فرآیند جامع آنالیز تاخیرات در پروژه

بخش یازدهم:

آنالیز مالی تاخیرات

آنالیز خسارت وارده به پیمانکار (Compensation)

ارائه دهنده:

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What we will learn?

- ☐ Delay damages to the contractors
- ☐ Types of delay damages to the contractors
  1. Extended field costs
  2. General overhead (home office overhead)
  3. Inefficiency or lost productivity costs caused by delay (Disruption Analysis)
  4. Acceleration costs
  5. Other categories of delay damages

Delay Damages To the Contractors

Introduction

- Most contracts deal with 3 types of delays:
  1. Un-excusable
  2. Excusable – Non-compensable
  3. Excusable – Compensable

!!The contractor could only recover delay damages that is on the critical path!

How much this sentence is true?

Introduction

❑ Most contracts deal with 3 types of delays:

1. Un-excusable
2. Excusable – Non-compensable
3. Excusable – Compensable

Remember:

1. Critical path delays

2. Non-critical path delays

Critical path delays

ASCE Standard ANSI/ASCE/CI 67-17 (Schedule Delay Analysis)

4.7 FOR A DELAY TO BE COMPENSABLE, IT SHOULD BE THE SOLE CAUSE OF DELAY

1. For compensable delay, the delaying event should be the **sole cause** of **longest path delay** **(no concurrent delays compensable)**
   - ❖ **Typically**, a delay solely **caused by the owner** is required to qualify as **compensable**.
   - ❖ **However**, **third party delay** may be compensable depending on the **provisions of the contract.**
2. For compensable delay, the delay should **extend the scheduled completion date** of the project.
   - ❖ *Activities with **float can fall on the longest path** because of schedule **constraints and multiple calendars** (e.g., weekend non-work restrictions),*
   - ❖ ***Critical activities** can fall on paths of work that are **not the longest path** (again because of constraints and multiple calendars).*

Critical path delays

ASCE Standard ANSI/ASCE/CI 67-17 (Schedule Delay Analysis)

4.7 FOR A DELAY TO BE COMPENSABLE, IT SHOULD BE THE SOLE CAUSE OF DELAY

- ☐ Delay to **intermediary contract milestones** typically do **not result in additional delay costs**,
  - because the contractor would have **been on-site until completion of the project**,
    - and as a result, delays to **intermediary milestones are not typically** compensable to the contractor, **even if excusable**.
  - ❖ However, **liquidated damages** attached to intermediary milestones by **contract** may be **assessed for failure** to meet each milestone and may be **cumulative**.

Critical path delays

ASCE Standard ANSI/ASCE/CI 67-17 (Schedule Delay Analysis)

4.7 FOR A DELAY TO BE COMPENSABLE, IT SHOULD BE THE SOLE CAUSE OF DELAY

❑ In some cases where **multiple subcontractors or multiple prime contractors** are **simultaneously responsible** for delay,

the **contractor or owner** may **still be able to recover** its costs **split** between the responsible parties ===== *Because this is not a concurrent delay*

as long as the **claiming party had no fault** or responsibility for delay during the **period claimed**.

NO CONCURRENT EXISTS

Non-Critical path delays

- ☐ Most contracts deal with 3 types of delays:
  1. Un-excusable
  2. Excusable – Non-compensable
  3. Excusable – Compensable

If <u>excusable delays</u> occur on the projects
And
Even if the delays are <u>not on the critical path</u>

The owner may still need to pay financial ramifications to the contractor
Unless the contract says otherwise!

خسارت تاخیر مجاز در قانون مدنی

☐ خسارت تاخیر مجاز

- به صورت کلی و طبق **قانون مدنی (ماده ۷۲۸ آئین دادرسی)** **عدم اجرای تعهدات طرفین**، در شرایطی که **باعث ضرر (از جنس از بین رفتن مال یا فوت شدن منفعت)** به طرف دیگر گردد، باید **جبران** شود.
- پس **تاخیری** که به سبب عدم اجرای تعهدات یکی از طرفین اتفاق افتاده باشد، در صورتی که بر روی **مسیربحرانی** بوده و باعث **تغییر زمان پروژه** گردد، هم بحث **زمانی** و هم **مالی** را به همراه دارد و باید جبران گردد.
- حتی اگر تاخیر **روی مسیر بحرانی نبوده** و **باعث تغییر زمان پروژه نشود** هم میتواند **خسارت مالی** از جنس بهره وری را به همراه داشته باشد.

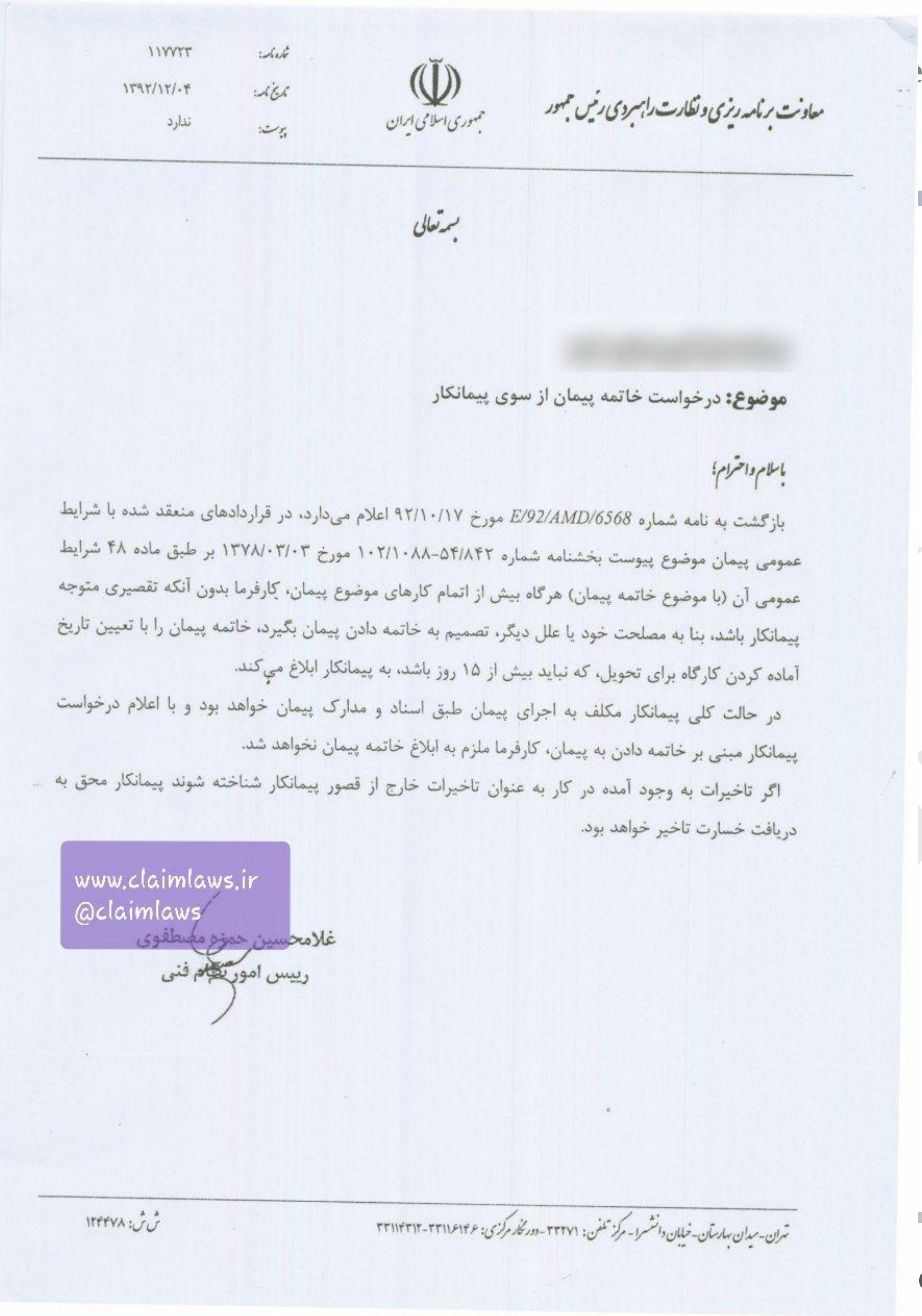
صرف نظر از مبانی نشریه ۴۳۱۱، آیا قانون مدنی اجازه ادعای خسارت مالی برای تاخیراتی مانند آب و هوا را میدهد؟

خسارت تاخیر مجاز در قانون مدنی

☐ خسارت تاخیر مجاز

- ❖ در قانون مدنی کشور، **یکی از شروط جبران خسارت** آنست که **خسارت ناشی از عدم انجام تعهد** در شرایطی باشد که **عدم اجرای تعهد مستند به خود متعهد** بوده و **ناشی از علت خارجی نباشد** (برای خارجی بودن باید دو شرط غیرقابل پیشبینی و غیر قابل دفع را داشته باشد).
- ❖ به همین دلیل، **فورس ماژور** که حادثه **ای غیرقابل دفع** و **غیر قابل پیش بینی** است در ۴۳۱۱ شامل خسارت نمیگردد.

خسارت تاخیر مجاز



معاونت برنامه ریزی و نظارت راهبردی رئیس جمهور

جمهوری اسلامی ایران

شماره نامه: ۱۱۷۷۲۳
تاریخ نامه: ۱۳۹۲/۱۲/۰۴
پیوست: ندارد

بسمه تعالی

[redacted]

موضوع: درخواست خاتمه پیمان از سوی پیمانکار

باسلام و احترام؛

بازگشت به نامه شماره *E/92/AMD/6568* مورخ ۹۲/۱۰/۱۷ اعلام می‌دارد، در قراردادهای منعقد شده با شرایط عمومی پیمان موضوع پیوست بخشنامه شماره ۱۰۲/۱۰۸۸-۵۴/۸۴۲ مورخ ۱۳۷۸/۰۳/۰۳ بر طبق ماده ۴۸ شرایط عمومی آن (با موضوع خاتمه پیمان) هرگاه بیش از اتمام کارهای موضوع پیمان، کارفرما بدون آنکه تقصیری متوجه پیمانکار باشد، بنا به مصلحت خود یا علل دیگر، تصمیم به خاتمه دادن پیمان بگیرد، خاتمه پیمان را با تعیین تاریخ آماده کردن کارگاه برای تحویل، که نباید بیش از ۱۵ روز باشد، به پیمانکار ابلاغ می‌کند.

در حالت کلی پیمانکار مکلف به اجرای پیمان طبق اسناد و مدارک پیمان خواهد بود و با اعلام درخواست پیمانکار مبنی بر خاتمه دادن به پیمان، کارفرما ملزم به ابلاغ خاتمه پیمان نخواهد شد.

اگر تاخیرات به وجود آمده در کار به عنوان تاخیرات خارج از قصور پیمانکار شناخته شوند پیمانکار محق به دریافت خسارت تاخیر خواهد بود.

غلامحسین حمزه مصطفوی
رییس امور نظام فنی

❑ خسارت تاخیر مجاز

- ❖ چنانچه تاخیرات به وجود آمده در کار به عنوان تاخیرات خارج از قصور پیمانکار باشد، پیمانکار محق به دریافت خسارت تاخیر خواهد بود.

Calculation of damages

- ☐ In the **following sections** we explore the proper use of **several methods** used to compile delay damages.

- ☐ **Before** we cover some of the **specific damage components** (material, equipment, and labor costs; labor and equipment inefficiency; etc.), it is important to **better understand** the **basic principles** underlying the recovery of damages.

The calculation of damages must be properly supported by the pertinent Contract provisions and the applicable facts supporting the claim (whether they come from the documents, cost records, testimony, etc.).

General guidelines for the presentation and recovery of damages

☐ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

1. **Carefully review and closely follow the Contract provisions.**
   - A certain measure of risk or loss should be considered if the requirements are not satisfied.

General guidelines for the presentation and recovery of damages

❑ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

2. **Avoid frivolous claim items and overstated claim amounts.**
   - Although **some parties believe** you must **start high** and **negotiate down**, **frivolous claim items** and inflated claim amounts cause a Contractor to **lose credibility** and ultimately **delay the process of resolution**.
   - **Contracts often now include clauses** that **classify overstated claim amounts** as false claims, with **harsh consequences**.
   - A **well-documented damage claim** should **satisfy any audit requirements** of the Contract.

General guidelines for the presentation and recovery of damages

❑ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

3. **Be prepared to negotiate and compromise.**
   - ❖ Just about **any unresolved dispute** involves **shades of gray** and is **not** a case of **black and white**, **settlement** is **seldom reached unless** each party is willing and able to **compromise**.

The more supporting documentation accompanying the claim, the more likely a settlement may be negotiated.

General guidelines for the presentation and recovery of damages

☐ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

4. **Carefully evaluate your opponent's ability to settle.**
   - ❖ **Many public agencies** are **not in a position** to **negotiate** due to the **need to justify any settlement amount** to others, such as **taxpayers or other agencies**.

General guidelines for the presentation and recovery of damages

☐ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

5. **<u>Support damages based on the verifiable facts, and not one's expectations anticipated prior to the award of the Contract.</u>**
   - **If a Project incurs a loss**, it is the **reasons** for the loss that are being **claimed** with appropriate support and measurement, **<u>not the bottom-line loss</u>**.

General guidelines for the presentation and recovery of damages

- ☐ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

6. **Summarize your damages within a format that will allow subsequent updates or revisions.**
   - ❖ **Especially** if the **quantitative measure** is **not fully available** until a future date.

General guidelines for the presentation and recovery of damages

- ☐ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

7. **Avoid duplication of claimed costs and calculation or posting errors.**
    - ❖ **Cross-check** and **double-check** the calculation as it **evolves over time**.

General guidelines for the presentation and recovery of damages

❑ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

8. **Remember the burden of proof is borne by the party submitting the claim.**
   - The **claimant must produce facts** to **establish** that the damages were incurred as a result of actions of the other party, along with the **measure of the damages**.

General guidelines for the presentation and recovery of damages

☐ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

9. **There is always an obligation to mitigate damages.**
   - **If** certain **damages** could have been **mitigated**, these costs are **unlikely** to be **recoverable**.

General guidelines for the presentation and recovery of damages

- ☐ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

10. **Generally a claimant's actual costs are considered reasonable when measuring damages, unless proven differently.**
    - ❖ However, **actual costs** do **not automatically prove** that damages were incurred as a **result** of the action of the **other party**.

General guidelines for the presentation and recovery of damages

- ☐ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

11. **The evidence used in supporting damages must be admissible under the jurisdictional rules governing the case.**

General guidelines for the presentation and recovery of damages

☐ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

12. **The evidence supporting your damages is generally more persuasive if it is prepared contemporaneously with the actual progress of the Project, as compared to documents prepared after the fact.**

General guidelines for the presentation and recovery of damages

❑ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

13. **<u>Remember to establish a cause-and-effect relationship to the extent possible for each component of damages being claimed.</u>**

    ❖ You need to show **how you were damaged** as a **result** of the **<u>other parties' actions or inactions</u>**.

General guidelines for the presentation and recovery of damages

❑ **Basic guidelines** for the **Contractor** in preparing its **statement of damages:**

14. **When feasible, submit your claim for damages using the suggested format of the Owner.**

- ❖ This process will **lessen** the areas of **disagreement** with the **Owner** about the format and structure of the claim and **keep the discussion focused** on the **content of the claim**.

General guidelines for the presentation and recovery of damages

Keep in mind that it is a Contractor’s responsibility to mitigate damages whenever practical in order to not create damages greater than those reasonably justified under the circumstances.

Calculation of damages

DISCLAIMER

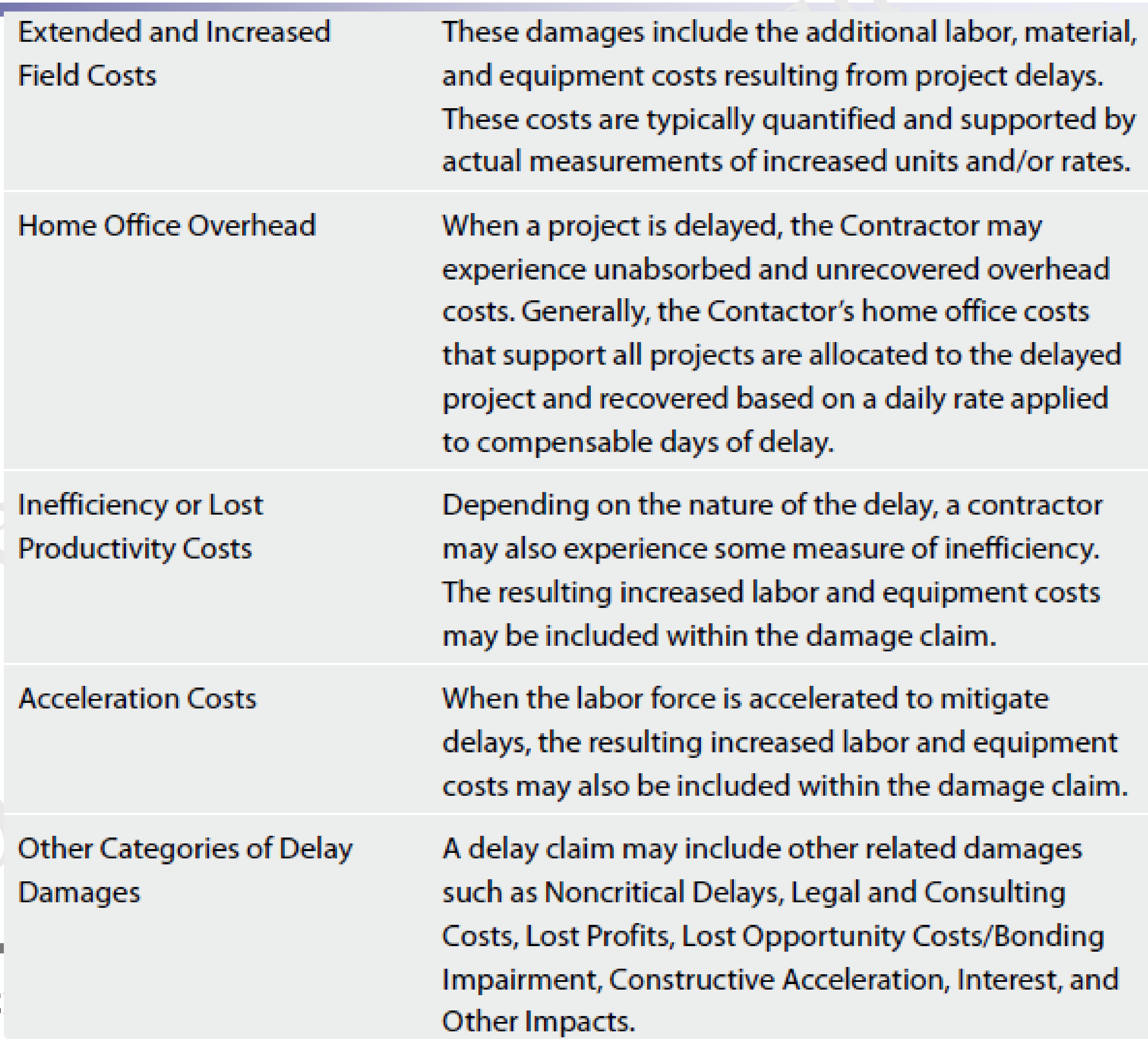
Although this session pertains to delay damages and actual costs, you should be aware that other methods of recovery may be applicable under varying circumstances.

These methods are usually specified by the Contract, and legal counsel should be used to pursue items such as wrongful termination, total cost claims, modified total cost claims, and jury verdict methods.

Types of delay damages to the contractors

Types of delay damages to the contractors

- ❑ Delay damages are summarized here, although not all may be recoverable.



Extended and Increased Field Costs	These damages include the additional labor, material, and equipment costs resulting from project delays. These costs are typically quantified and supported by actual measurements of increased units and/or rates.
Home Office Overhead	When a project is delayed, the Contractor may experience unabsorbed and unrecovered overhead costs. Generally, the Contactor's home office costs that support all projects are allocated to the delayed project and recovered based on a daily rate applied to compensable days of delay.
Inefficiency or Lost Productivity Costs	Depending on the nature of the delay, a contractor may also experience some measure of inefficiency. The resulting increased labor and equipment costs may be included within the damage claim.
Acceleration Costs	When the labor force is accelerated to mitigate delays, the resulting increased labor and equipment costs may also be included within the damage claim.
Other Categories of Delay Damages	A delay claim may include other related damages such as Noncritical Delays, Legal and Consulting Costs, Lost Profits, Lost Opportunity Costs/Bonding Impairment, Constructive Acceleration, Interest, and Other Impacts.

Types of delay damages to the contractors

DISCLAIMER

The next few sections deal separately with various kinds of delay-related damages that Contractors may be entitled to recover as the result of an excusable, compensable delay.

Not all categories will be addressed in every detail, as the possibilities are virtually unlimited.

Rather, an example of the general methodology is presented so you may apply the same principles to your specific situation.

Extended Field Costs

(Direct Costs + Project Overhead Costs)

Extended field costs

- ❑ This type is **not difficult** to calculate if the contractor maintains reasonably good **job cost records.**

- ❑ Common types:
  - ❖ Labor costs
  - ❖ Equipment costs
  - ❖ Material costs
  - ❖ Extended Project (field) overhead costs

Labor costs

❑ Labor costs are incurred either

1. As **field overhead** to support the work ***(extended field overhead labor costs)***
2. **More labor** is required to produce the **same amount of work** ***(labor productivity loss)***
3. In the **performance** of the work ***(direct labor costs)***

Labor costs – Extended field labor & labor productivity loss

- ☐ **Delays** generally **increase** the **time of performance** rather than the **amount of work**
- ☐ Delay costs related to labor are **usually in the form of**
  1. Extended field overhead labor
     - ❖ This labor is typically associated with **project management and superintendence** and general support.
       - ✓ **Extended field costs** are addressed in more **detail later in this Section.**
  2. Labor productivity loss
     - ❖ **More labor** is required to **produce the same amount of work**, typically defined
       - i. As a **loss of productivity** or inefficiency, or
       - ii. When **additional labor** becomes necessary to complete the work faster, which may result in additional charges for overtime, shift work, or travel costs to add labor in a limited labor environment
     - ❖ Delay costs arising from **inefficiency** addressed in **disruption costs**

Labor costs – Performance of the work

- ☐ A contractor may also incur **additional labor costs** due to a delay when **additional tasks** become necessary to **accomplish the work,**

  when the **hourly cost** of the **labor increases** due to either

  - ✓ Labor is forced to be idle, or
  - ✓ Skill level or escalation

    1. Idle labor
    2. Escalation of labor costs

Labor costs – Idle labor

- If a Project is **delayed or suspended**, the **Contractor's workers** may be at the **Project site but** may be **unable to productively work**.
- For potential recovery of this type of cost, the **Project daily reports** need to **show** that
  1. **Contractor's workers** were on the site
  2. **But** were **unable to perform their work**
  - The **Owner** would appropriately question **why** the Contractor was **unable or unwilling to shift** those workers to other tasks or **other jobs or lay them off**.

Why?

Labor costs – Idle labor

It should be noted that the Contractor has an obligation under most contracts to mitigate the damages when a delay occurs;

therefore, if possible, the Contractor needs to look at shifting its labor to other work during a delay.

Labor costs – Idle labor

Both the Owner and the Contractor should diligently maintain documentation of labor activity on each day throughout the Project.

Why both?

