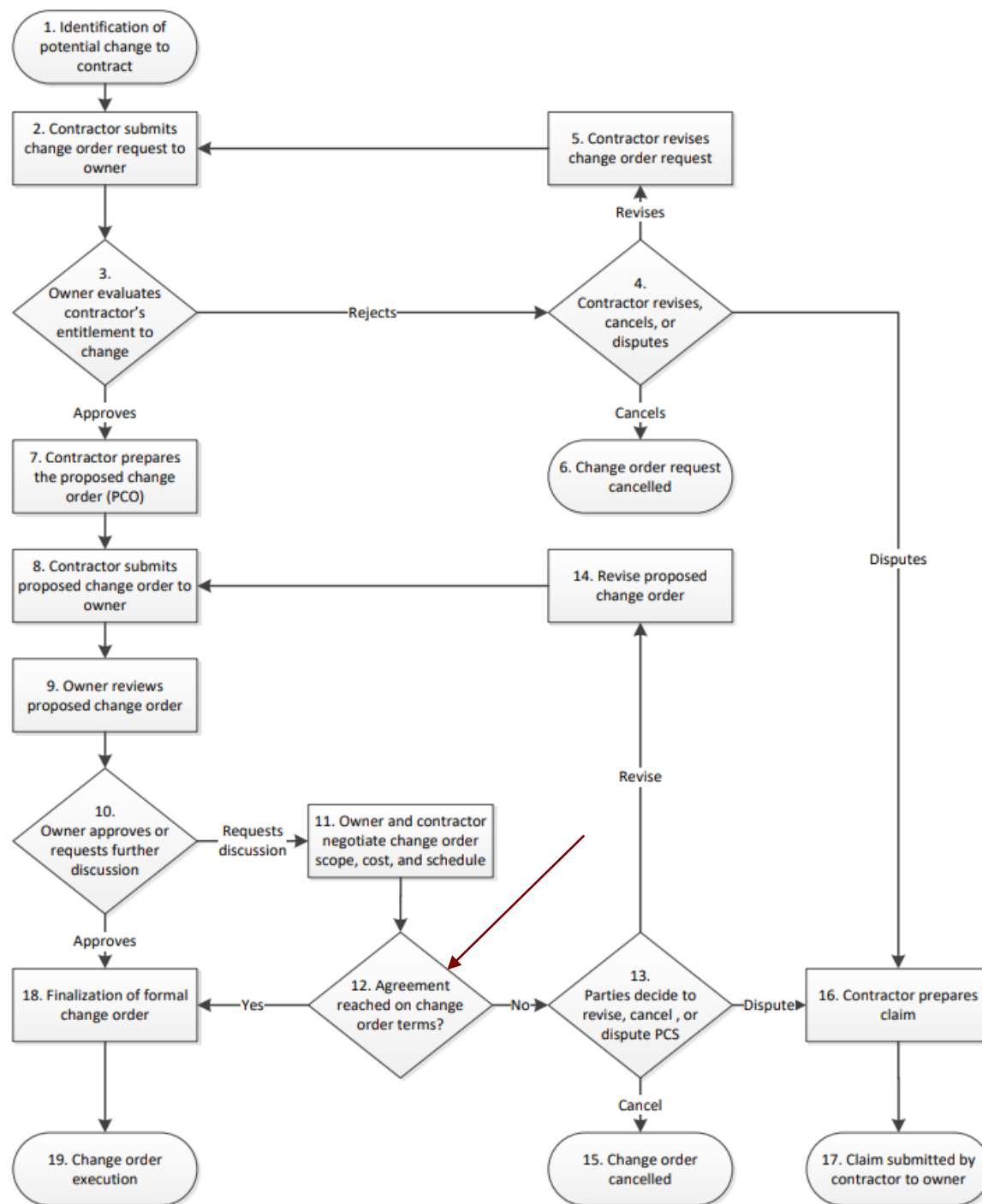


8. Owner and Contractor Negotiate Change Order (Box 11)

☐ Change order negotiations and resolution

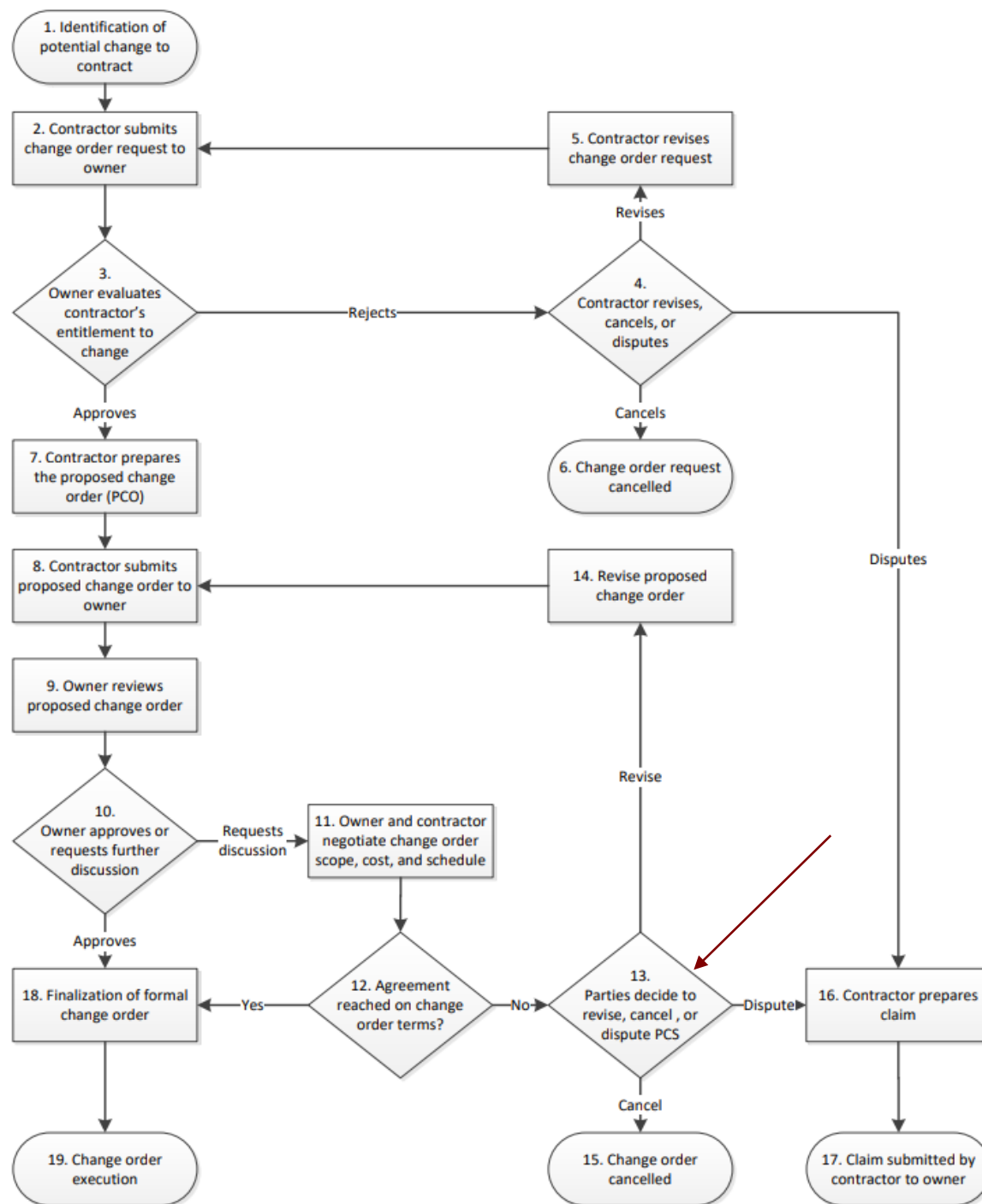
❖ LUMP SUM

- ✓ To be **productive**, the focus of the negotiations should remain on the **factual circumstances** that are related to the Change Order.
- ✓ During negotiations, **disagreements** are often **experienced**, which can impede the progress for finalizing the Change Order.
- ✓ It is important to **actively resolve** any disputes as they develop so that an accord between parties can be **reached in a timely manner**.
- ✓ This attention by the parties will help to **minimize** the **filing of claims** on a project.



9. Agreement Reached on Change Order (Box 12)

- ❑ Ultimately, there comes a point in which the owner and contractor either **reach an accord, or not**.
 - ❖ If an **accord is reached** between the owner and contractor, **finalization of the change order proceeds** (See Box 16).
 - ❖ **If not**, the parties must determine the **next steps** to take with the PCO (See Box 13).



موسسه مهندسی و مدیریت ساخت علوی پور (ACEMI)

دفتر آموزش



تهران، بلوار فردوس شرق، مجتمع آبگینه، طبقه سوم اداری، واحد C42



+۹۸ ۲۱ ۴۶ ۱۰۰ ۴۴۵



+۹۸ ۲۱ ۴۶ ۱۰۰ ۴۵۰



info@dralavipour.com



www.dralavipour.com



@alavipour_pm



@acemi_social



@alavipour_pm



@IRANACEMI