Labor costs – Idle labor

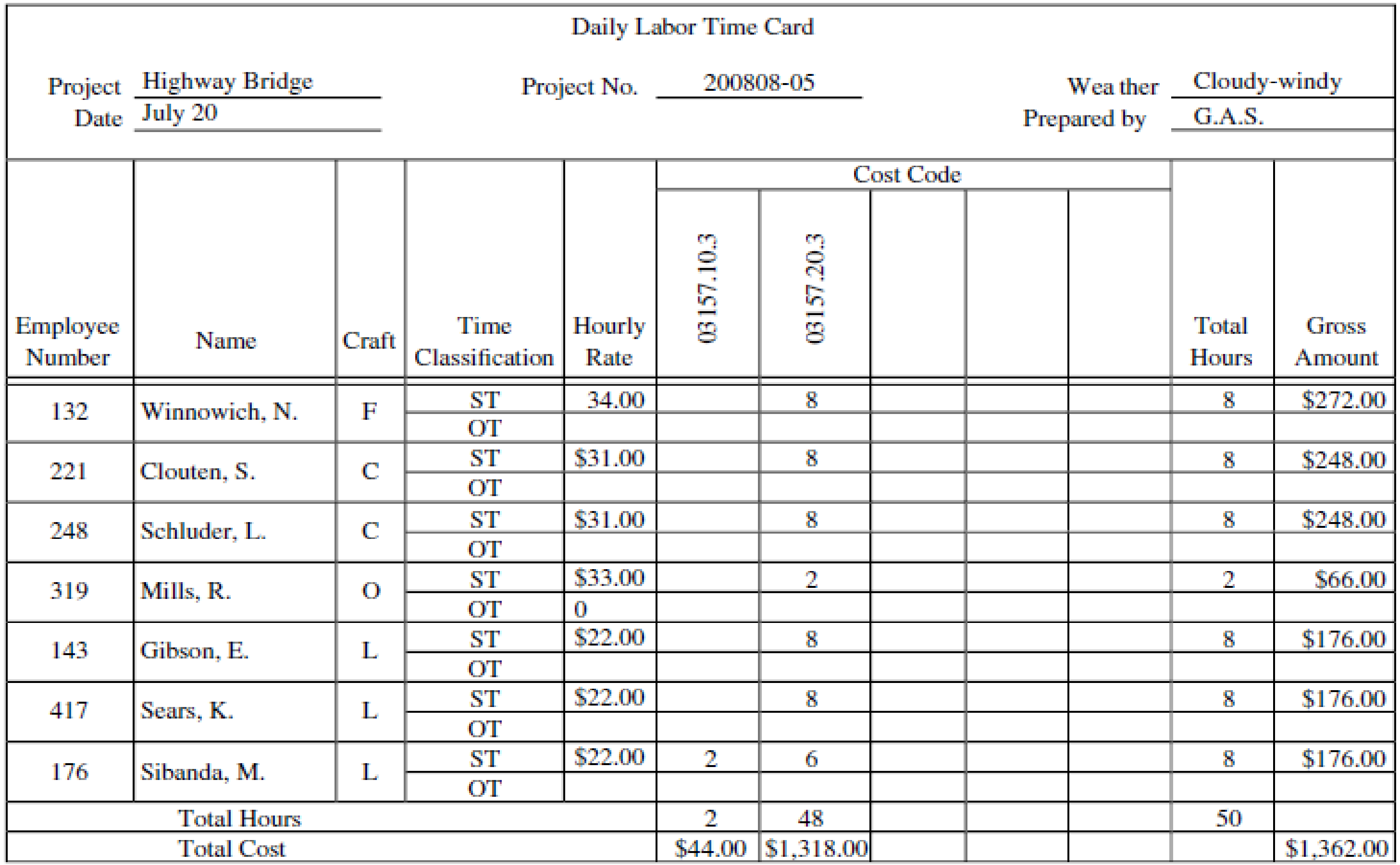
If the **owner** does not retain such daily reports,

there may be **no basis for a challenge** to the **contractor's documented claim**.

"time card labor"

Labor costs – Idle labor

Labor Time Reporting



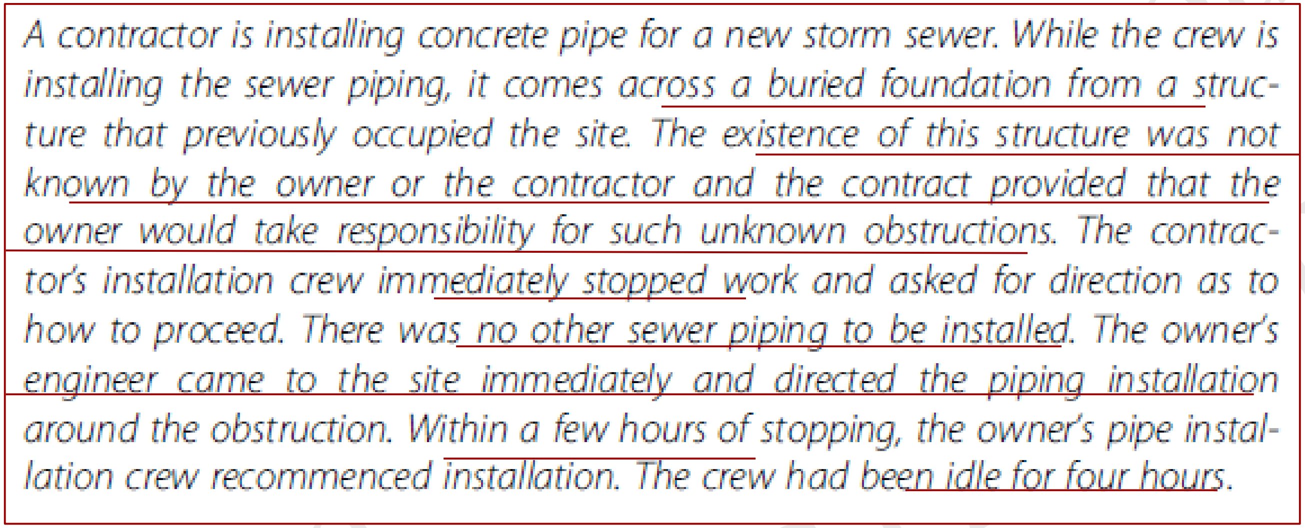
Daily Labor Time Card

Project Highway Bridge
Date July 20
Project No. 200808-05
Weather Cloudy-windy
Prepared by G.A.S.

Employee Number	Name	Craft	Time Classification	Hourly Rate	Cost Code					Total Hours	Gross Amount
					03157.10.3	03157.20.3					
132	Winnowich, N.	F	ST	34.00		8				8	$272.00
			OT								
221	Clouten, S.	C	ST	$31.00		8				8	$248.00
			OT								
248	Schluder, L.	C	ST	$31.00		8				8	$248.00
			OT								
319	Mills, R.	O	ST	$33.00		2				2	$66.00
			OT	0							
143	Gibson, E.	L	ST	$22.00		8				8	$176.00
			OT								
417	Sears, K.	L	ST	$22.00		8				8	$176.00
			OT								
176	Sibanda, M.	L	ST	$22.00	2	6				8	$176.00
			OT								
Total Hours					2	48				50	
Total Cost					$44.00	$1,318.00					$1,362.00

Highway bridge, daily labor time card

Labor costs – Idle labor: Example



A contractor is installing concrete pipe for a new storm sewer. While the crew is installing the sewer piping, it comes across a buried foundation from a structure that previously occupied the site. The existence of this structure was not known by the owner or the contractor and the contract provided that the owner would take responsibility for such unknown obstructions. The contractor's installation crew immediately stopped work and asked for direction as to how to proceed. There was no other sewer piping to be installed. The owner's engineer came to the site immediately and directed the piping installation around the obstruction. Within a few hours of stopping, the owner's pipe installation crew recommenced installation. The crew had been idle for four hours.

But the delay reduced? Is there still any <u>compensation</u>?

Labor costs – Idle labor: Example

- ❑ **Even if** the crew had **not been idle**,

  but had instead **moved to another location** on the site,

  - ❖ **Delay** may have been **reduced or eliminated**, but the contractor may have incurred

1. Additional costs to **move** equipment and materials.
2. Additional costs might also be incurred when the **contactor returns to the original location** to **recommence** the work that **was stopped**.

Disruption compensation claim is still valid!

Labor costs – Idle labor: Conclusion

- **Some construction contracts** specifically address instances **when the owner** would **agree to pay** for idle labor.
  - However, in **those instances**, recognition and payment of idle labor costs are **triggered** by
    1. **Owner's issuance** of a **stop** work order or
    2. **Other direction approving** the **need** for the contractor to **maintain its crew on the project site** to resume work when directed to do so.

*Understanding the requirements and limitations in the **contract** regarding the contractor's **recovery of idle labor costs is essential**.*

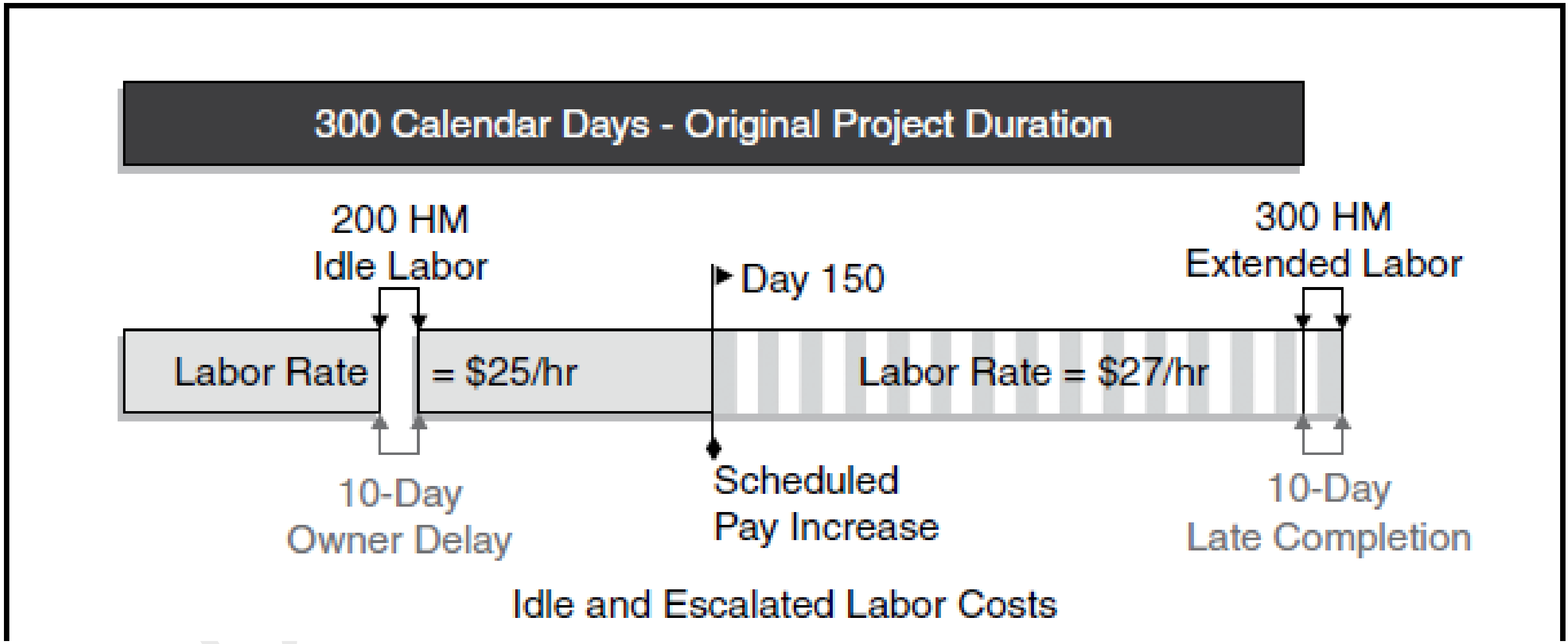
Labor costs – Escalation of labor costs

- ☐ Some delays can cause the Contractor to experience **escalation of its labor costs**.
- ☐ This may occur if the **delay shifts labor** into a **more expensive time period** than that **originally scheduled**.
    - ❖ This situation is sometimes referred to as **extended labor**, but it should **more appropriately** be considered **labor cost escalation**.

Let's illustrates the difference between idle and escalated labor costs.

Labor costs – Idle and Escalation of labor costs: Example

- ☐ In the **third month** of the Project, the **Owner causes a ten-day delay** to the Project.
- ☐ The **Owner accepts responsibility** for the delay, so there is no question of liability or the magnitude of the delay.
- ☐ The **Project is extended** by **change order** an **additional ten days.**

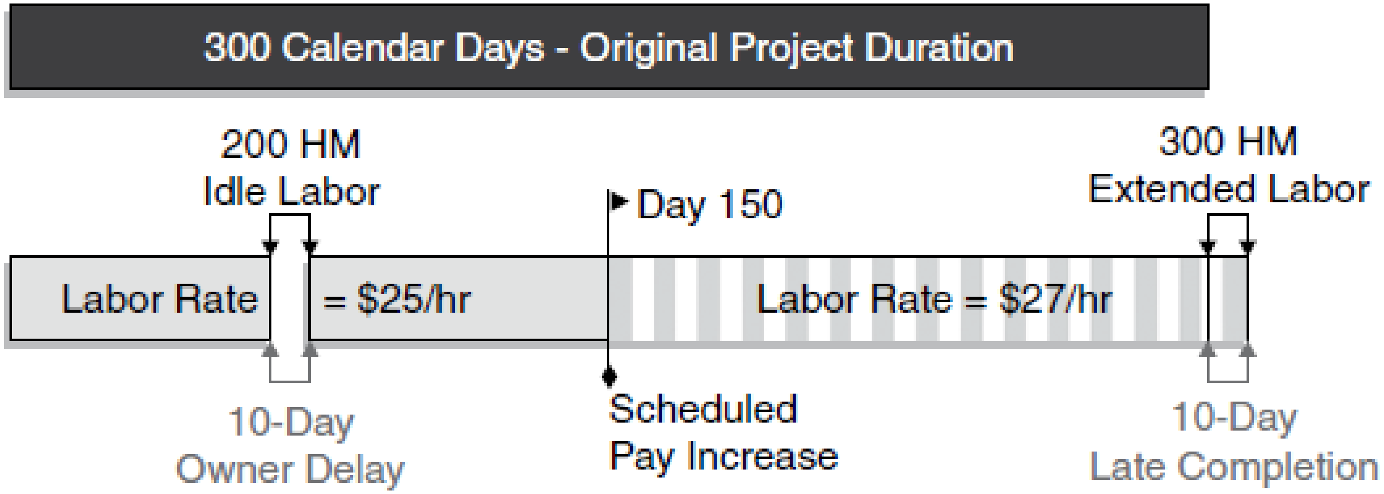


Labor costs – Idle and Escalation of labor costs: Example

- The Contractor presented a claim of **200 hrs * $25 per hr = $5,000 for idle labor**.

The Contractor's records also show 300 labor hours for common laborers during the last ten days on the job, which occurred in a time frame later than that originally planned. The Contractor seeks compensation for the additional $2 per hour ($27.00 – $25.00) for the 300 labor hours.

$$\$2/\text{hour} \times 300 \text{ labor hours} = \$600$$

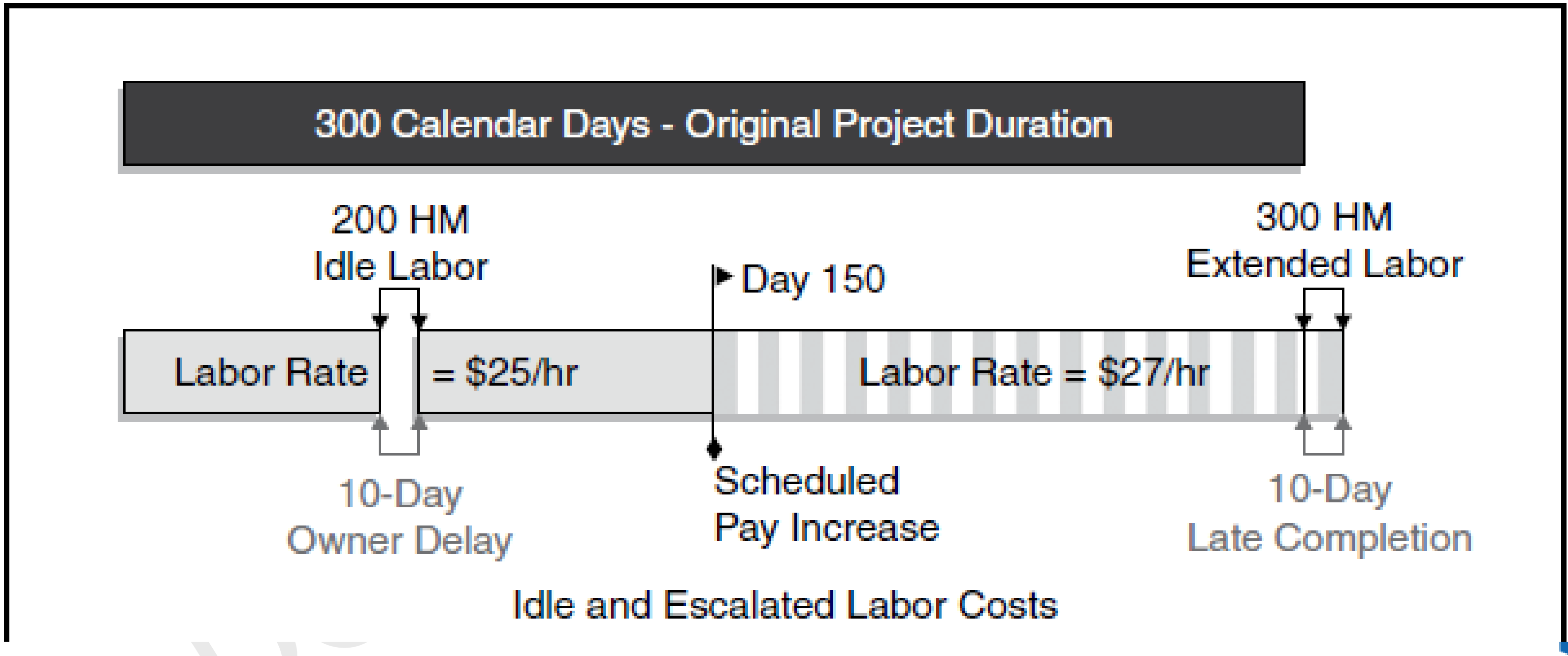


Idle and Escalated Labor Costs

Labor costs – Idle and Escalation of labor costs: Example

- ☐ The Contractor presented a total claim of **$5,600**, with
  1. $5,000 for **idle** labor
  2. $600 for **extended** labor

The Contractor's approach, however, is incorrect.



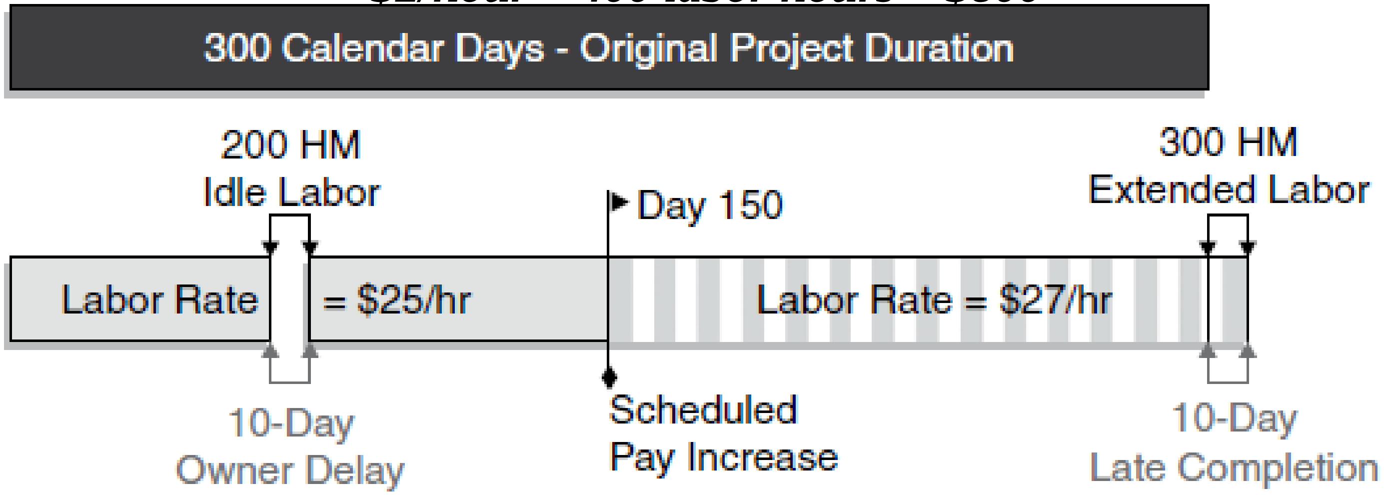
Idle and Escalated Labor Costs

Labor costs – Idle and Escalation of labor costs: Example

- ❑ **300HM was planned if there had not been a delay.**
- ❑ The **Contractor’s certified payrolls** showed that **400 labor hours were worked during the ten-day period (maybe because it was winter)** immediately after the wage increase. Therefore, the Contractor would be entitled to an **additional $800** for **escalated cost** of its labor due to the delay.

Remember we talked about actual costs if you don’t have pre-agreed contract?

$2/hour × 400 labor hours = $800



Idle and Escalated Labor Costs

Labor costs – Idle and Escalation of labor costs: Example

This simple example illustrates that

analyst should not estimate damages without first clearly understanding the nature of the delays

A more realistic and complex project example might involve several trades under different collective bargaining agreements,

each with different wage increases occurring on different dates.

A wage increase might extend over a period of more than a year for some trades.

The updated labor agreements may make new and different requirements for apprentices or supervisory labor.

Labor costs – Idle and Escalation of labor costs: Example

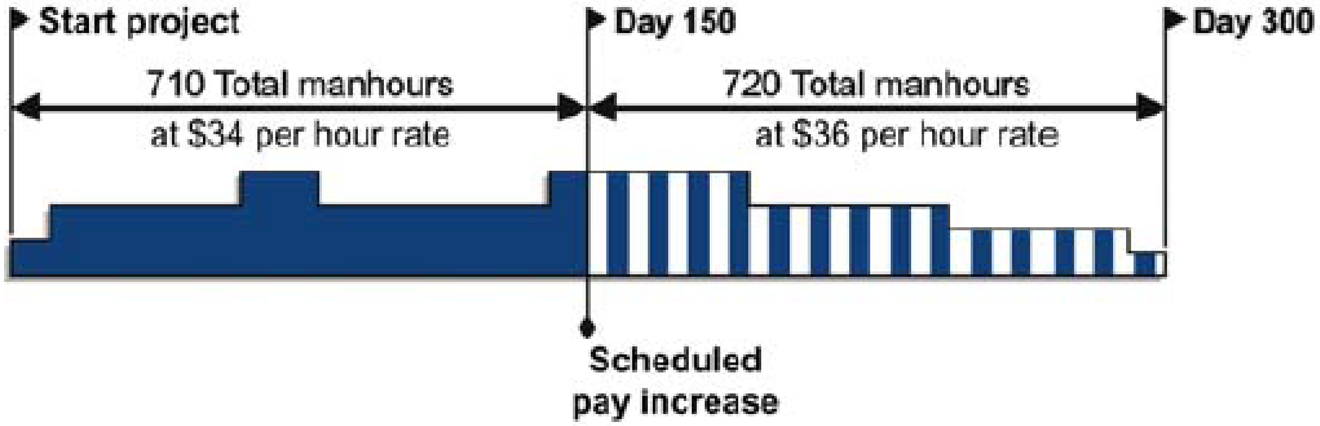
What happens when a delay alters the work sequence, or when a delay combines with other changes to affect the actual labor distribution on the job?

In these situations, the contractor must substantiate the original-planned distribution of labor compared with the actual distribution.

Let’s see an example!

Labor costs – Idle and Escalation of labor costs: Example

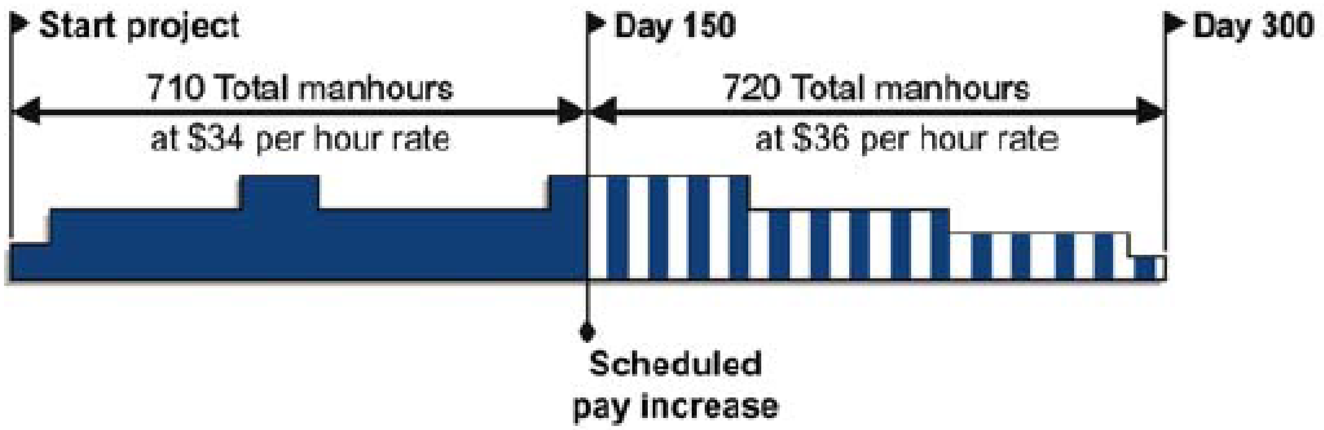
- ❑ **During the Project**, the **Contractor** maintains a **resource-loaded CPM schedule** to show the **distribution of manpower** **planned over time**.
- ❑ A Project is scheduled for a duration of **300 calendar days**.
- ❑ Figure shows the **distribution of planned carpenter hours** for the Project taken from the **original CPM schedule**.



Distribution of carpenter manhours—original CPM schedule

Labor costs – Idle and Escalation of labor costs: Example

Here it seems that there is no idle cost because the contractor uses the labors somewhere else.

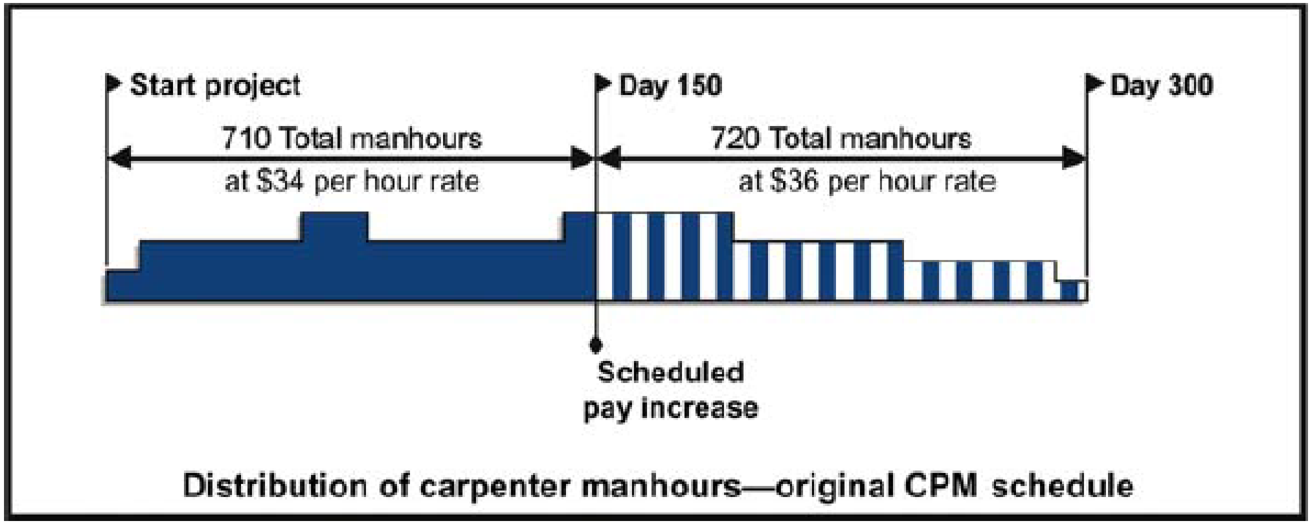


Distribution of carpenter manhours—original CPM schedule

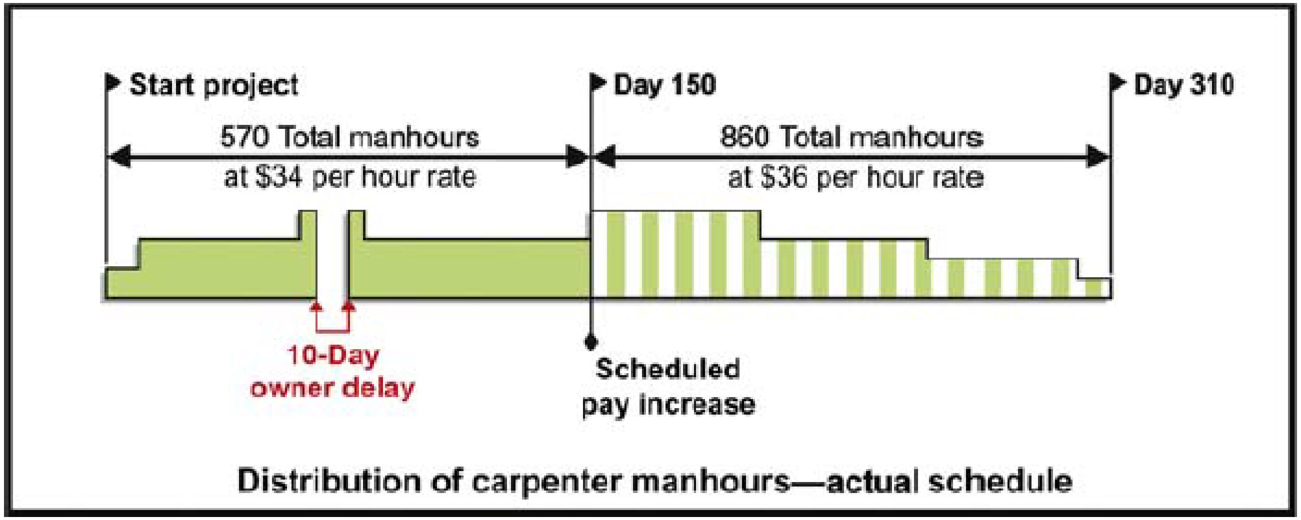
Labor costs – Idle and Escalation of labor costs: Example

860 actual hours – 720 planned hours = 140 labor hours

140 hours × $2/hour wage increase = $280.00



Distribution of carpenter manhours—original CPM schedule



Distribution of carpenter manhours—actual schedule

Labor costs – Idle and Escalation of labor costs: Example

In this example, the actual distribution of carpenter labor was caused solely by the Owner's delay.

In a different situation, if the Owner can demonstrate that this was not the case, then the delay damages would not include the escalated labor calculation.

Labor costs – Idle and Escalation of labor costs: Example

Many projects do not have a resource-loaded CPM schedule to allow a reasonably precise comparison between the planned and the actual distribution of labor.

Without the CPM schedule, the analyst can **estimate** the **planned labor distribution** from the **Project bar chart**.

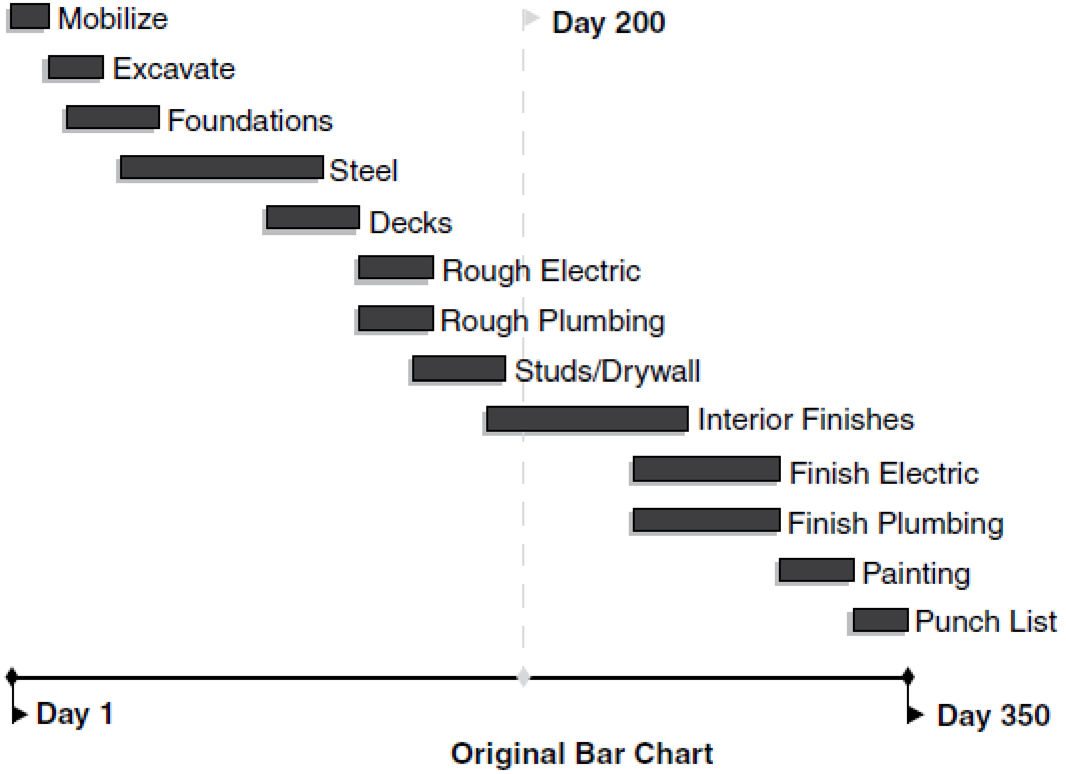
The analyst can **compare**

1. **Labor hours actually expended** on the job (taken from the **project daily reports**)
2. **Planned labor hour distribution** (taken from **bar chart**)

Let's see!

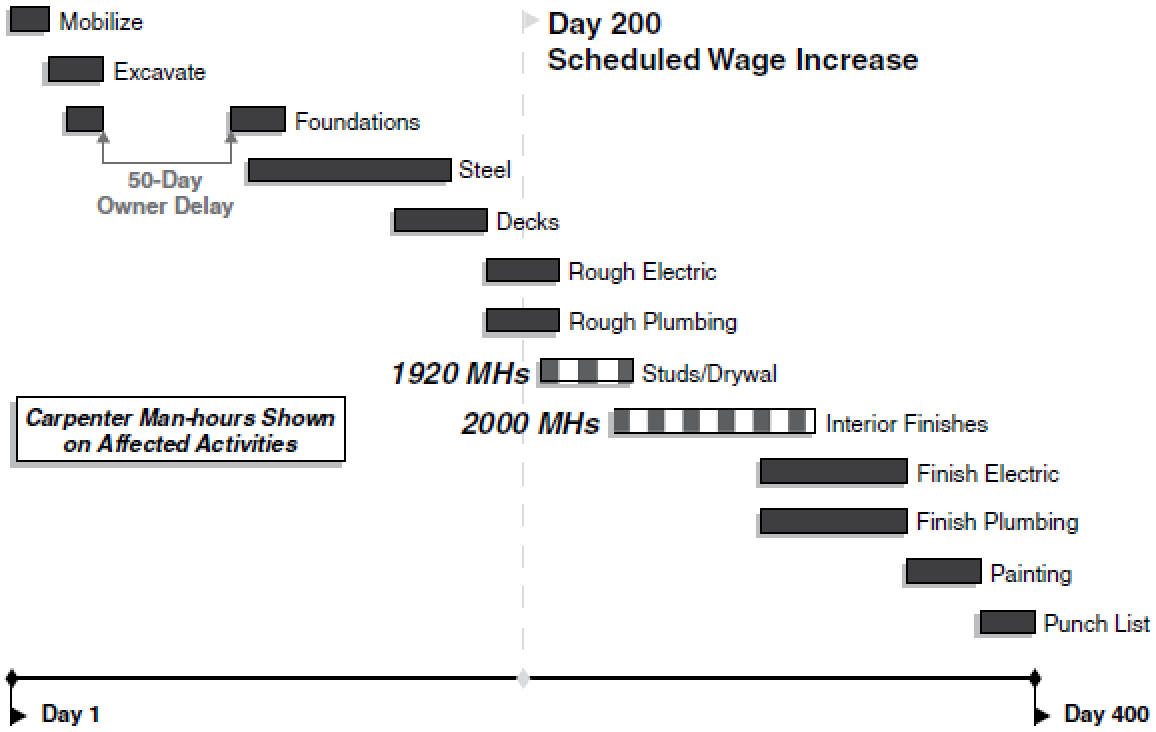
Labor costs – Idle and Escalation of labor costs: Example

- ☐ This Chart is the **Contractor's bar chart** for the work as **originally**.
- ☐ **No labor hours** are shown in the **bar chart**.
- ☐ Due to an **Owner-caused delay**, the Contractor experiences **escalated labor cost** on the Project, after a **rate increase** (from **$35 per hour to $36 per hour**) went into **effect on day 200 of the project**.



Labor costs – Idle and Escalation of labor costs: Example

- ❑ **This chart** shows the **actual bar chart** for the project, **reflecting the delays**.
- ❑ It also shows the **actual carpenter labor hours worked** on **each shaded activity**.
- ❑ These **labor hours** were **taken** from the **contemporaneously recorded Project daily**

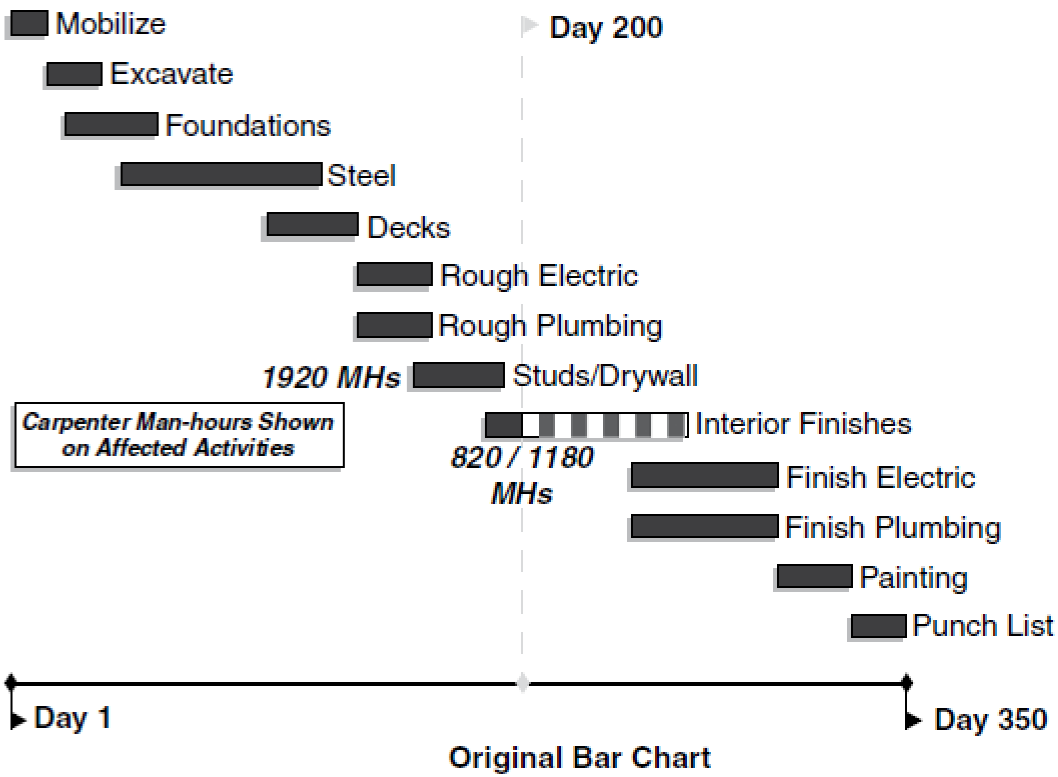


Bar Chart with Delay

Labor costs – Idle and Escalation of labor costs: Example

$$\$1/hour \times (1{,}920\ hours + 820\ hours) = \$2{,}740$$

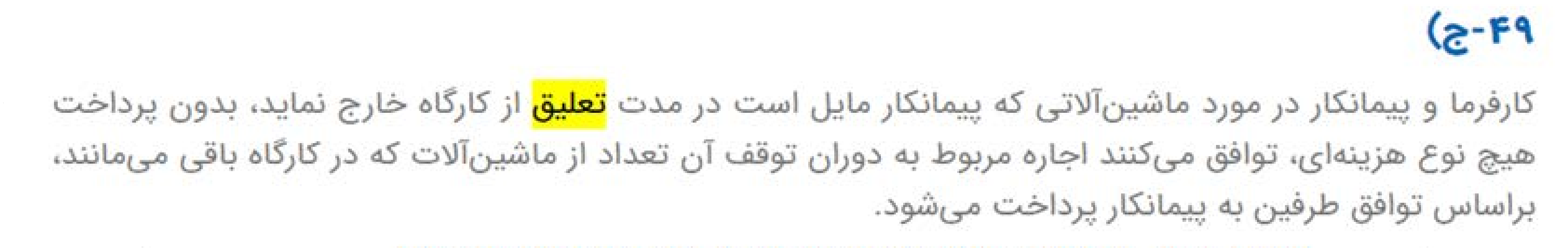
- It should be noted that **this conclusion assumes** the delay **only shifts the work into** the **more costly time period** and that **no labor inefficiency resulted**.



Original Bar Chart

Equipment costs

- ❑ Delays may cause the **equipment** to be **idle**.
- ❑ The **amount of damages** that can be claimed for idle equipment **depends** on the **contract provisions**.
- ❑ In some cases, the **contract** may address **idle** or **standby equipment** and allow **only a reduced rate or no compensation at all**.
  - ❖ If the **contract** is **silent** on this issue, the **contractor would likely claim** damages at the **full rates** of the **equipment during the idle time**.



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کارفرما و پیمانکار در مورد ماشین‌آلاتی که پیمانکار مایل است در مدت تعلیق از کارگاه خارج نماید، بدون پرداخت هیچ نوع هزینه‌ای، توافق می‌کنند اجاره مربوط به دوران توقف آن تعداد از ماشین‌آلات که در کارگاه باقی می‌مانند، براساس توافق طرفین به پیمانکار پرداخت می‌شود.

Equipment costs

- ❑ As in the case of idle labor,

  the **contractor** would need to **identify specific equipment** on the project in the **daily reports** to show **exactly**

  1. **When this equipment** was **idle**
  2. **Duration** of the idle time.

What forms you should use for this?

Equipment costs

- ☐ **Owner** should **verify** the **<u>Contractor's use of equipment</u>**

1. **Prior to delay**
2. **During the delay**
3. **Following the period of the delay**

Why is this really important for owner?

Equipment costs

- If the equipment was **idle** **both before and after the delay period**, then the **Owner** may appropriately **question**
  1. Whether the Contractor actually **sustained any damages** from the delay
     - Use the **equipment somewhere else**, so there would be no damage
  2. Whether **idle time occurred due to another reason**
     - Concurrent delay

How about escalation costs here?

Equipment costs

- ❑ As with labor costs, a **Contractor's equipment costs** may also be subject to **escalation**.
  - ❖ If a Contractor is using **rental equipment**, the delay could **shift** the Contractor's equipment into a **time period with a higher rental rate**.
    - ✓ This situation should be **documented with invoices**.

Let's see an example!

Equipment costs – Example

- ☐ If a **significant delay occurs** to a portion of a Project, **specialized equipment** originally **planned** for the work may **no longer be available**.
  1. The Contractor's own paving machine may have been assigned to a Project for a particular period of time, but it is no longer available after the delay period. The Contractor is **forced to replace the owned equipment** with **more expensive rental equipment** in order to **meet the Project's revised schedule**.
  2. In another case, the **Contractor originally planned** to perform mass excavation work **using scrapers**. Because of the delay, the Contractor now finds it **must use loaders and trucks** to excavate the material.

What do you think if in the second case the rental cost does not change?

Are you still entitled to the damages?

Equipment costs – Example

- ☐ It should also be noted that when the **performance of work** on the **project's critical path** is
  1. **Less productive or inefficient**
  2. Takes **longer than planned** to complete

the **extended duration of this work** could cause delays to the project that result in **additional delay-related costs**.

Project overhead costs + home office overhead costs (in the case of suspension)

You may be entitled to claim for:

1. **Escalation costs (rental)**
2. **Disruption costs**
3. **Project overhead costs**
4. **Home office overhead**

Equipment costs

- ☐ The **damages to the Contractor** would be measured by comparing the **cost** of the **<u>originally planned</u>** versus the **<u>actual</u>**.
  - ❖ In the **case of disruption**, you may need other **supportive measurements**!

<u>Next Example</u> illustrates **both** **<u>cost escalation</u>** and **<u>inefficiency</u>** in equipment use caused by a delay.

Equipment costs – Example

- ❑ An Owner is constructing a waste water treatment plant addition. The Project site is an inactive landfill.
- ❑ The excavation Subcontractor is required to excavate approximately 200,000 cubic yards of material and dispose of it at a nearby active landfill.
- ❑ Prior to beginning excavation, the Owner is advised that the site may contain hazardous waste materials.
- ❑ Consequently, the Owner stops the Contractor's excavation activity in order to perform toxicity testing.
- ❑ The testing takes three months to complete, at which time the excavation Subcontractor is allowed to again proceed with the work as originally specified.
- ❑ Because of the delay, however, the Subcontractor experiences changes in its equipment cost and availability.

Equipment costs – Example

- ☐ Originally, the Subcontractor planned to excavate 170,000 cubic yards with scrapers and the remaining 30,000 cubic yards with a hydraulic excavator and a 20-ton dump truck.
- ☐ Due to the delay, the scrapers are no longer available because they have been committed to another Project.
- ☐ Consequently, the Subcontractor must now perform all of the excavation work without the use of scrapers.

Equipment costs – Example

- ❑ The Subcontractor experiences **two problems** because of the delay.
  - ❖ First, the excavators it intended to rent have increased in cost.
  - ❖ Second, the unit cost for the excavation work is higher using the dump trucks than it would have been using the scrapers.

Based on these factors, it calculates the **increased costs.**

Equipment costs – Example

1. **Escalation of rental equipment cost:**

❖ **Cat hydraulic excavator rates**

- ✓ Quoted rate: $2,800/week (quote attached)
- ✓ New rate: $2,900/week (invoice attached)
    - o Difference of $100/week.

❖ **Planned equipment time was 10 weeks (2 excavators for 5 weeks).**

Extra cost: $100/week × 10 weeks = $1,000

Equipment costs – Example

2. Increased excavation cost (productivity loss):

- **Excavation with scrapers:**
  - ✓ $4.50/cubic yard (calculations attached).
- **Excavation with dump truck:**
  - ✓ $7.20/cubic yard (calculations attached).

Difference of $2.70/cubic yard

Extra cost: $2.70/cubic yard × 170,000 cubic yard = $459,000

Equipment costs – Example

Total cost from delay: $460,000 = $459,000 + $1,000

Equipment costs – Example

Of course, the __Contractor__ must always show that it complied with its obligation to mitigate damages.

In this case, the Subcontractor __may need__ to demonstrate that the premium to rent scrapers over and above the cost of the __planned scrapers__ was greater than the damages that __resulted__ from the change in work methods.

Material costs

- ☐ The most common added **material cost** caused by a delay is **price escalation**.
- ☐ The calculation of escalation cost for materials can be performed in the **same manner** as that for the **escalation of labor cost**.
- ☐ A **comparison** must be made between the **price** of each material that would **have been purchased** in the **original schedule** and the **price** of each material **purchased** later **under the delayed schedule**.

Let's see the example!

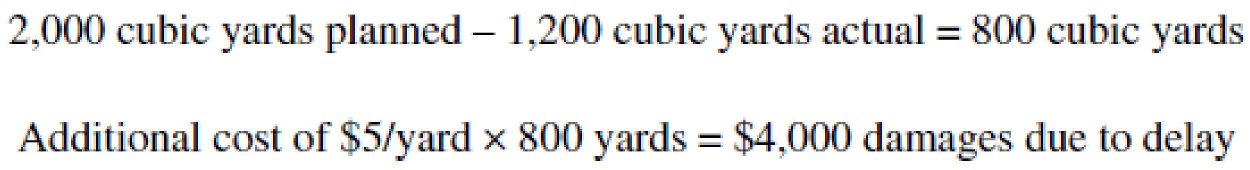
Material costs – Example

- ☐ A Project was originally scheduled to take 300 calendar days.
- ☐ The Project experienced a 90-day, Owner-caused delay.
- ☐ The delay occurred at the beginning of the Project and forced the Contractor to pay more for concrete.
- ☐ The Contractor can demonstrate it had a purchase order for concrete at $80 per cubic yard from the beginning of the Project until day 100.
- ☐ After day 100, by the terms of the purchase order, the cost of concrete increased to $85 per cubic yard.

Due to the delay, the Contractor purchased more concrete material at $85 per cubic yard than it originally planned.

Material costs – Example

- A review of the schedule shows that the Contractor planned to have placed concrete on six of eight floors before the price increase took effect.
- A quantity takeoff establishes this as 2,000 cubic yards of concrete.
- In the actual performance of the work, the Contractor placed only 1,200 cubic yards of concrete before the price increase took effect.
- The material cost increase is directly attributable to the excusable delay.
- Therefore, the associated damages will be at least $4,000 (**$5 per cubic yard × 800 cubic yards**) due to the escalated price of



2,000 cubic yards planned – 1,200 cubic yards actual = 800 cubic yards

Additional cost of $5/yard × 800 yards = $4,000 damages due to delay

Material cost – Storage

- ☐ **Contractor** may be **forced** to store **materials** either **on or off the site** as a **result of a delay**.

- ☐ The Contractor must **support claims** for these costs **with invoices**.

- ☐ In some cases, the **Contractor** may be able to **purchase materials** **before** they are **required for installation** and **store them**, as this may be **less expensive** than the escalated cost of the materials purchased at a later date.
  - ❖ The Contractor should **notify the Owner** in **advance** of this course of action.

Extended Project (field) overhead costs – Field labor costs

- ☐ When a Project experiences a delay, the **Contractor's field staff** and **field equipment** may be **on site longer than originally scheduled**.
- ☐ **Depending** on the **Project-specific circumstances**, when a Project encounters a delay, the Contractor would typically retain its **supervisory team at the job site**.
  - ❖ **Personnel** such as the Project Manager, Project engineer, superintendent, assistant superintendent, and administrative support positions:
    1. **If they can be allocated to the delayed activity:**
       - ✓ These personnel represent a **direct labor cost** to the **contracting firm**.
    2. **If they cannot be allocated to the delayed activity (more than one delayed activity):**
       - ✓ These personnel represent a **extended filed labor cost** (**project overhead cost)**.

Extended Project (field) overhead costs – Field labor costs

☐ To calculate the **delay-related direct labor cost** to maintain these people on site:

(Aggregate of each daily salary + burden) × Number of days of compensable delay = Damages for extended field labor (supervisory personnel)

❖ Make sure that if the **delay** is expressed in **calendar days** that the **costs** are also expressed in **cost per calendar day**.

While this calculation is straightforward, it is important to note that the analyst also needs to address the propriety of the Contractor's claim to recover extended field costs for supervisory personnel.

Extended Project (field) overhead costs – Filed labor costs

- ☐ In order to address the **propriety of claiming damages** for extended **field supervisory labor**, the analyst should start with a review of the **Contractor's normal accounting procedures** for these costs.
- ✓ *If the **Contractor routinely charges** the **Project Manager** to the **activity**, then claiming damages would be **appropriate** but **subject to the Contract requirements**.*
- ✓ *If the **Contractor routinely charges** the **Project Manager** for the **Project overhead**, then claiming damages would be **appropriate** but **should be considered as a project overhead**.*
- ✓ *If the **Contractor routinely charges** the **Project Manager** to **home office overhead**, then claiming this cost as a **direct field cost** may **not be appropriate**.*

The same principle applies to the salary of any other field supervisory personnel extended on the Project because of the delay.

Extended Project (field) overhead costs – Office costs

- **Extended field office costs** will also consist of the **daily cost** of all of the support equipment and services that are necessary to **maintain the project site**.
  1. **Equipment:** Typically include **office** and **storage trailers**, **portable sanitary facilities**, **office equipment**, and **security fencing**, etc.
  2. **Services:** Typically include phone service, electrical services, drinking water supply, and security.
     - ❖ The key to determining which costs are included in the **daily rate** is the **time-related nature** of the expenditure.

Extended Project (field) overhead costs – Other costs

❑ Delays on a construction Project may cause a number of different increased costs to the Contractor, such as the following:

- ❖ Temporary utility and facility costs
- ❖ Extended warranties
- ❖ Maintaining and protecting work during delays
- ❖ Increased bond costs

Normally, all of these items fit into one of the general cost categories, such as field overhead, project overhead, and so forth.

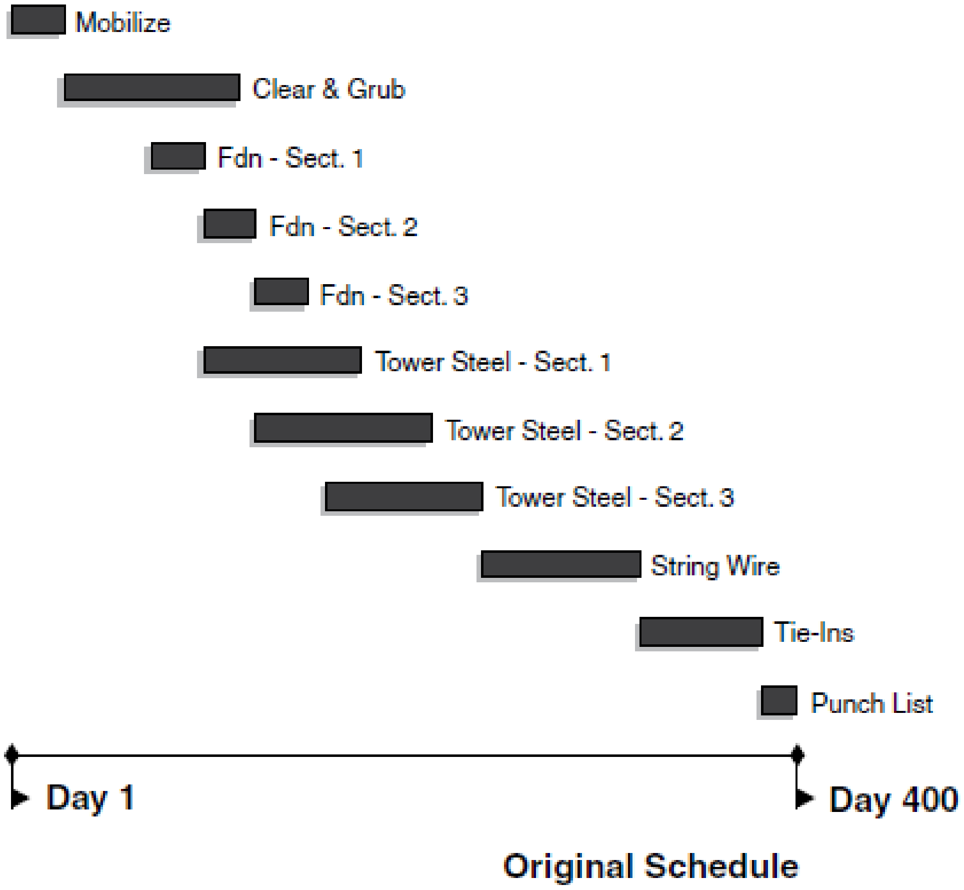
Example

This Example shows a Contractor’s damage calculations considering items mentioned in this section

It is intended to help present a clear picture of the procedures to use for calculating delay damages for an excusable delay

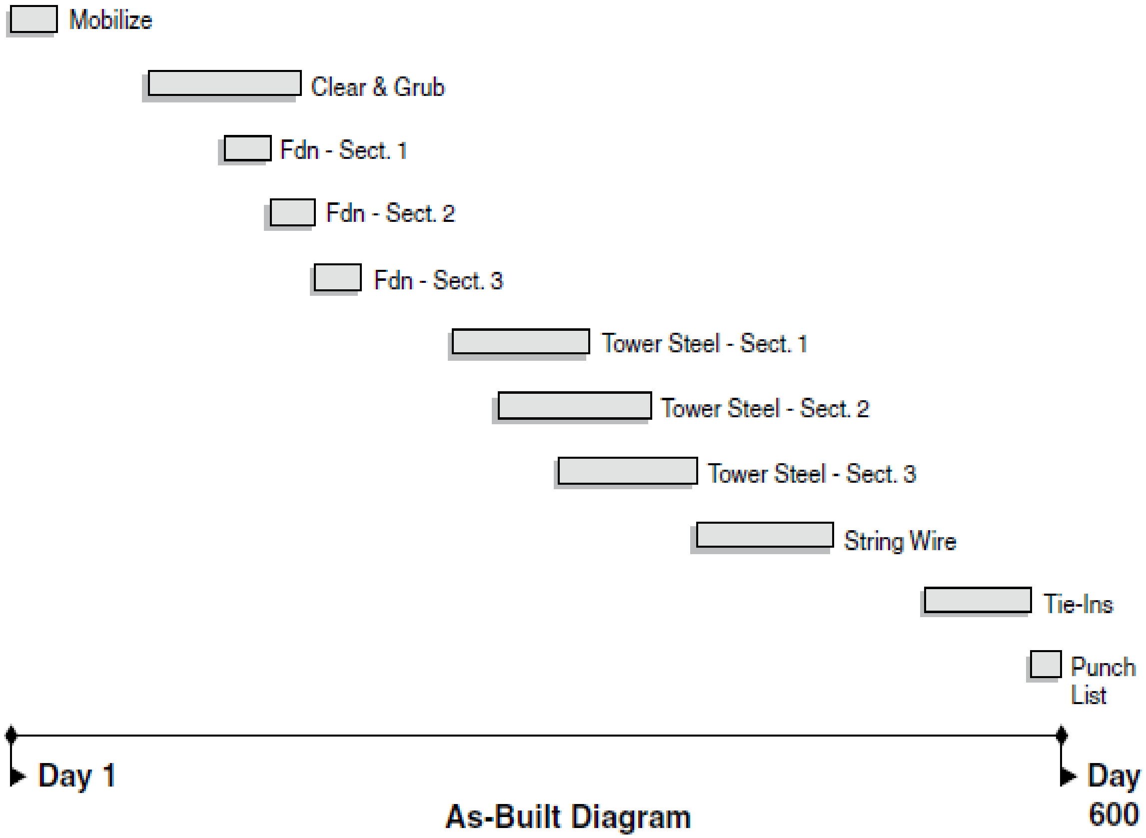
Example – As-planned schedule

- ☐ A Project has a Contract duration of 400 calendar days. The Contractor estimates the construction schedule to last the full 400 calendar days.



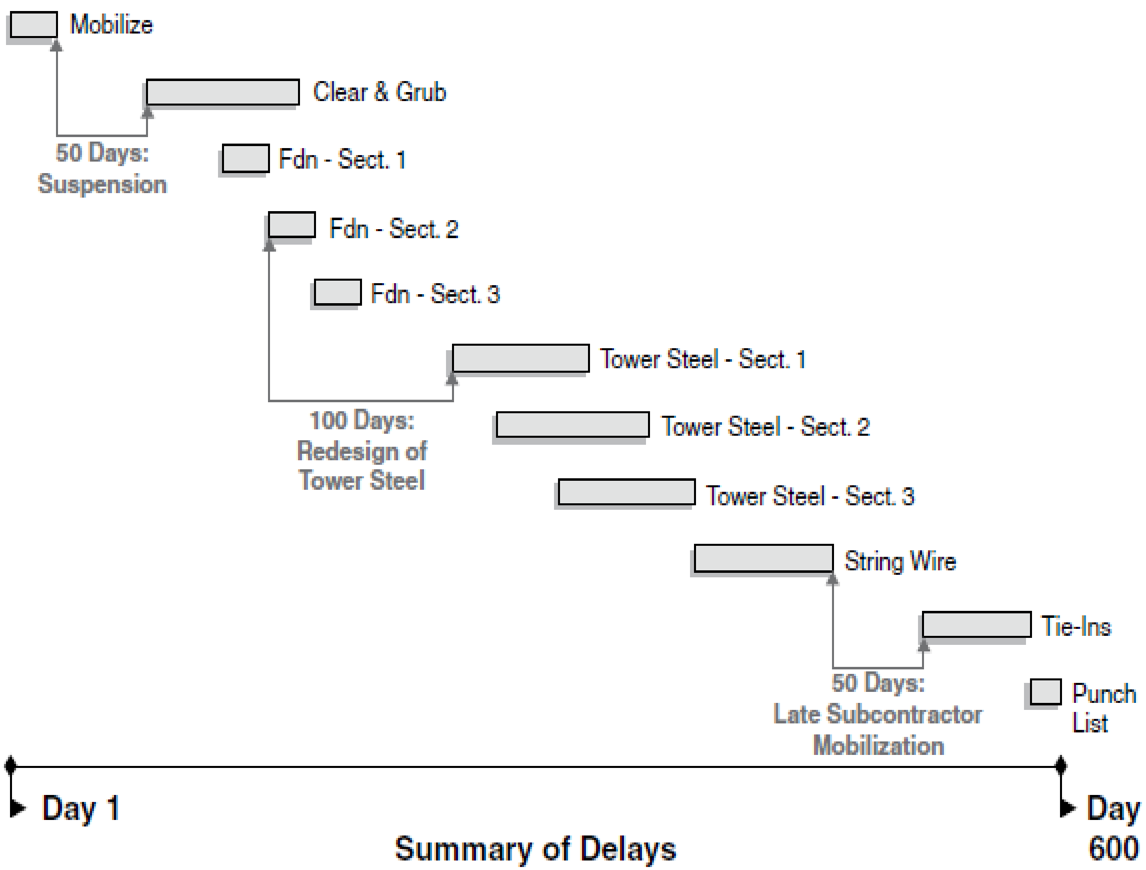
Example – As-built schedule

- ☐ The Project has a delay of **200 calendar days**.
- ☐ It was determined that the **Owner caused 150 days of delay**, and the **Contractor** was responsible for the remaining **50 days**.
- ☐ The Owner has issued a **two-part change order** for its delays.
- ☐ The Owner is now in **negotiation** with the Contractor over the **compensation for the delay**



Example – Summary of delays

- ❑ A **summary of delays** to the schedule, shows that:
- ❑ **<u>Owner</u>** delayed the **start of the Project** by **<u>suspending the work</u>** for **50 days**.
- ❑ The next delay was also caused by the **<u>Owner</u>**, who, by **requesting design revisions**, delayed the Project an additional **100 days**.
- ❑ The **final delay** was **50 days**, attributable to the Contractor for **failing to mobilize** a **Subcontractor** to perform work.



Summary of Delays

Example – Contractor’s additional compensation presentation

Request for Equitable Adjustment

Ace Construction Company hereby requests the following compensation for the 150 days of delay caused by factors beyond our control. In Part 1 of Change Order No. 7, the owner has granted a time extension of 150 calendar days. Because of this 150-day delay, Ace Construction accrued the following extra costs.

Extended Field Overhead

Labor				
Project Manager	150 days @ $600/day for 25% of time	=	$22,500	*Note: Certified payrolls attached.*
Superintendent	150 days @ $520/day	=	$78,000	*Project Manager is a direct job charge.*
Clerk	150 days @ $200/day	=	$30,000	
Master Mechanic	150 days @ $480/day	=	$72,000	
Subtotal Labor			$202,500	
Equipment				
Superintendent’s truck	150 days @ $25/day	=	$3,750	*Note: Invoices for equipment attached.*
Portable toilet	5 mos. @ $150/month	=	$750	*Superintendent’s truck costed by*
Project trailer	5 mos. @ $160/month	=	$800	*normal company accounting practices.*
Tool trailer	5 mos. @ $120/month	=	$600	
Subtotal Equipment			$5,900	
General Conditions				
Utilities	Electricity: 5 mos. @ $150/month	=	$750	
	Water/Sewer: 5 mos. @ $100/month	=	$500	
Dumpsters	2 dumpsters: 5 mos. @ $150 ea/month	=	$1,500	
Copy machine	5 mos. @ $120/month	=	$600	
Office supplies	5 mos. @ $80/month	=	$400	
Scheduling updates	5 mos. @ $1,000/month	=	$5,000	
Subtotal General Conditions			$8,750	
Total Extended Field Overhead			**$217,150**	

Example – Contractor’s additional compensation presentation

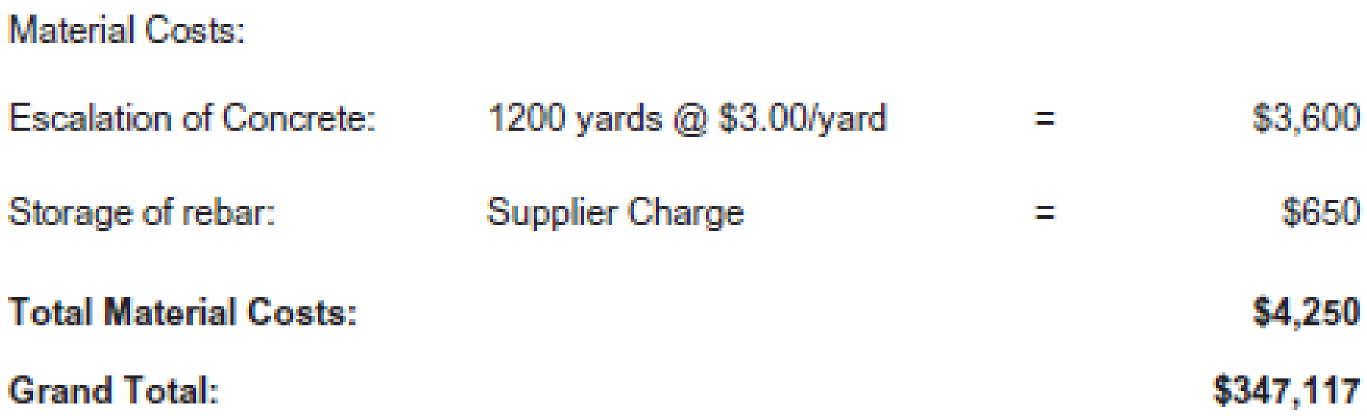
Construction Equipment Costs:

Extended Equipment:				
100-ton crane:	3 extra mos. @ $6,000/month	=	$18,000	Note: Applicable timesheets and certified payrolls attached.
Escalation of Equipment:				
D-7 dozer:	2 mos. @ increased rental rate of $400/month	=	$800	Union agreement and calculation of rates to include burden and overhead attached.
Idle Equipment:				
Scrapers:	327 hours @ $70/hour	=	$22,890	
D-7 dozer:	240 hours @ $75/hour	=	$18,000	
Total Construction Equipment Costs		:	**$59,690**	

Example – Contractor’s additional compensation presentation

Idle Labor:				
Carpenters:	725 hours @ $37/hour	=	$26,825	
Laborers:	816 hours @ $25.50/hour	=	$20,808	
Ironworkers:	420 hours @ $37/hour	=	$15,540	
Subtotal Idle Labor:			$63,173	
Escalation of Labor:				
Carpenters	Escalation: 700 hours @ $1.60/hour	=	$1,120	
Laborers:	Escalation: 250 hours @ $1.50/hour	=	$375	Note: Applicable timesheets and certified payrolls attached.
Ironworkers	(1st increase) escalation: 320 hours @ $1.20/hour	=	$384	
	(2nd increase) escalation: 650 hours @ $1.50/hour	=	$975	Union agreement and calculation of rates to include burden and overhead attached.
Subtotal Labor Escalation:			$2,854	
Total Labor Costs:			**$66,027**	

Example – Contractor’s additional compensation presentation



Material Costs:

Escalation of Concrete:	1200 yards @ $3.00/yard	=	$3,600
Storage of rebar:	Supplier Charge	=	$650
Total Material Costs:			**$4,250**
Grand Total:			**$347,117**

GENERAL OVERHEAD
(Home office overhead)

(HOOH)

Introduction

- ☐ Since the contractor adds a **percentage for markup** to the **direct cost bid amount** to **recover** home office costs,
  - ❖ If this **Project** were to then **experience a delay**, **Project revenues** may be **earned** over a **longer period of time**,

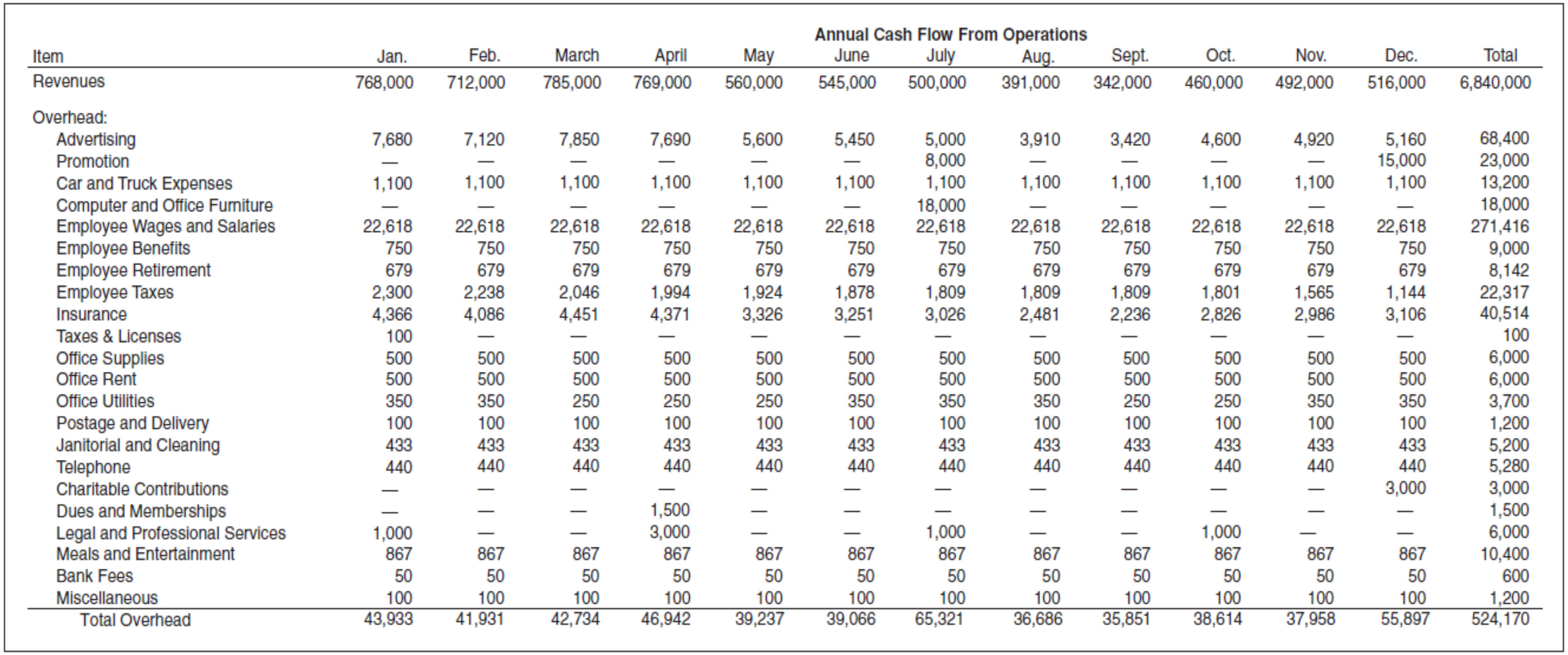
    disrupting the basis under which the Contractor **originally allocated** its home office overhead costs.
  - ❖ Usually, the **Contractor** calculates the **final bid price** by adding a **percentage for markup** to the **direct cost bid amount** to **recover** home office costs, but unable to recover those costs.

This is called **home office overhead (HOOH)** costs

Home office overhead (HOOH)

What included in HOOH?

There is a debate here!



Item	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
						Annual Cash Flow From Operations							
Revenues	768,000	712,000	785,000	769,000	560,000	545,000	500,000	391,000	342,000	460,000	492,000	516,000	6,840,000
Overhead:													
Advertising	7,680	7,120	7,850	7,690	5,600	5,450	5,000	3,910	3,420	4,600	4,920	5,160	68,400
Promotion	—	—	—	—	—	—	8,000	—	—	—	—	15,000	23,000
Car and Truck Expenses	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	13,200
Computer and Office Furniture	—	—	—	—	—	—	18,000	—	—	—	—	—	18,000
Employee Wages and Salaries	22,618	22,618	22,618	22,618	22,618	22,618	22,618	22,618	22,618	22,618	22,618	22,618	271,416
Employee Benefits	750	750	750	750	750	750	750	750	750	750	750	750	9,000
Employee Retirement	679	679	679	679	679	679	679	679	679	679	679	679	8,142
Employee Taxes	2,300	2,238	2,046	1,994	1,924	1,878	1,809	1,809	1,809	1,801	1,565	1,144	22,317
Insurance	4,366	4,086	4,451	4,371	3,326	3,251	3,026	2,481	2,236	2,826	2,986	3,106	40,514
Taxes & Licenses	100	—	—	—	—	—	—	—	—	—	—	—	100
Office Supplies	500	500	500	500	500	500	500	500	500	500	500	500	6,000
Office Rent	500	500	500	500	500	500	500	500	500	500	500	500	6,000
Office Utilities	350	350	250	250	250	350	350	350	250	250	350	350	3,700
Postage and Delivery	100	100	100	100	100	100	100	100	100	100	100	100	1,200
Janitorial and Cleaning	433	433	433	433	433	433	433	433	433	433	433	433	5,200
Telephone	440	440	440	440	440	440	440	440	440	440	440	440	5,280
Charitable Contributions	—	—	—	—	—	—	—	—	—	—	—	3,000	3,000
Dues and Memberships	—	—	—	1,500	—	—	—	—	—	—	—	—	1,500
Legal and Professional Services	1,000	—	—	3,000	—	—	1,000	—	—	1,000	—	—	6,000
Meals and Entertainment	867	867	867	867	867	867	867	867	867	867	867	867	10,400
Bank Fees	50	50	50	50	50	50	50	50	50	50	50	50	600
Miscellaneous	100	100	100	100	100	100	100	100	100	100	100	100	1,200
Total Overhead	43,933	41,931	42,734	46,942	39,237	39,066	65,321	36,686	35,851	38,614	37,958	55,897	524,170

General Overhead Budget

Could owner restrict this?

Home office overhead (HOOH)

- ❑ The **auditing or accounting standards** employed by the owner can **further restrict** the **definition of home office overhead**.
  - ❖ For example, under contracts governed by **Federal Acquisition Regulation (FAR)** cost principles,

    certain costs, such as those **<u>expended for marketing and entertainment</u>** may **not be recoverable** as home office overhead costs.

    As a result, on Federal projects, or on projects that rely on the FAR for the purposes of cost accounting, these marketing and entertainment costs ***end up being covered*** *by whatever amounts the contractor is able to mark up its costs for profit, if at all.*

How delays could affect on HOOH?

Effects of delays on general (home office) overhead costs

- There is a distinction between:
  1. *Extended home office overhead:* Project was **formally suspended**
     - **Additional expenses** incurred **over time** due to a delay that **prevents** a contractor from **taking on additional work in a same project**.
  2. *Unabsorbed home office overhead:* Project was **partially or informally suspended**
     - The **portion of home office overhead costs** that are **not contributed** to **a project** as a result of **delay, suspension, or other reason**.
- The **calculation** of damages for **each may differ**, but **in practice**, **most courts** and boards have **not always maintained** this clear **distinction** in terms.

Regardless of the nature of the delay, the analyst should establish the damages the Contractor actually experiences.

Let’s look at “unabsorbed home office overhead!

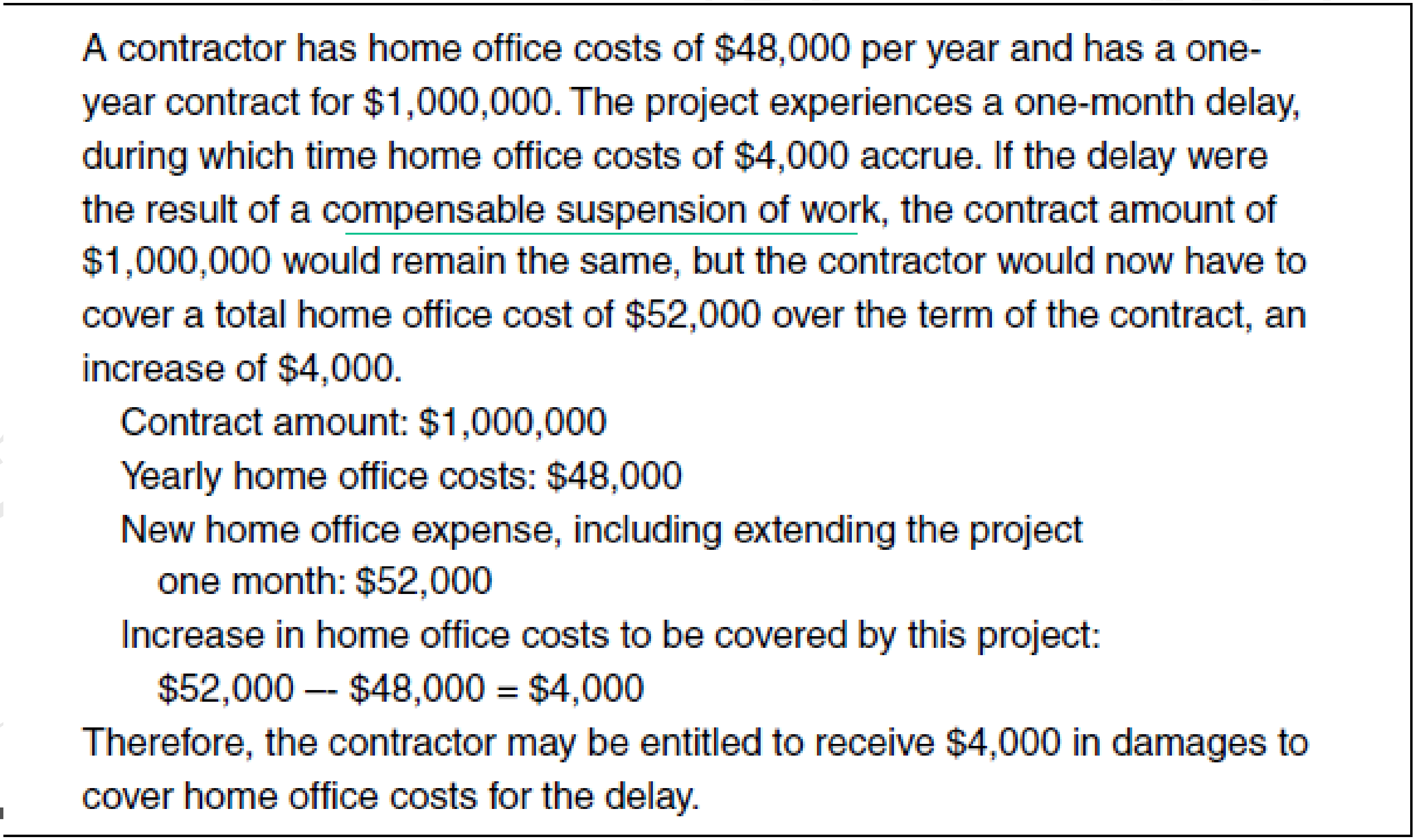
Effects of delays on general (home office) overhead costs

- ***Generally, there are two situations:***

1. One project at a time
2. Multiple projects

Unabsorbed home office overhead – One project at a time - Example

- Relatively **straightforward**
- The **difference** between delays caused by a **suspension** and those that result from **extra work** are explained later.



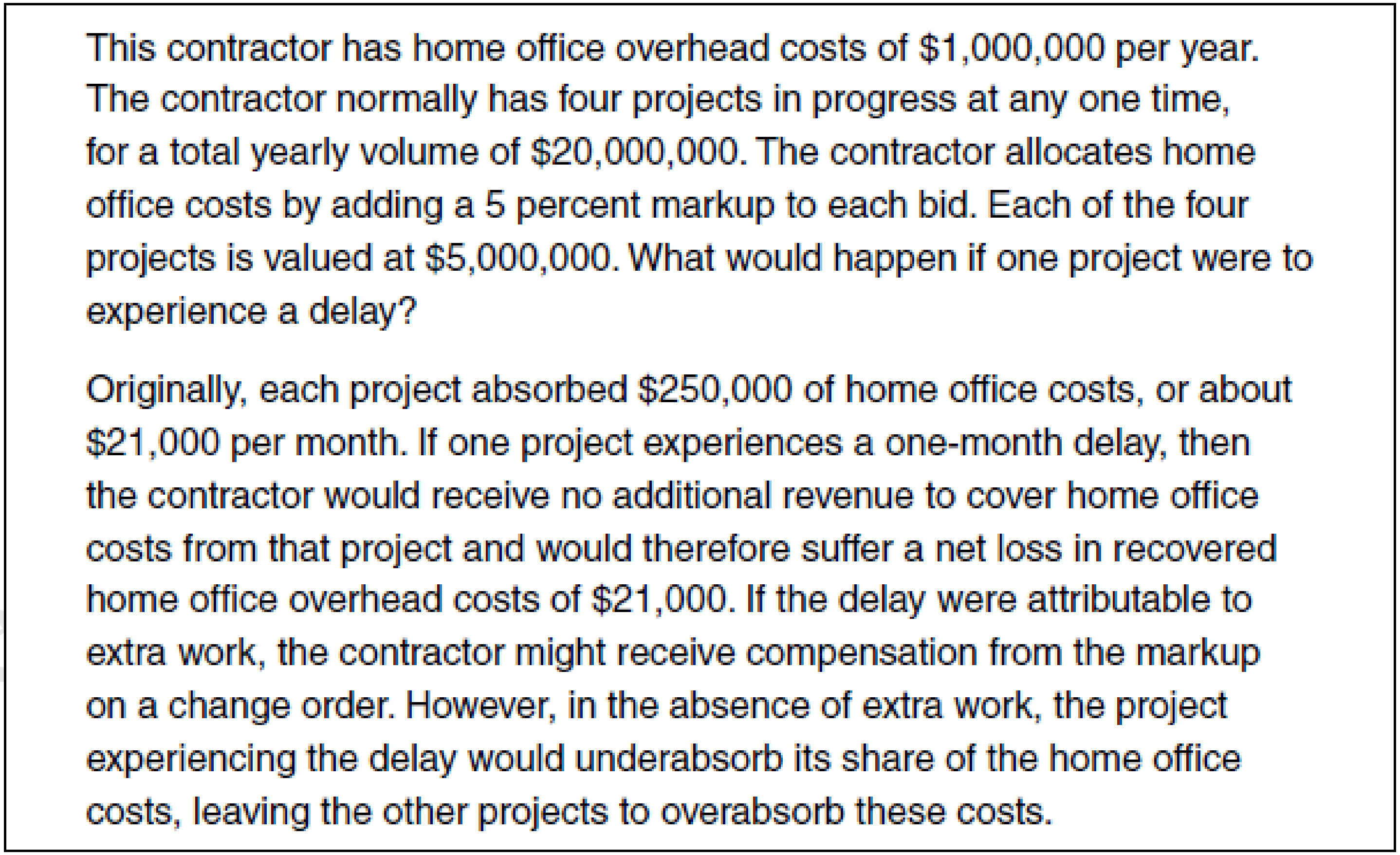
A contractor has home office costs of $48,000 per year and has a one-year contract for $1,000,000. The project experiences a one-month delay, during which time home office costs of $4,000 accrue. If the delay were the result of a compensable suspension of work, the contract amount of $1,000,000 would remain the same, but the contractor would now have to cover a total home office cost of $52,000 over the term of the contract, an increase of $4,000.

Contract amount: $1,000,000
Yearly home office costs: $48,000
New home office expense, including extending the project one month: $52,000
Increase in home office costs to be covered by this project: $52,000 — $48,000 = $4,000

Therefore, the contractor may be entitled to receive $4,000 in damages to cover home office costs for the delay.

Unabsorbed home office overhead – Multiple projects - Example

❑ Clearly, as the number of projects increases, the calculations become more difficult.



This contractor has home office overhead costs of $1,000,000 per year. The contractor normally has four projects in progress at any one time, for a total yearly volume of $20,000,000. The contractor allocates home office costs by adding a 5 percent markup to each bid. Each of the four projects is valued at $5,000,000. What would happen if one project were to experience a delay?

Originally, each project absorbed $250,000 of home office costs, or about $21,000 per month. If one project experiences a one-month delay, then the contractor would receive no additional revenue to cover home office costs from that project and would therefore suffer a net loss in recovered home office overhead costs of $21,000. If the delay were attributable to extra work, the contractor might receive compensation from the markup on a change order. However, in the absence of extra work, the project experiencing the delay would underabsorb its share of the home office costs, leaving the other projects to overabsorb these costs.

Is there any debate on this?

Unabsorbed home office overhead – Debates

- ❑ In **principle**, **home office overheads are recoverable**, however **difficult to ascertain** in **practice**.
  - ❖ **Despite** being a commonly **sought element** of delay damages, **home office overhead** remains a **contentious issue**.

Why?

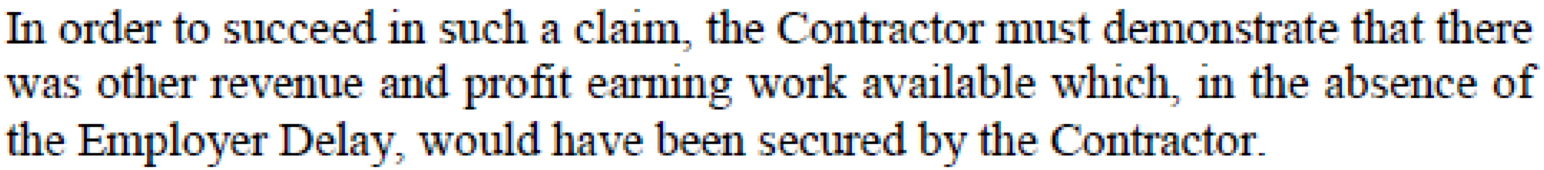
Unabsorbed home office overhead – Debates

- ❑ There is **no standard method** of calculating HOOH!
  - ❖ Most contractors want to use formulas
  - ❖ Most owners want to see “Real damage”
    - o Some **disagree with the formulas** that are **often used to calculate** home office overhead costs.
- ❑ Some **do not agree** that there is a home office overhead cost incurred by the contractor as a **result of a delay** or that any cost incurred is **the contractor’s risk and not the owner’s responsibility.**
- ❑ Some believe that the **home office costs associated** with a delay are **fully compensated by the markup** for overhead provided on the **cost of the change** that caused the delay or on the other delay costs being sought.

We will see whether the courts agree or not later!
What are the least requirements to recover these costs?

Unabsorbed home office overhead – Least requirements

- **Before** it can **recover unabsorbed overheads**, the **contractor must** be able to **demonstrate** that it has:
  - a) **Failed** to **recover** the overheads it could reasonably have expected during the **period of prolongation**
  - b) **Been unable** to **recover** such overheads **because** its **resources were tied up** by delay


In order to succeed in such a claim, the Contractor must demonstrate that there was other revenue and profit earning work available which, in the absence of the Employer Delay, would have been secured by the Contractor.

What do you need?

Unabsorbed home office overhead – Least requirements

4. Cost records

- ☐ If the **contractor** wants to **use a formula** for the **assessment** of **lost profits** and **general overheads (unabsorbed overheads)**, it will need to **produce evidence** that the **delay caused by owner** **avoid** **contractor** to take a **new project**.
- ☐ To **prove**, you **need the following**:
  1. **Business plans** prior to delay **caused by employer**
  2. Contractor's **bidding history**
  3. Records of **acceptance** or **rejection of bidding**
  4. Records that **support** the **inputs into the formula** used, in particular **contractor's company accounts** for:
     - a) **Periods** immediately **preceding and succeeding** the **employer delay**
     - b) **Period** when the **employer delay occurred**

Unabsorbed home office overhead – Calculation

The remainder of this section presents some methods for calculating delay damages associated with <u>unabsorbed home office overhead</u> costs.

The contractor should make all reasonable efforts to demonstrate through records the home office overheads that it has failed to recover.

If not feasible then the following formulae may be used with caution.

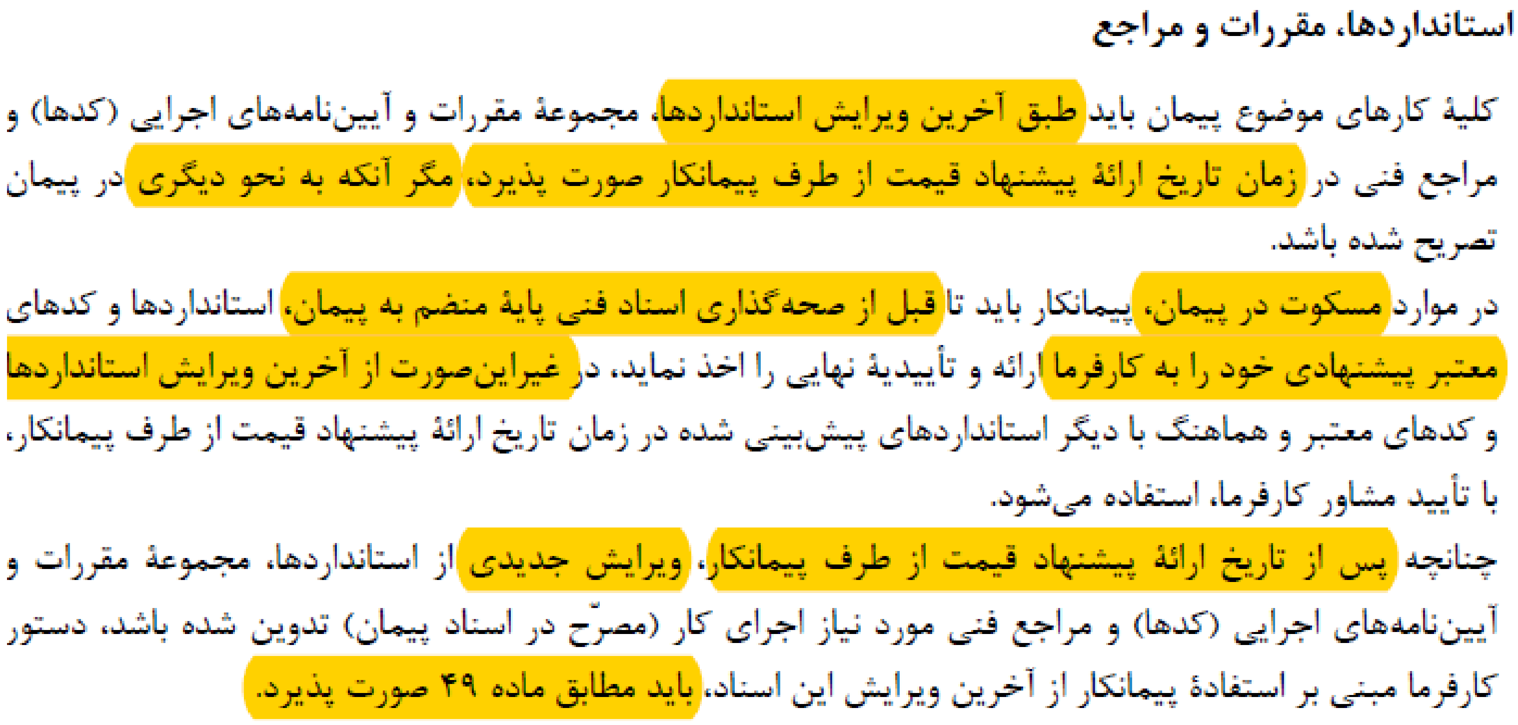
آیا میتوان عرف و عادت خارجی را به داخل تعمیم و تسری داد؟

- ☐ ماده ۶ شرایط عمومی پیمان قراردادهای مهندسی، تامین کالا و تجهیزات، ساختمان و نصب به صورت توام برای کارهای صنعتی (EPC – نشریه ۵۴۹۰) اشاره کرده:

"در موارد مسکوت در پیمان از آخرین نگارش استانداردها و مدهای معتبر خارجی هماهنگ با دیگر استانداردهای پیش بینی شده در پیمان با تایید مشاور کارفرما استفاده میشود."

البته تعمیم و تسری مورد بحث، با ملحوظ نمودن محدودیتهای حقوق موضوعه بایستی صورت گیرد.

آیا میتوان عرف و عادت خارجی را به داخل تعمیم و تسری داد؟



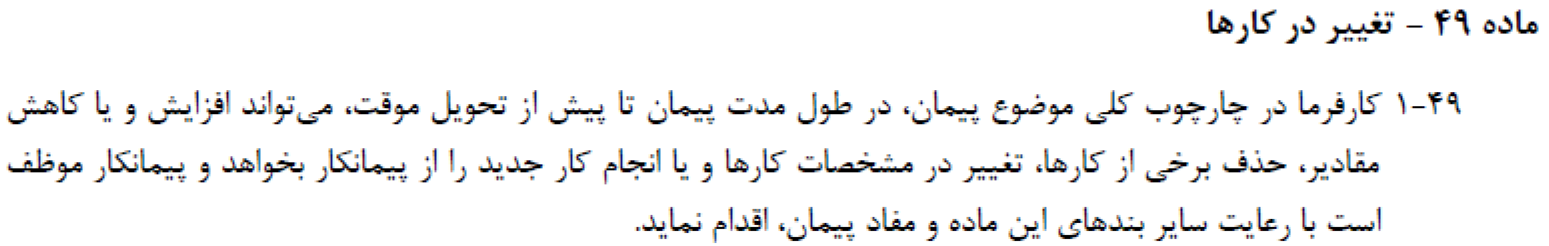
ماده ۶ – استانداردها، مقررات و مراجع

کلیهٔ کارهای موضوع پیمان باید طبق آخرین ویرایش استانداردها، مجموعهٔ مقررات و آیین‌نامه‌های اجرایی (کدها) و مراجع فنی در زمان تاریخ ارائهٔ پیشنهاد قیمت از طرف پیمانکار صورت پذیرد، مگر آنکه به نحو دیگری در پیمان تصریح شده باشد.

در موارد مسکوت در پیمان، پیمانکار باید تا قبل از صحه‌گذاری اسناد فنی پایهٔ منضم به پیمان، استانداردها و کدهای معتبر پیشنهادی خود را به کارفرما ارائه و تأییدیهٔ نهایی را اخذ نماید، در غیراین‌صورت از آخرین ویرایش استانداردها و کدهای معتبر و هماهنگ با دیگر استانداردهای پیش‌بینی شده در زمان تاریخ ارائهٔ پیشنهاد قیمت از طرف پیمانکار، با تأیید مشاور کارفرما، استفاده می‌شود.

چنانچه پس از تاریخ ارائهٔ پیشنهاد قیمت از طرف پیمانکار، ویرایش جدیدی از استانداردها، مجموعهٔ مقررات و آیین‌نامه‌های اجرایی (کدها) و مراجع فنی مورد نیاز اجرای کار (مصرّح در اسناد پیمان) تدوین شده باشد، دستور کارفرما مبنی بر استفادهٔ پیمانکار از آخرین ویرایش این اسناد، باید مطابق ماده ۴۹ صورت پذیرد.

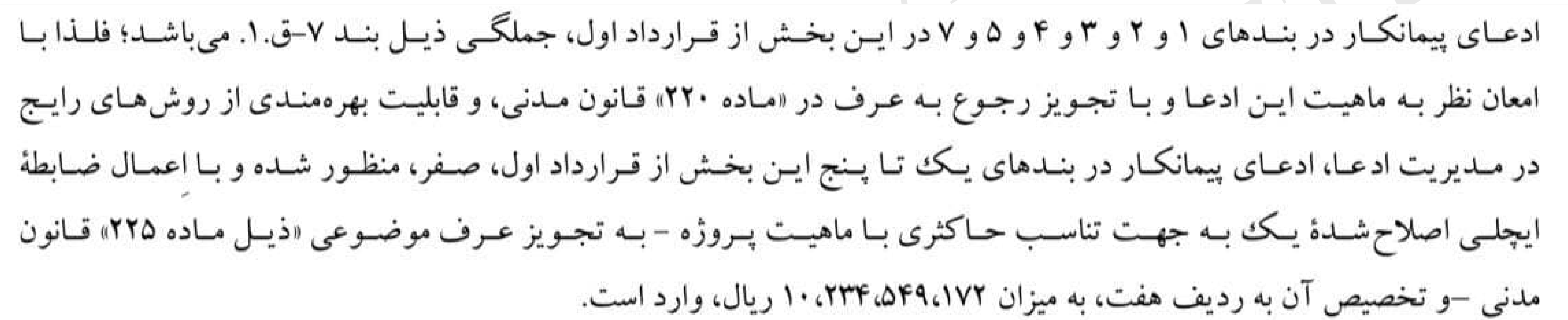
آیا میتوان عرف و عادت خارجی را به داخل تعمیم و تسری داد؟



ماده ۴۹ – تغییر در کارها

۱-۴۹ کارفرما در چارچوب کلی موضوع پیمان، در طول مدت پیمان تا پیش از تحویل موقت، می‌تواند افزایش و یا کاهش مقادیر، حذف برخی از کارها، تغییر در مشخصات کارها و یا انجام کار جدید را از پیمانکار بخواهد و پیمانکار موظف است با رعایت سایر بندهای این ماده و مفاد پیمان، اقدام نماید.

آیا میتوان عرف و عادت خارجی را به داخل تعمیم و تسری داد؟



ادعـای پیمانکـار در بنـدهای ۱ و ۲ و ۳ و ۴ و ۵ و ۷ در ایـن بخـش از قـرارداد اول، جملگـی ذیـل بنـد ۷–ق.۱. می‌باشـد؛ فلـذا بـا امعان نظر بـه ماهیـت ایـن ادعـا و بـا تجـویز رجـوع بـه عـرف در «مـاده ۲۲۰» قـانون مـدنی، و قابلیـت بهره‌منـدی از روش‌هـای رایـج در مـدیریت ادعـا، ادعـای پیمانکـار در بنـدهای یـک تـا پـنج ایـن بخـش از قـرارداد اول، صـفر، منظـور شـده و بـا اِعمـال ضـابطهٔ ایچلـی اصلاح‌شـدهٔ یـک بـه جهـت تناسـب حـاکثری بـا ماهیـت پـروژه – بـه تجـویز عـرف موضـوعی «ذیـل مـاده ۲۲۵» قـانون مدنی –و تخصیص آن به ردیف هفت، به میزان ۱۰،۲۳۴،۵۴۹،۱۷۲ ریال، وارد است.

Eichleay formula

- **In 1960** the **ASBCA (** دادگاه استیناف قراردادهای نیروهای مسلح آمریکا) **heard the appeal of the Eichleay Corporation** from a **Corps of Engineers** determination concerning **home office expense** allocable as a result of delays encountered during the construction of a **Nike Missile Base in** Pennsylvania.
- **ASBCA** recognized that when a contractor encounters government caused delays of an unknown duration, the contractor's **HOOH continues to accrue** but is **no longer supported** by revenue from the delayed project.
- **ASBCA** acknowledged previous Court findings that there is **no exact way** to calculate unabsorbed HOOH in order to determine the compensation owed the contractor.
- The **appellant** in this case, the **Eichleay Corporation**, **offered a formula** to proportionately allocate their HOOH from the corporate level.
- The **ASBCA** in their decision **adopted** the appellant's proposed method of computing unabsorbed HOOH delay costs – and thus the **Eichleay Formula was born!**

Eichleay formula

- The Eichleay Formula, brought about initially by decisions issued by the **U.S. Court of Claims**, is a method to equitably **determine** the **allocation of unabsorbed overhead** to allow **fair compensation** to a contractor for a government caused delay.

- It is **not necessary** to **prove a specific amount** of home office expenses, but **only to determine a fair allocation** for the purpose of compensating a contractor for delay by the government.

The Eichleay Formula is not an accounting formula, it is an estimating formula!

Eichleay formula

تمامی فرمولهای فارسی از سایت حقوق احداث برداشته شده است.

https://clc1int.com/

Classic Eichleay formula

- ❑ The Eichleay Formula is a simple **three-step formula**.

❖ STEP 1

$$\text{Allocable Contract Overhead} = \text{Total overhead cost incurred during the contract period} \times \frac{\text{Billings from the delayed contract}}{\text{Total billings during the contract}}$$

- ✓ **<u>Contract period</u>** is the time of the contract including **excusable and non-excusable delays.**
- ✓ **<u>Total billings during the contract</u>** are the total billings for **all projects.**

$$\text{بالاسری قابل تخصیص به قرارداد} = \text{تمام بالاسری دفتر مرکزی در بازه زمانی اجرا} \times \frac{\text{مبلغ نهایی (تجمعی) قرارداد (صورت‌وضعیت قطعی)}}{\text{کل درآمد شرکت (تمامی صورت‌وضعیت‌ها) در زمان اجرا}}$$

The question is that what categories of overheads should be included?

Classic Eichleay formula

- ☐ The Eichleay Formula is a simple **three-step formula**.

  - ❖ **STEP 2**

$$\frac{\text{Allocable overhead}}{\text{Number of days of contract performance (including delay)}} = \text{Daily allocable overhead rate}$$

What does that mean?

$$\frac{\text{بالاسری قابل تخصیص به قرارداد}}{\text{روزهای واقعی اجرای قرارداد (مدت اولیه+ تأخیرات مجاز و غیرمجاز)}} = \text{نرخ روزانه بالاسری قابل تخصیص به قرارداد}$$

Classic Eichleay formula

☐ The Eichleay Formula is a simple **three-step formula**.

- ❖ **STEP 3**

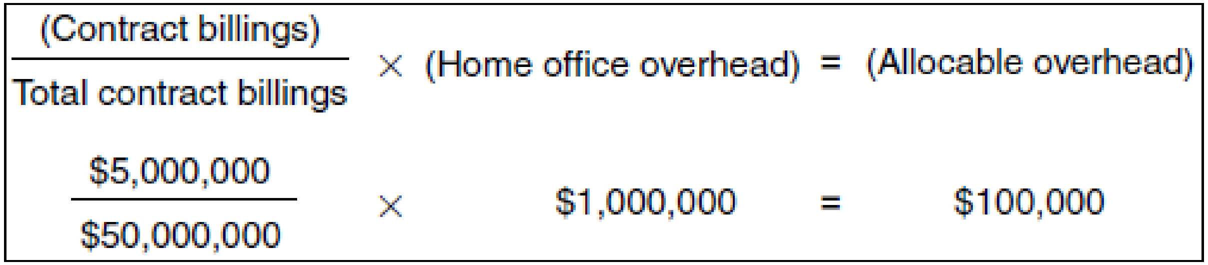
Daily allocable overhead rate × Number of days of compensable delay = Home office overhead damages

What does that mean?

میزان بالاسری جذب نشده مورد إدّعا برای قرارداد چار تأخیر = تعداد روزهای تأخیر ناشی از قصور کارفرما (تأخیرات مجاز) × نرخ روزانه بالاسری

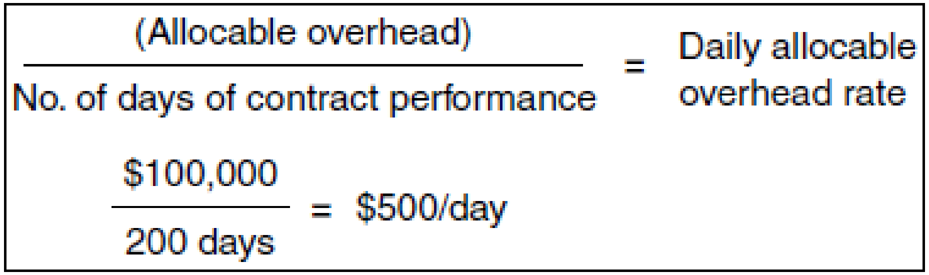
Classic Eichleay formula – Example

- ❑ Company has total billings of $50,000,000 during the Contract period. The Contract billings total $5,000,000. Total home office overhead is $1,000,000 during the Contract period. The Project duration totals 200 days, and compensable delays total 30 days.



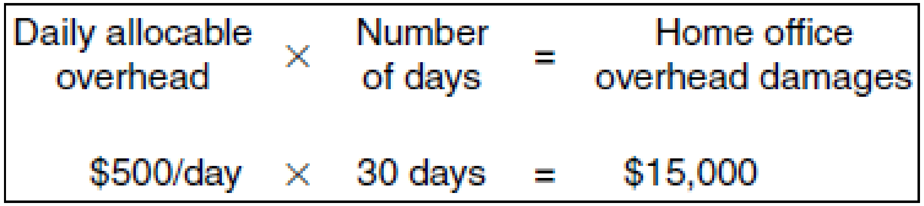
$$\frac{\text{(Contract billings)}}{\text{Total contract billings}} \times \text{(Home office overhead)} = \text{(Allocable overhead)}$$

$$\frac{\$5{,}000{,}000}{\$50{,}000{,}000} \times \$1{,}000{,}000 = \$100{,}000$$



$$\frac{\text{(Allocable overhead)}}{\text{No. of days of contract performance}} = \text{Daily allocable overhead rate}$$

$$\frac{\$100{,}000}{200\text{ days}} = \$500\text{/day}$$



$$\text{Daily allocable overhead} \times \text{Number of days} = \text{Home office overhead damages}$$

$$\$500\text{/day} \times 30\text{ days} = \$15{,}000$$

Classic Eichleay formula – Problems

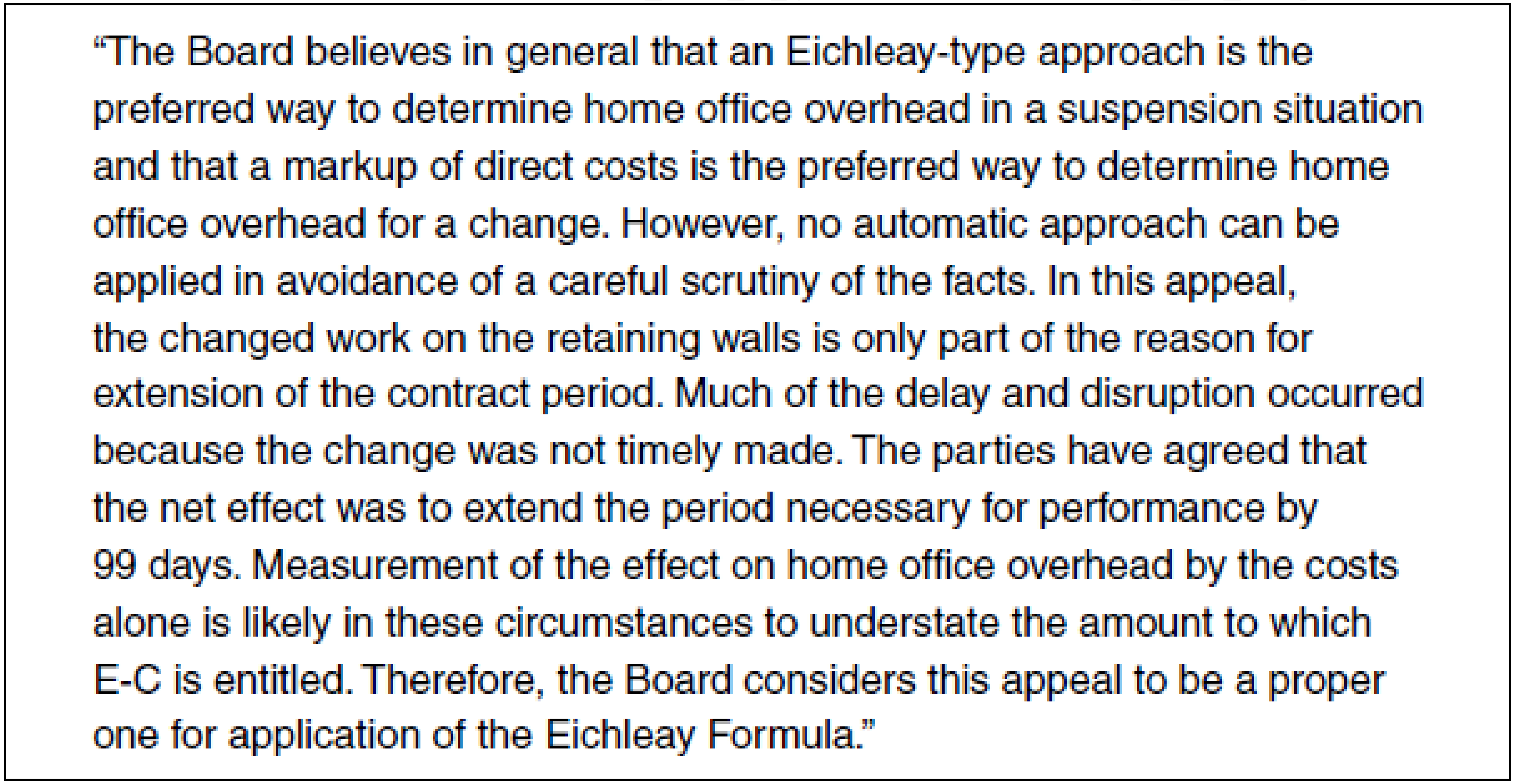
- ❑ While the **Eichleay Formula is simple** to apply, one might reasonably **question its accuracy**.
- ❑ The Eichleay Formula is an **estimated allocation** and may, therefore, be somewhat **inaccurate**, yielding results that are **either too high or too low**.
- ❑ **Despite this limitation**, the **federal courts** and **boards** have, for the most part, **accepted** the formula as a **reasonable approximation** of the damages sustained.
- ❑ **With less case law** to draw upon, **state courts** have been **less receptive** to outright acceptance of the formula.

Debate over the use of the formula has therefore led to refinements regarding its application.

Let's see!

Classic Eichleay formula – Problems: Example

- ❑ The **most common argument** against the use of the **Eichleay** Formula is that the **Contractor receives compensation** of home office overhead by virtue of the **markup on a change**.
- ❑ Excavation-Construction, Inc., ENG BCA 3851 (1984), the Engineering Board of Contract Appeals (ENG BCA) recognized the use of the Eichleay Formula to determine the cost **not only of a suspension of work** but **also of a delay caused by extra work**.



"The Board believes in general that an Eichleay-type approach is the preferred way to determine home office overhead in a suspension situation and that a markup of direct costs is the preferred way to determine home office overhead for a change. However, no automatic approach can be applied in avoidance of a careful scrutiny of the facts. In this appeal, the changed work on the retaining walls is only part of the reason for extension of the contract period. Much of the delay and disruption occurred because the change was not timely made. The parties have agreed that the net effect was to extend the period necessary for performance by 99 days. Measurement of the effect on home office overhead by the costs alone is likely in these circumstances to understate the amount to which E-C is entitled. Therefore, the Board considers this appeal to be a proper one for application of the Eichleay Formula."

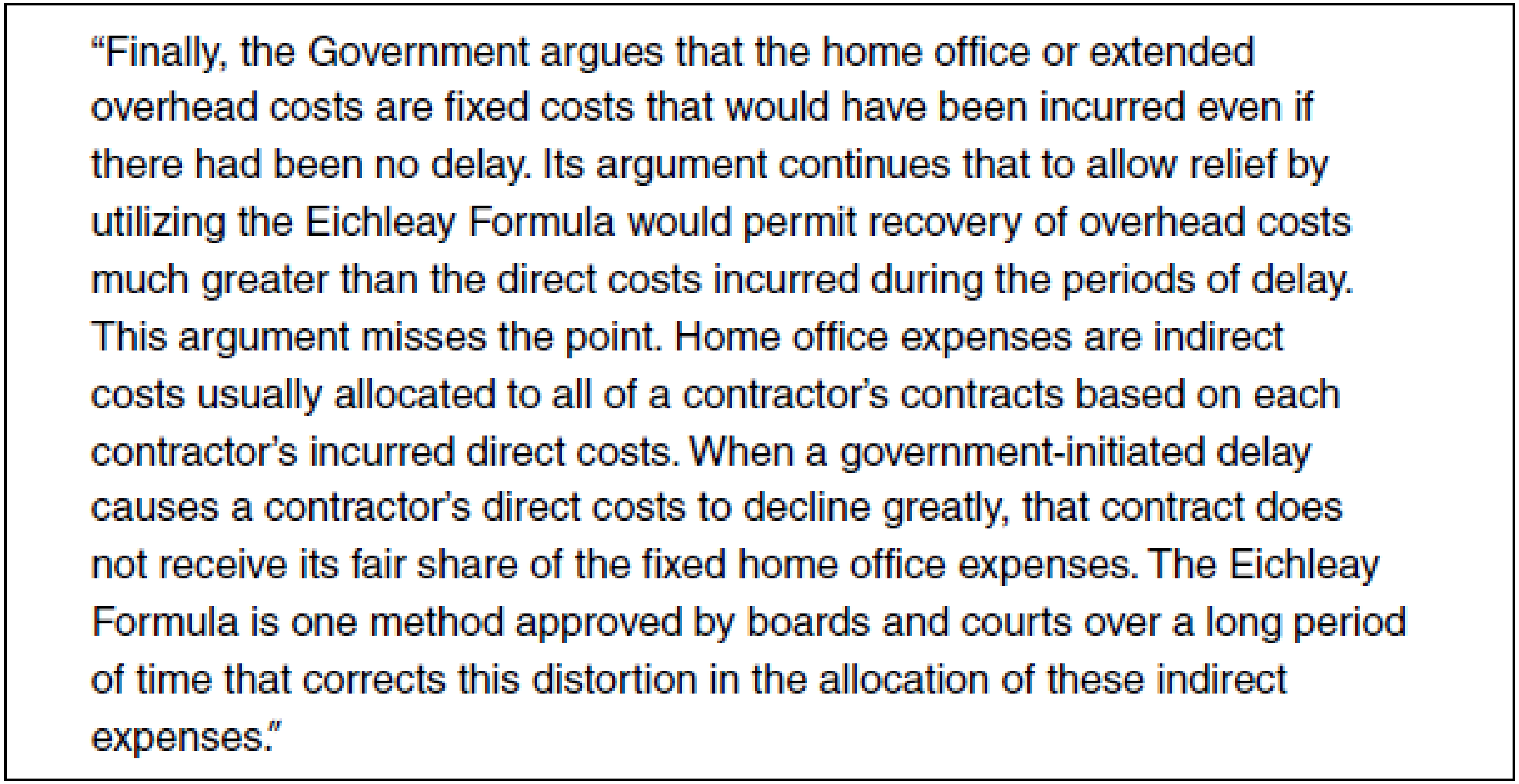
Classic Eichleay formula – Problems: Example

- The **board** did, however, **subtract** **from the Eichleay calculation** the **amount of overhead** that was already **being paid** by virtue of the **markup on the change order**.

Classic Eichleay formula – Problems: Example

- **Another common argument** is that HOOH costs are **fixed costs** that would have been incurred **even if there had been no delay**.
  - **So, Eichleay formula should not be used.**

- Armed Services Board of Contract Appeals’ response in George E. Jensen Contractor, Inc., ASBCA no. 29772 (1984).



“Finally, the Government argues that the home office or extended overhead costs are fixed costs that would have been incurred even if there had been no delay. Its argument continues that to allow relief by utilizing the Eichleay Formula would permit recovery of overhead costs much greater than the direct costs incurred during the periods of delay. This argument misses the point. Home office expenses are indirect costs usually allocated to all of a contractor’s contracts based on each contractor’s incurred direct costs. When a government-initiated delay causes a contractor’s direct costs to decline greatly, that contract does not receive its fair share of the fixed home office expenses. The Eichleay Formula is one method approved by boards and courts over a long period of time that corrects this distortion in the allocation of these indirect expenses.”

Classic Eichleay formula – Problems

❑ **Accountants & Auditors**

- ❖ Consider it an accounting formula

❑ **Owners**

- ❖ HOOH not real cost & Eichleay pays too much

❑ **Contractors**

- ❖ Too many restrictions of collecting HOOH

Classic Eichleay formula – Problems: Accountants & Auditors

- ☐ **Eichleay assumes proportional relationship between contract billings & fixed indirect costs**
  - ❖ **Contract billings rarely** used as **base** for distribution of indirect costs
    - ✓ **Break-even contribution margin ratio**
  - ❖ Thus, there may **not be a proportionate relationship** between billings and indirect costs

Eichleay does not adjust for this

Classic Eichleay formula – Problems: Accountants & Auditors

- ❑ **Eichleay assumes contractor performs no substituted work during delay period**
  - ❖ If contractor **remobilized** to **another part** of project and **kept working**, **HOOH being paid** for.
  - ❖ If contractor **took on new work** HOOH **being offset**
  - ❖ **Substituted** work **mitigates damages**

Eichleay does not adjust for this

Classic Eichleay formula – Problems: Accountants & Auditors

- ☐ **Eichleay assumes effect of delay always the same, regardless of when delay occurs**
  - ❖ If delay **occurs** in **winter period** when contractor **less productive**, has **fewer resources**, delay has **less impact** than if arose **during summer** when have **more resources**.

Eichleay does not adjust for this

Classic Eichleay formula – Problems: Accountants & Auditors

- ❑ **Eichleay assumes actual contract duration acceptable base period for calculating fixed indirect costs**
  - ❖ This may be **accurate under normal**, **stable business conditions**
    - ✓ But, in **times of economic turbulence**, indirect costs may **vary widely**
      - o But, **Eichleay** assumes **indirect costs not variable**

Eichleay does not adjust for this

Classic Eichleay formula – Problems: Accountants & Auditors

- ☐ **HOOH recovered through mark-ups on added or changed work is not accounted for in the context of the Eichleay formula.**

Eichleay does not adjust for this

Classic Eichleay formula – Problems: Accountants & Auditors

- **Eichleay does not take into consideration that project delay simply defers HOOH recovery from one period to another**
  - There may be no true economic loss and the time value of money is not considered.

Eichleay does not adjust for this

Classic Eichleay formula – Problems: Owner

- ❑ **Eichleay** may cause **overpayment of damages**
  - ❖ **Contractor** using Eichleay may be **double dipping**
    - ✓ **Unless** portion of **change order markup paid** for HOOH previously **removed** from delay damages
- ❑ For those owners who want to **settle delay as it occurs**, Eichleay is an **end of project calculation**
  - ❖ **Cannot be applied mid-project-time** & costs employed are **all end of project numbers**

ACEMI

Classic Eichleay formula – Problems: Contractors

- ❑ **Many states do not accept Eichleay**
  - ❖ **Some have substantial restrictions on when Eichleay could be applied**
- ❑ **Some states** even **disallow** Eichleay
- ❑ **Federal courts** **restrict** when Eichleay **can be used** & some state courts **have followed suit**
  - ❖ Will be talked later
- ❑ Eichleay is an **end of job formula**
  - ❖ **Actual duration of work**, **total project revenue**, **total company HOOH during project period**
    - ✓ **Cannot** be used to price delay claims in **middle of project**
    - ✓ Does **not help resolving** delay issues **as they arise**

ODCC

Eichleay formula – When to apply?

The application of the Eichleay Formula is automatic.

1. **Like all claims** for delay damages, to recover **home office overhead costs**, the Contractor must first establish that the **delay was indeed compensable**.
   - ❖ This typically entails establishing that the delay was the **Owner's fault** or **responsibility** and could **not have been** reasonably **anticipated** or otherwise **mitigated** by the **Contractor**.
2. Contractor must also **demonstrate** that there was **other revenue available** which, in the **absence of the employer delay**, would have been **secured by the contractor**.

In addition, many courts that have accepted the Eichleay Formula have attached other prerequisites to its application.

What prerequisite?

Eichleay formula – When to apply?

- The **prerequisite** could include the **contractor establishing**:
  1) An **owner-imposed** **suspension** of **critical work**
     - **Owner must be sole cause of delay (no concurrent delays)**
  2) An **owner requirement** that the **contractor stand-by** during the **associated delay**
  3) Proof that **while standing-by**, the **contractor was unable** to **take on additional work**
  4) Of **unknown duration** (if there is an uncertainty about the suspension duration)
  5) **Suspending most**, if not all, work (work force **need not be 100% idle**)
     - Contractor required to remain on **“hot standby”**
     - Contractor unable to perform **replacement work**
  6) Must experience **compensable delay**
  7) Resulting in **substantial decrease** in **project revenue**

Eichleay formula – When to apply?

- ❑ **Eichleay Formula** is a calculation **applied** at the **end of the Project** after **all the work and delays are completed**.

- ❑ **If** the parties attempt to **resolve the question** of home office overhead **during the Project**, some form of a **modified Eichleay Formula** may be appropriate.
  - ❖ One approach is to **apply the Eichleay Formula** from the **beginning of the Project** up to the **point of negotiations**.
    - ✓ Thus, the total Contract billings, the total company billings, and the total number of days from the **start of the Project up to the approximate date of the calculation** are used.

Eichleay formula – When to apply?

- ❑ When using the Eichleay Formula in **federal government** cases, **some costs** (such as advertising, entertainment, interest, etc.) that are normally considered home office overhead are **not allowable**.
  - ❖ The government will normally **disallow** these costs during **its audit procedures**.
  - ❖ In its Contract, the federal government **has the right** to **audit a Contractor's records**.
- ❑ For delay claims **in excess of $100,000**, the government normally will **perform an audit**.
- ❑ The **various federal agencies** have **different internal guidelines** mandating the dollar **level** at which an **audit is required**.

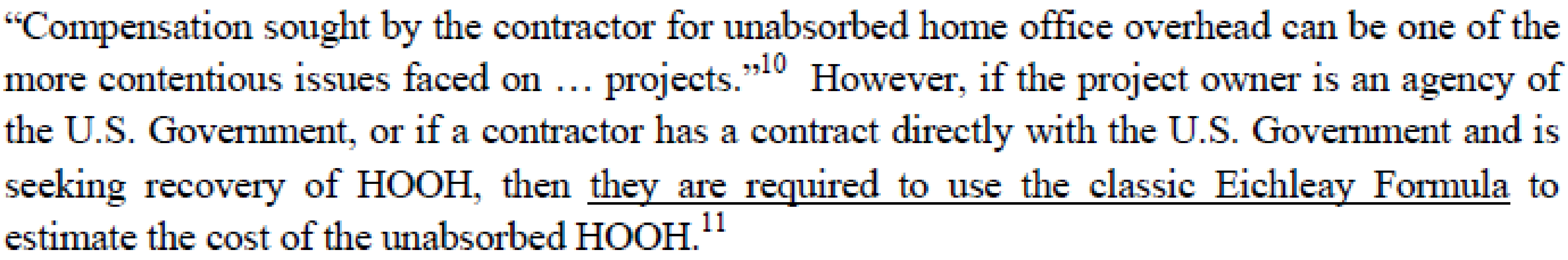
Eichleay formula – Potential remedies

Let’s examine some potential remedies

- **Must be included in contract documents**

AND

- **Must seeking competent legal advice**



“Compensation sought by the contractor for unabsorbed home office overhead can be one of the more contentious issues faced on … projects.”[10] However, if the project owner is an agency of the U.S. Government, or if a contractor has a contract directly with the U.S. Government and is seeking recovery of HOOH, then <u>they are required to use the classic Eichleay Formula</u> to estimate the cost of the unabsorbed HOOH.[11]

Practical Problems with Pricing Delay Using Eichleay,
Navigant Consulting Inc.

Eichleay formula – Potential remedies

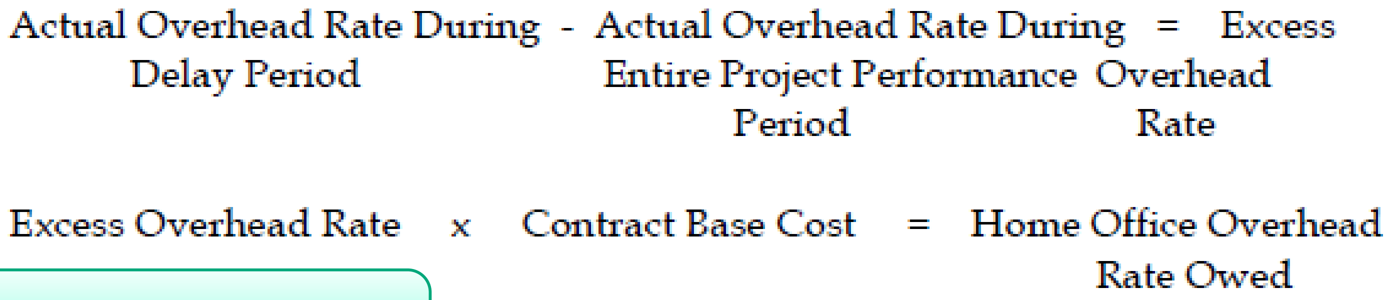
- ☐ **Change rules on HOOH recovery**
  - ❖ ***Audit/Access to records clause***
    - ❖ **Enables** owner to look at **certain issues**
    - ❖ **Insert** clause in **every contract**
    - ❖ If not have one, use **Federal Acquisition Regulation** (***FAR 52.214-26 or 52.215-2***)
  - ❖ ***Adopt Mortensen Rule by Contract***
    - ❖ **Contractor** has **option at outset** of contract to choose between
      - ✓ Percentage markup on each change
      - ✓ Select daily rate on changes causing time extension
        - o Choice applies to all change orders
        - o Use also the same method for suspension

Eichleay formula – Potential remedies

- ❑ **Change rules on HOOH recovery**
  - ❖ ***Adopt Absorption Rate Formula in contract***

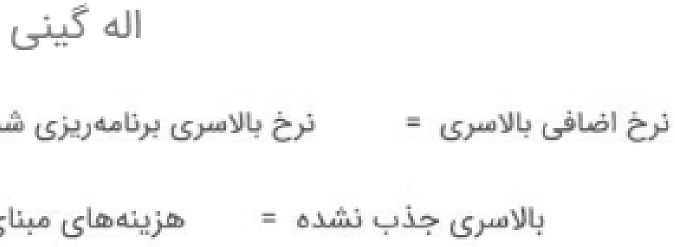
Absorption rate formulas calculate under absorption by **comparing** a **potential or reasonable overhead absorption rate** against the **actual absorption rate**

- ❖ **Allegheny formula**


Actual Overhead Rate During Delay Period - Actual Overhead Rate During Entire Project Performance Period = Excess Overhead Rate

Excess Overhead Rate x Contract Base Cost = Home Office Overhead Rate Owed

This is not correct!


اله گینی

نرخ اضافی بالاسری = نرخ بالاسری برنامه‌ریزی شده - نرخ بالاسری در زمان واقعی اجرا

بالاسری جذب نشده = هزینه‌های مبنای کار × نرخ اضافی بالاسری

Eichleay formula – Potential remedies

- **Change rules on HOOH recovery**
  - ***Adopt Absorption Rate Formula in contract***

Absorption rate formulas calculate under absorption by **comparing** a **potential or reasonable overhead absorption rate** against the **actual absorption rate**

- **Alleghany formula**

It is cost based, not time based.

Thus, it does not derive a daily overhead rate but calculates overhead from the rate differential times the base bid cost.

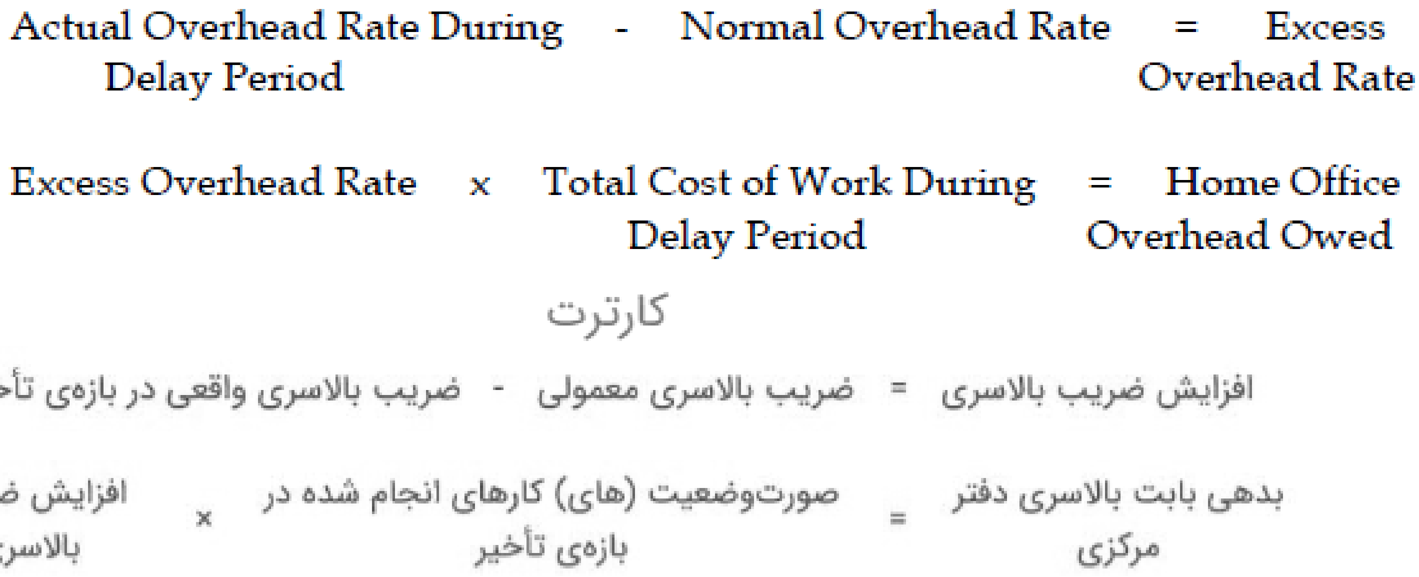
Again, if no rate differential can be demonstrated, then no HOOH is owed even if owner-caused delay is present.

Eichleay formula – Potential remedies

- **Change rules on HOOH recovery**
  - ***Adopt Absorption Rate Formula in contract***

Absorption rate formulas calculate under absorption by **comparing** a **potential or reasonable overhead absorption rate** against the **actual absorption rate**

- **Carteret formula**



Actual Overhead Rate During Delay Period - Normal Overhead Rate = Excess Overhead Rate

Excess Overhead Rate x Total Cost of Work During Delay Period = Home Office Overhead Owed

کارترت

افزایش ضریب بالاسری = ضریب بالاسری معمولی - ضریب بالاسری واقعی در بازه‌ی تأخیر

بدهی بابت بالاسری دفتر مرکزی = صورت‌وضعیت (های) کارهای انجام شده در بازه‌ی تأخیر × افزایش ضریب بالاسری

Eichleay formula – Potential remedies

- **Change rules on HOOH recovery**
  - ***Adopt Absorption Rate Formula in contract***

Absorption rate formulas calculate under absorption by **comparing** a **potential or reasonable overhead absorption rate** against the **actual absorption rate**

- **Carteret formula**

Carteret is a formula that comes out of the manufacturing sector but some have attempted to apply the formula to construction delay cases.

Since this is a cost based formula, it does not derive a daily rate.

The problem with this approach is that if no rate differential can be shown, then no HOOH is owed.

Eichleay formula – Potential remedies

- ☐ **Change rules on HOOH recovery**
    - ❖ ***Use other alternative formulas***
        - ✓ Will be talked later

Eichleay formula – Potential remedies

- ☐ **Change rules on HOOH recovery**
  - ❖ ***Incorporate Federal rules in contract***
    - ✓ Delay must be owner caused
    - ✓ Of indefinite (unknown) duration
    - ✓ Suspending most (%included) of project work
    - ✓ Resulting in substantial decrease in monthly project revenue
    - ✓ Contractor required to remain on “hot standby”
    - ✓ Unable to work around or secure new work

Eichleay formula – Potential remedies

- **Change rules on HOOH recovery**
  - ***Incorporate Federal Acquisition Regulation (FAR) unallowable cost provisions by contract language***
    - Some owners do **not object** to the **Eichleay Formula** but want to **insure** that **certain of the contractor’s HOOH costs** are **disallowed** when calculating their HOOH costs.
      - ✓ **Disallows** some **specific HOOH costs**
        - o **Require contractor** to produce **audit document** to demonstrate **removal of such costs**
      - ✓ Use **Audit/Access to records clause** to **check on compliance**

Eichleay formula – Potential remedies

❑ Create Mid-Contract HOOH recovery rule in contract

- ❖ ***Limited Reservation of rights clause***
  - ➢ **Many owners** understand the **value of settling delay claims** as such **situations arise.**
    - ✓ For owners who want to **settle delay claims as they occur**
      1. **Include clause providing** for **payment of direct delay costs** (i.e., extended equipment and storage, extended FOOH, etc.)
      2. **Include reservation of rights language** preserving **contractor's right** to recover **HOOH at end of project**

Eichleay formula – Potential remedies

☐ **Create Mid-Contract HOOH recovery rule in contract**

- ***Create a Mid-project formula***
  - ✓ For owners who want to **settle delay claims as they occur**
    1. **Adopt one of previous formulas** to use to craft **mid-course delay claims** settlements
    2. **Reserve owner's rights** to apply **Eichleay at end of project** and **recover overcompensation paid**, depending upon the **outcome of the final calculation**

Eichleay formula – Potential remedies

- ☐ **Bid your delay**
  - ❖ ***Time related overhead approach***
    - ✓ **One line item in the bid** requires the contractor to fill in their **daily time related cost.**
    - ✓ The contractor is **paid monthly** as the project progresses.
    - ✓ If **delays arise** during the performance, the delay can be **priced**.
    - ✓ If delay **exceeds 149% of** the **original number of work days** in the contract, the **unit price** can be changed.

Eichleay formula – Potential remedies

☐ **Bid your delay**

- ***Include line item in bid for 60 days of owner caused delay***
  - ✓ **Bid documents stipulate** this **total delay cost** (FOOH, HOOH, etc.)
  - ✓ **Contractor fills in daily cost** and **multiplies** by **60**
  - ✓ Still has to be **low bidder** to **receive contract award**
  - ✓ This is **not subject** to **quantity variation clause**
  - ✓ At the end of job:
    1. If delay is **less than 60 days**, owner **takes remaining cost back**
    2. If **more than 60 days**, owner **pays at bid rate**

The U.S. General Services Administration (GSA) has successfully used the Bid Your Delay Approach to contractually define delay damages, including HOOH damages, to which a contractor is entitled.

Alternative formulas – Modified Eichleay formula – Variation 1

$$\frac{\text{Contract Billings}}{\text{Total Billings for Original Contract Period}} \times \text{Total Company Overhead During Original Contract Period} = \text{Overhead Allocable to Contract}$$

$$\frac{\text{Allocable Overhead}}{\text{Original Days of Contract Performance}} = \text{Overhead Allocable to Contract/Day}$$

$$\text{Daily Overhead} \times \text{Days of Owner-Caused Delay} = \text{Home Office Overhead Owed}$$

بالاسری قابل تخصیص به قرارداد = تمام بالاسری دفتر مرکزی در **مدت اولیه قرارداد** × مبلغ نهایی (تجمعی) قرارداد (صورت‌وضعیت قطعی) ÷ کل درآمد شرکت (تمامی صورت‌وضعیت‌ها) در **مدت اولیه قرارداد**

نرخ روزانه بالاسری قابل تخصیص به قرارداد = بالاسری قابل تخصیص به قرارداد ÷ مدت اولیه اجرای قرارداد

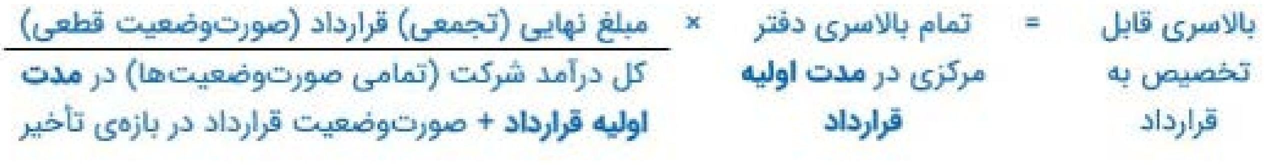
میزان بالاسری جذب نشده مورد اِدّعا برای قرارداد چار تأخیر = تعداد روزهای تأخیر ناشی از قصور کارفرما (تأخیرات مجاز) × نرخ روزانه بالاسری

Alternative formulas – Modified Eichleay formula – Variation 2

$$\frac{\text{Contract Billings}}{\text{Total Billings for Original Contract Period} + \text{Contract billings for Extended Period}} \times \text{Total Company Overhead During Original Contract Period} = \text{Overhead Allocable to Contract}$$

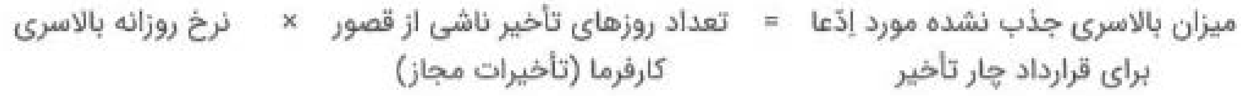
$$\frac{\text{Allocable Overhead}}{\text{Original Days of Contract Performance}} = \text{Overhead Allocable to Contract/Day}$$

$$\text{Daily Overhead} \times \text{Days of Owner-Caused Delay} = \text{Home Office Overhead Owed}$$



بالاسری قابل تخصیص به قرارداد = تمام بالاسری دفتر مرکزی در **مدت اولیه قرارداد** × مبلغ نهایی (تجمعی) قرارداد (صورت‌وضعیت قطعی) / کل درآمد شرکت (تمامی صورت‌وضعیت‌ها) در **مدت اولیه قرارداد** + صورت‌وضعیت قرارداد در بازه‌ی تأخیر

نرخ روزانه بالاسری قابل تخصیص به قرارداد = بالاسری قابل تخصیص به قرارداد / مدت اولیه اجرای قرارداد



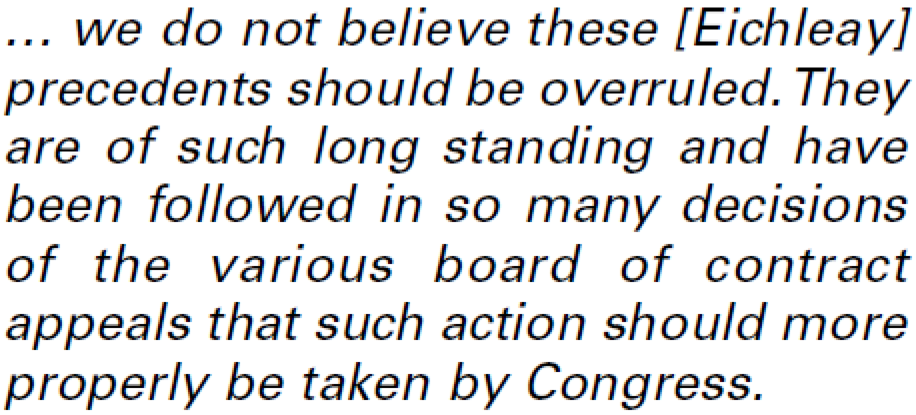
میزان بالاسری جذب نشده مورد اِدّعا برای قرارداد چار تأخیر = تعداد روزهای تأخیر ناشی از قصور کارفرما (تأخیرات مجاز) × نرخ روزانه بالاسری

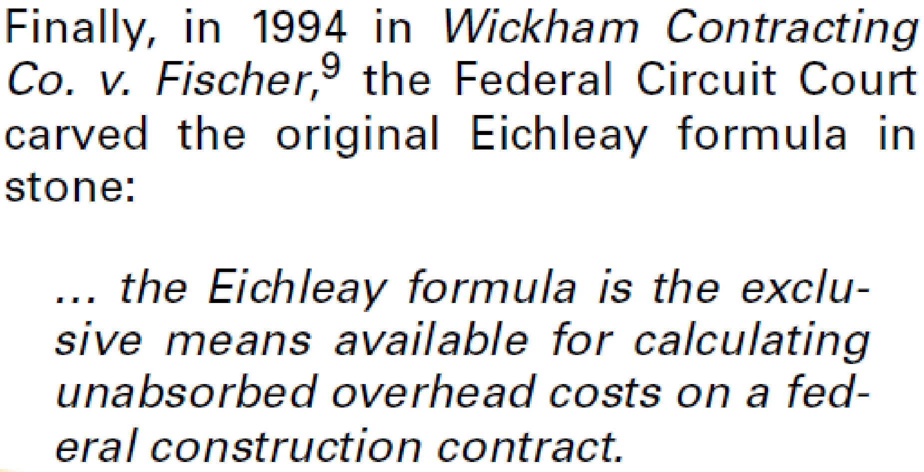
Alternative formulas – Modified Eichleay formulas

- ☐ The formula **does not look further back** than **contract time**, **nor** does it include the **delay period** as does the original Eichleay.
  - ❖ In other words, the project overhead **reflects the contractor's economic situation during contract time alone**.
    - ✓ The problem is that the **contractor's billings** during that period are **affected** by the **delay on the project**.
      - o The formula will **not give a "normal and regular" project overhead**.

Alternative formulas – Modified Eichleay formulas: Court decision

- ***This modification to the standard Eichleay formulas were rejected without analysis by the U.S. Court of Appeals for the Federal Circuit in Capital Electric Co. The court stated that:***


... we do not believe these [Eichleay] precedents should be overruled. They are of such long standing and have been followed in so many decisions of the various board of contract appeals that such action should more properly be taken by Congress.


Finally, in 1994 in *Wickham Contracting Co. v. Fischer,*[9] the Federal Circuit Court carved the original Eichleay formula in stone:

> *... the Eichleay formula is the exclusive means available for calculating unabsorbed overhead costs on a federal construction contract.*

Alternative formulas – Canadian method

- ☐ Alternative used extensively in Canada is “Canadian Method”

$$\frac{\text{Percentage markup} \times \text{Original contract sum}}{\text{Original number of days in the contract}} = \text{Daily overhead rate}$$

$$\text{Daily overhead} \times \text{Number of days of compensable delay} = \text{Compensation for home office overhead}$$

$$\text{نرخ روزانه بالاسری} = \frac{\text{مبلغ اولیه پیمان× درصد هزینه‌های بالاسری (درصد اضافه شده به برآورد برای بالاسری)}}{\text{مدت اولیه پیمان (روز)}}$$

غرامت بابت بالاسری دفتر مرکزی = تعداد روزهای تأخیر قابل جبران × نرخ روزانه بالاسری

Alternative formulas – Canadian method – Example

$$\frac{\text{Percentage markup} \times \text{Original contract sum}}{\text{Original number of days in the contract}} = \text{Daily overhead rate}$$

$$\text{Daily overhead} \times \text{Number of days of compensable delay} = \text{Compensation for home office overhead}$$

Example of the Canadian Method Used to Estimate Overhead Cost Associated with a 50-Day Delay

Project bid	= $5,000,000
Contract duration	= 500 days
Overhead from bid papers	= 10%
Compensable delay	= 50 days
Daily Rate = $\frac{10\% \times \$5{,}000{,}000}{500\ \text{days}}$	= $1,000/day
Damages = $1,000/day × 50 days	= $50,000

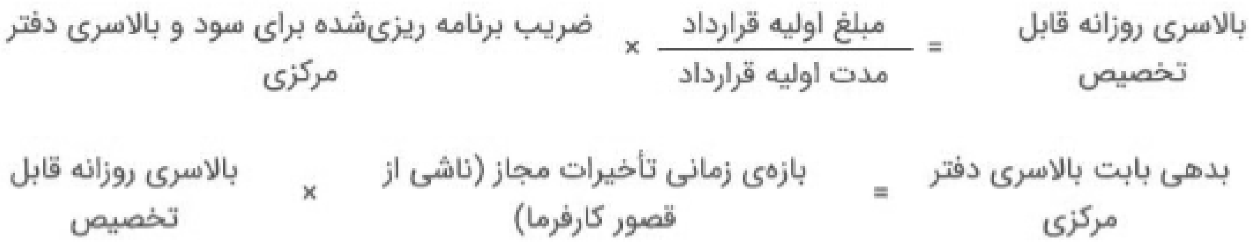
Alternative formulas – Canadian method

- ☐ **No consideration** is given to **unallowable costs.**
- ☐ Prevalent in Canada, not the U.S.
- ☐ Canadian method is **simpler** to apply **than** the **Eichleay Formula**.
  - ❖ However, despite this simplicity, it has **not been widely** used in the **United States** and **UK**.
- ☐ **A variation** of the **Canadian Method**, known as the **Hudson Method**, has been used in **Great Britain**.

Alternative formulas – Hudson formula

$$\text{Planned Home Office Overhead \& Profit \%} \times \frac{\text{Original Contract Sum}}{\text{Original Contract Period}} =$$

$$\text{Allocable Overhead Per Day} \times \text{Period of Owner-Caused Delay} = \text{Home Office Overhead Owed}$$



بالاسری روزانه قابل تخصیص = مبلغ اولیه قرارداد / مدت اولیه قرارداد × ضریب برنامه ریزی‌شده برای سود و بالاسری دفتر مرکزی

بدهی بابت بالاسری دفتر مرکزی = بازه‌ی زمانی تأخیرات مجاز (ناشی از قصور کارفرما) × بالاسری روزانه قابل تخصیص

- ❑ In this method, the **percentage markup portion** of the formula **includes** a **profit allocation**.
- ❑ As with **<u>any method</u>**, the **Contractor** **must** demonstrate that the underlying **<u>markup and cost assumptions</u>** are **reasonable** **before recovery** under these alternate methods will be allowed.

Alternative formulas – Hudson formula

- ☐ This formula was **created** by the **courts in the United Kingdom** and later **exported** to **Canada**.
- ☐ It derives its **daily HOOH rate** on the basis of the **as-bid calculations** and **assumes** that the **bid rate** should hold **constant** **throughout the life of the project**.
  - ❖ **Some along the U.S.-Canadian border** have started **seeing this in claims**.

- ☐ **Based on SCL Protocol:**
  - ❖ The use of **Hudson formula** is **not supported**. Why?
    - ✓ Because it is **dependent** on the **adequacy of bid** and because the **calculation** is derived from a **number** which in itself **contains an element of head office overheads and profit**:

SO IT IS DOUBLE COUNTING!

Alternative formulas – Ernstorm formula

$$\frac{\text{Total Overhead for Contract Period (All Projects)}}{\text{Total Labor Costs for Contract Period (All Projects)}} = \text{General Labor/Overhead Ratio}$$

Labor/Overhead Ratio x Labor Costs During Delay = Overhead Allocable to Delay

$$\text{نرخ عمومی}\ \frac{\text{کار}}{\text{بالاسری}} = \frac{\text{تمام بالاسری [شرکت] برای مدت اجرای قرارداد (تمامی پروژه‌ها)}}{\text{کل هزینه‌های کار برای مدت اجرای قرارداد (تمامی پروژه‌ها)}}$$

$$\text{بالاسری قابل تخصیص به تأخیر} = \text{هزینه‌های کار در بازه تأخیر} \times \text{نرخ عمومی}\ \frac{\text{کار}}{\text{بالاسری}}$$

Alternative formulas – Ernstorm formula

- ❑ This formula rests on the theory that there is a **direct relationship** between **overhead costs** and **labor costs** that can be calculated and applied to a delay situation.

- ❑ Since this is a ratio formula, it does **not develop a daily HOOH cost** but rather calculates **a lump sum cost**.

In discussing this formula with the author, J. William Ernstrom, he advises that while there are no citations in New York case law, he has had some success in getting juries to accept this approach in jury trials.

Alternative formulas – Manshul formula

$$\text{Cost of Work Performed During Delay Period} \times \frac{\text{Contract Cost \%}}{\text{Cost + Mark Up \%}} = \text{Direct Cost}$$

$$\text{Direct Cost Incurred During Delay Period} \times \text{Home Office Overhead \%}^{*} = \text{Home Office Overhead Owed}$$

* Estimated or known HOOH % portion of bid markup.

هزینه مستقیم = % هزینه قرارداد / % (هزینه قرارداد+ درصد پیش‌بینی شده برای بالاسری و سود در مناقصه) × مبلغ صورت‌وضعیت متناظر با کار انجام شده در بازه‌ی تأخیر [ص.و کارکرد(+تعدیل)]

بدهی بابت بالاسری دفتر مرکزی = % درصد بالاسری دفتر مرکزی در اسناد مناقصه × هزینه مستقیم تحمیلی در بازه‌ی تأخیر

Alternative formulas – Manshul formula

- This formula has also been referred to as the **Direct Cost Allocation Method**.

- It is a **creature** of the courts in the **State of New York.**
  - When New York courts **rejected *Eichleay*,** they were challenged to pose a **substitute method** of calculating overhead and created this formula.

- It does **not** arrive at a **daily overhead rate**.
  - Rather, it uses the **as-bid HOOH rate times** the cost of work performed during the delay period to determine the **overhead used.**

Alternative formulas – Emden formula

$$\frac{\text{Total Overhead \& Profit}^{*} / \text{ Total Company Turnover}^{**}}{100} \times \frac{\text{Gross Contract Sum}}{\text{Planned Contract Period}} \times \text{Owner-Caused Delay Period} = \text{Home Office Overhead Owed}$$

* Total company overhead and profit during contract period
** Total company revenue for contract period

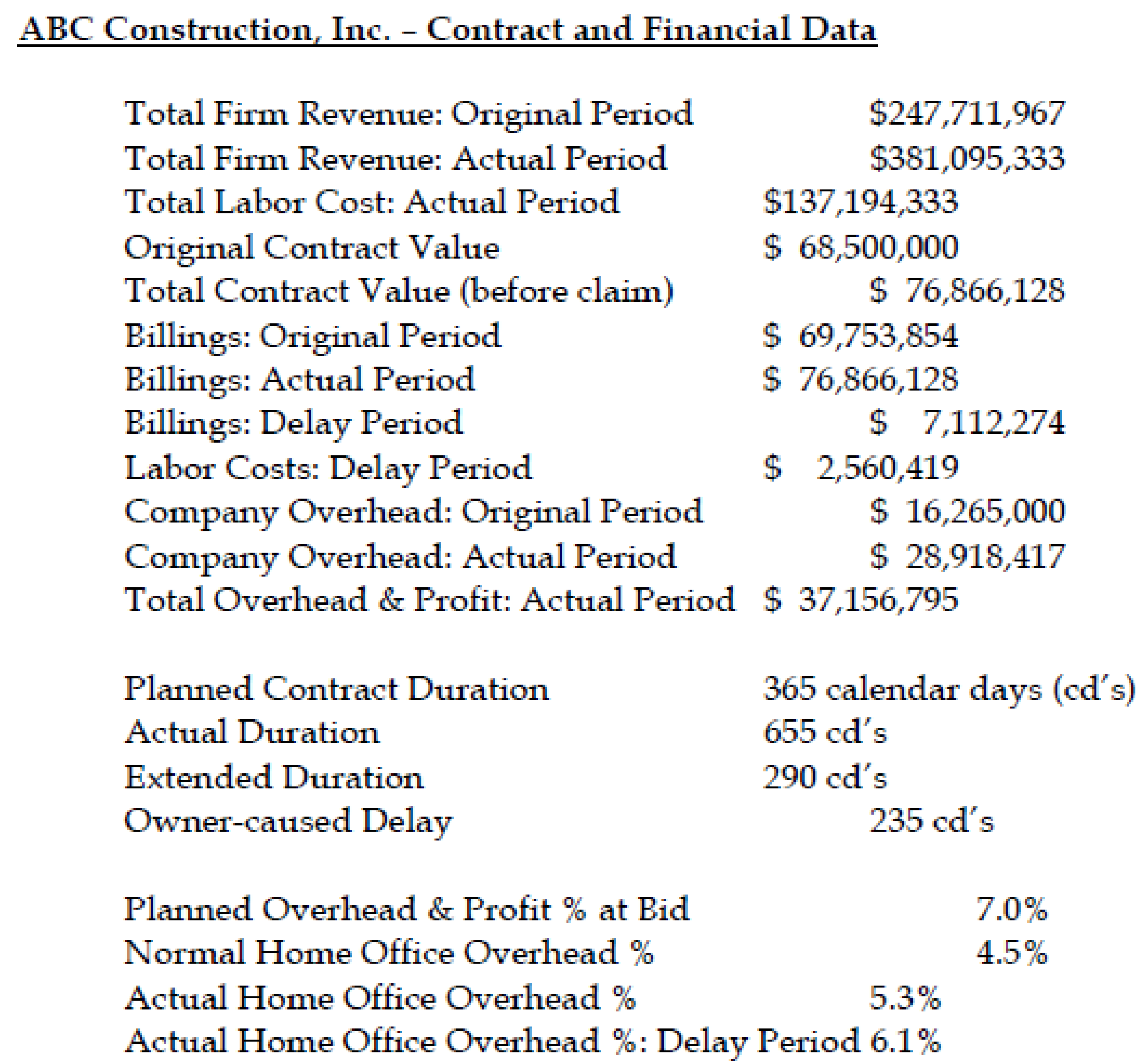
$$\text{بدهی بابت بالاسری دفتر مرکزی} = \text{بازه‌ی زمانی تأخیر} \times \frac{\text{مبلغ اولیه قرارداد}}{\text{مدت اولیه قرارداد}} \times \frac{\text{کل سود و هزینه بالاسری شرکت در مدت اجرا}}{\text{کل درآمد شرکت در بازه‌ی اجرا}}$$

Alternative formulas – Emden formula

- ❑ This formula is a creature of the **Canadian Courts.**
- ❑ The Emden formula does, however, **require adjustments** to make it reflect reality **more accurately**.
- ❑ Emden determines, **in Step 1,** a **reasonable project overhead** that *should* have been contained in the **contract amount**, based on the **contractor's performance in the past**.
  - ❖ How about **bidding condition?**
- ❑ **Another adjustment** should be made after Steps 2 and 3, to take into account the **<u>contractor's extra revenues</u>** (or lack of them) **during the delay period**, **both** on the **<u>delayed project</u>** and on the **<u>rest of the contractor's projects</u>**.

Neither adjustment is easy, nor an exercise in pure mathematics.

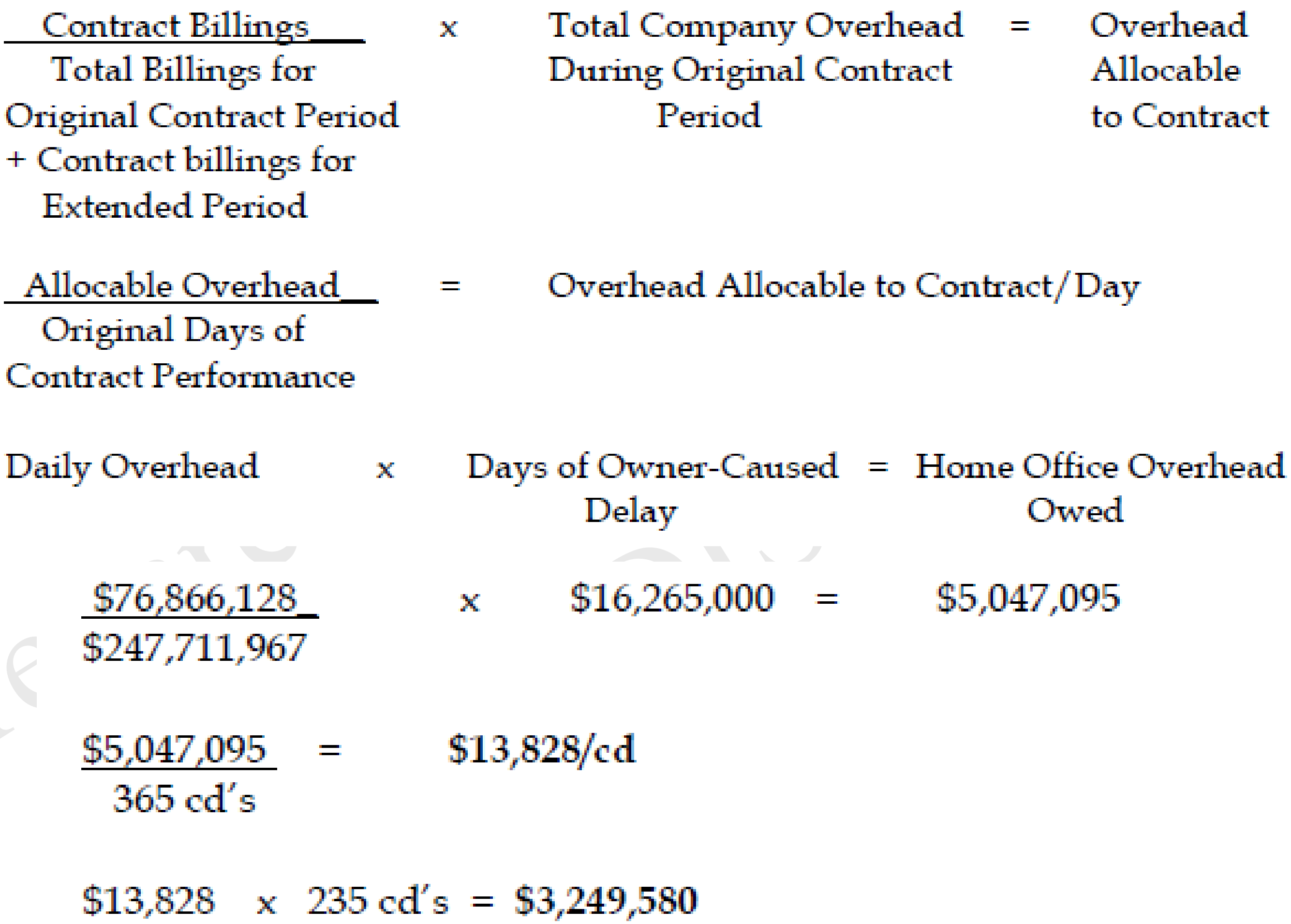
Alternative formulas – Example



ABC Construction, Inc. – Contract and Financial Data

Total Firm Revenue: Original Period	$247,711,967
Total Firm Revenue: Actual Period	$381,095,333
Total Labor Cost: Actual Period	$137,194,333
Original Contract Value	$ 68,500,000
Total Contract Value (before claim)	$ 76,866,128
Billings: Original Period	$ 69,753,854
Billings: Actual Period	$ 76,866,128
Billings: Delay Period	$ 7,112,274
Labor Costs: Delay Period	$ 2,560,419
Company Overhead: Original Period	$ 16,265,000
Company Overhead: Actual Period	$ 28,918,417
Total Overhead & Profit: Actual Period	$ 37,156,795
Planned Contract Duration	365 calendar days (cd's)
Actual Duration	655 cd's
Extended Duration	290 cd's
Owner-caused Delay	235 cd's
Planned Overhead & Profit % at Bid	7.0%
Normal Home Office Overhead %	4.5%
Actual Home Office Overhead %	5.3%
Actual Home Office Overhead %: Delay Period	6.1%

Alternative formulas – Example: Modified Eichleay formula 1



$$\frac{\text{Contract Billings}}{\text{Total Billings for Original Contract Period + Contract billings for Extended Period}} \times \text{Total Company Overhead During Original Contract Period} = \text{Overhead Allocable to Contract}$$

$$\frac{\text{Allocable Overhead}}{\text{Original Days of Contract Performance}} = \text{Overhead Allocable to Contract/Day}$$

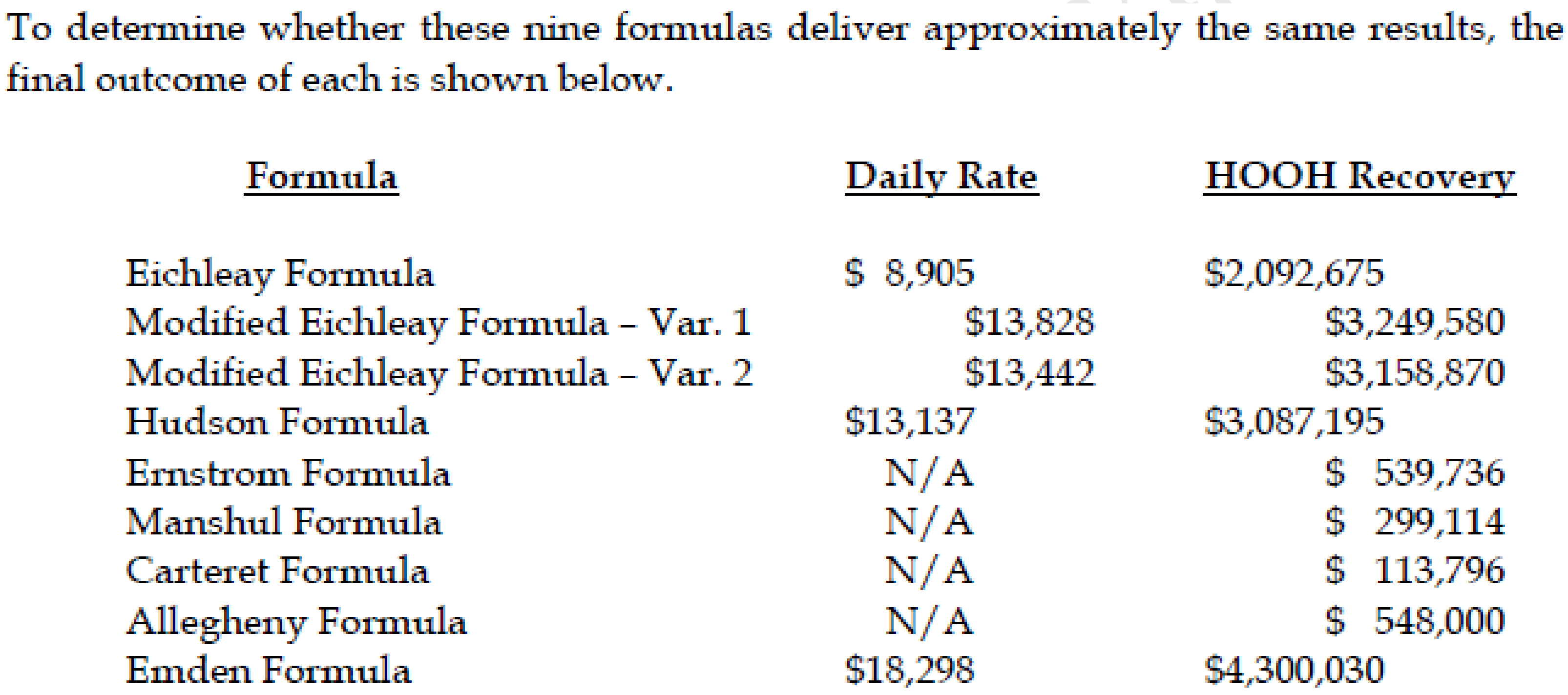
$$\text{Daily Overhead} \times \text{Days of Owner-Caused Delay} = \text{Home Office Overhead Owed}$$

$$\frac{\$76{,}866{,}128}{\$247{,}711{,}967} \times \$16{,}265{,}000 = \$5{,}047{,}095$$

$$\frac{\$5{,}047{,}095}{365 \text{ cd's}} = \$13{,}828/\text{cd}$$

$$\$13{,}828 \times 235 \text{ cd's} = \$3{,}249{,}580$$

Alternative formulas – Example: Emden formula



To determine whether these nine formulas deliver approximately the same results, the final outcome of each is shown below.

Formula	Daily Rate	HOOH Recovery
Eichleay Formula	$ 8,905	$2,092,675
Modified Eichleay Formula – Var. 1	$13,828	$3,249,580
Modified Eichleay Formula – Var. 2	$13,442	$3,158,870
Hudson Formula	$13,137	$3,087,195
Ernstrom Formula	N/A	$ 539,736
Manshul Formula	N/A	$ 299,114
Carteret Formula	N/A	$ 113,796
Allegheny Formula	N/A	$ 548,000
Emden Formula	$18,298	$4,300,030

Conclusion

- ☐ The most common question is:

Which formula is better?

Emden and **Eichleay** formula are **<u>preferred</u>** by many **protocols like** SCL.

<u>However</u>, It is **suggested** that the result be **cross-checked using another formula**:

How?

Use the Excel file provided by SCL Protocol.

INEFFICIENCY OR LOST PRODUCTIVITY COSTS

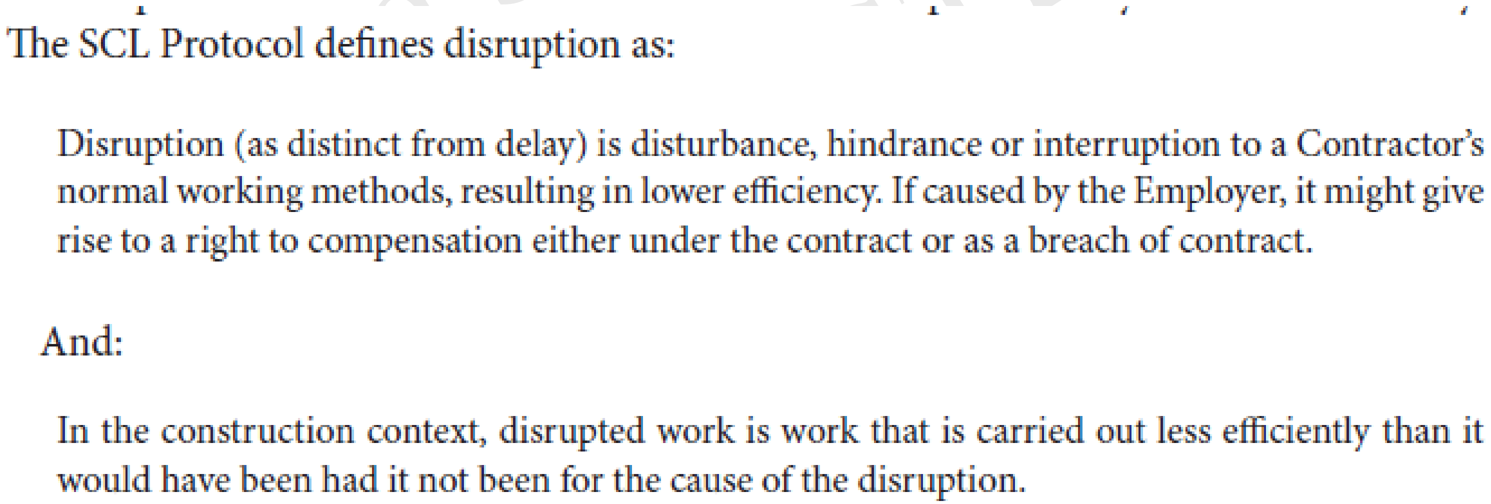
caused by delay

(Disruption Analysis)

Introduction

- ☐ In addition to the delays and damages **presented in previous sections**, there are other **delay-related effects that may occur**.

  - ❖ High on this list is a **decrease** in the **Contractor's efficiency** caused by delays.
    - ✓ The delay may either **directly cause** the inefficiency or **be caused** by the inefficiency.



The SCL Protocol defines disruption as:

> Disruption (as distinct from delay) is disturbance, hindrance or interruption to a Contractor's normal working methods, resulting in lower efficiency. If caused by the Employer, it might give rise to a right to compensation either under the contract or as a breach of contract.

And:

> In the construction context, disrupted work is work that is carried out less efficiently than it would have been had it not been for the cause of the disruption.

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Introduction

- ☐ In construction, **‘disruption’** may be defined as an **interruption** to the flow, continuity or sequence of planned work; a bringing of disorder to an activity or project.

- ☐ **Disruption** **may** be a **cause of delay**, and **delay** **may** be a **cause of disruption**, but they are **not one and the same**.

Disruption may not delay the project!

ODCC

What is inefficiency?

- ☐ Perhaps the best way to define ***inefficiency*** is to start with a definition of ***efficiency***.
- ☐ **Efficiency** is a **measure** of **units of work performed** per **units of resources consumed to perform that work**.
- ☐ **Inefficiency** (also referred to as **loss of efficiency or lost productivity**) is a **relative measurement**.
- ☐ An **operation is inefficient** when it **consumes** **more units of resources** to perform **a unit of work** **than** should **have been consumed**.

What is inefficiency?

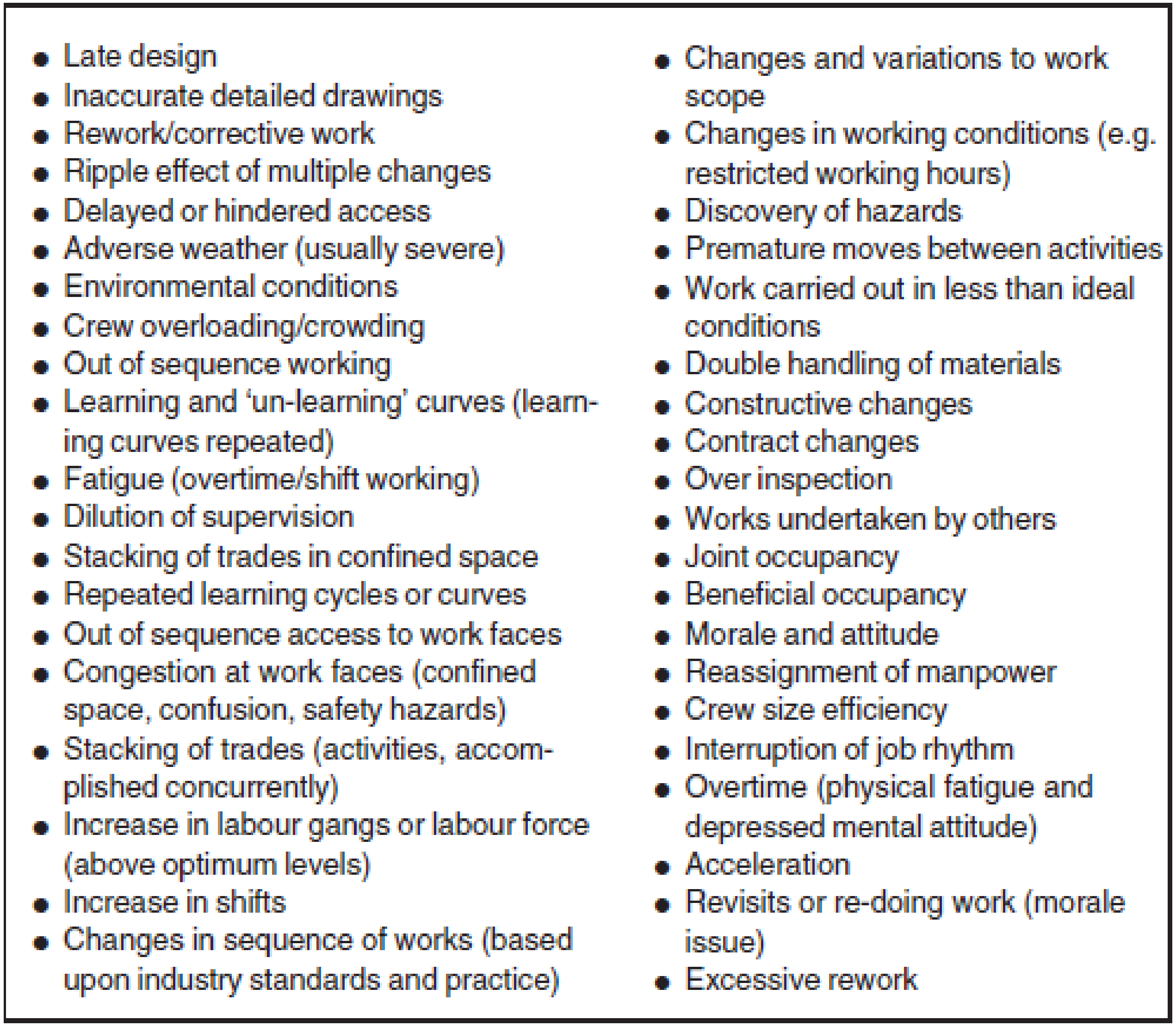
- ☐ This section is **not intended** to explain **every type of inefficiency**.

Rather

- ☐ It will

1. **show how a delay** can **affect** the **productivity of the job** and
2. discuss **how** that **reduction** in productivity **can be measured**, as long as **accurate**, **contemporaneous** records are **maintained**.

Causes of disruption and loss of efficiency



- Late design
- Inaccurate detailed drawings
- Rework/corrective work
- Ripple effect of multiple changes
- Delayed or hindered access
- Adverse weather (usually severe)
- Environmental conditions
- Crew overloading/crowding
- Out of sequence working
- Learning and 'un-learning' curves (learning curves repeated)
- Fatigue (overtime/shift working)
- Dilution of supervision
- Stacking of trades in confined space
- Repeated learning cycles or curves
- Out of sequence access to work faces
- Congestion at work faces (confined space, confusion, safety hazards)
- Stacking of trades (activities, accomplished concurrently)
- Increase in labour gangs or labour force (above optimum levels)
- Increase in shifts
- Changes in sequence of works (based upon industry standards and practice)
- Changes and variations to work scope
- Changes in working conditions (e.g. restricted working hours)
- Discovery of hazards
- Premature moves between activities
- Work carried out in less than ideal conditions
- Double handling of materials
- Constructive changes
- Contract changes
- Over inspection
- Works undertaken by others
- Joint occupancy
- Beneficial occupancy
- Morale and attitude
- Reassignment of manpower
- Crew size efficiency
- Interruption of job rhythm
- Overtime (physical fatigue and depressed mental attitude)
- Acceleration
- Revisits or re-doing work (morale issue)
- Excessive rework

Ways that delay can lead to inefficiencies

- ☐ The following are **examples of how delays** can **lead to inefficiencies**.
  - ❖ Shifts in construction season
  - ❖ Availability of resources
  - ❖ Additional manpower
  - ❖ Unlevelled staffing
  - ❖ Preferred/optimum crew size
  - ❖ Sequencing of work

Only the disruption caused by owner that is compensable should be considered!

Ways that delay can lead to inefficiencies – Shifts in the construction season

- ☐ A delay to a Project can **shift work originally scheduled** for one season **into a different season**.

- ☐ For example, work scheduled for **late summer and early fall** may be **pushed** into the **winter months by a delay**.

- ☐ The **effect of the delay** on the **Contractor's efficiency** depends on the **type of work**.

Ways that delay can lead to inefficiencies – Shifts in the construction season: Example

- ❑ A Contractor plans to complete all concrete operations before the winter season. A delay forces the Contractor to continue concrete work through the winter months in a cold-weather environment.
- ❑ As a consequence, the concrete crews do not work as efficiently as they would under ideal conditions, and the Contractor experiences an increase in the unit cost for placing concrete.
- ❑ The Contractor is also forced to change the concrete mix design to include accelerators, which further increases the unit cost, in this case, for materials. Finally, the Contractor must use winter concrete placing techniques, including extra winter protection and steam curing in some instances.

All of these extra items were the direct result of the shift in season caused by the initial delay to the Project.

Ways that delay can lead to inefficiencies – Shifts in the construction season: Example

- ❑ A Contractor performing a heavy-earth-moving operation is delayed so work that was to be performed during a relatively dry season is forced into a wetter season.

- ❑ The earth-moving operation is adversely affected by muddy conditions in the cut and fill areas.

- ❑ In wet weather, the overall productivity of cubic yards per crew/equipment day is reduced.

Ways that delay can lead to inefficiencies – Availability of resources

- ☐ At **times**, delays can affect the **availability of resources** in the areas of
  - ❖ Manpower
  - ❖ Subcontracts
  - ❖ Equipment

- ☐ The next examples illustrate the effects of unavailable resources.

Ways that delay can lead to inefficiencies – Availability of resources: Example

- ☐ A General Contractor plans to complete a Project in April. Because of a delay, the work extends into the summer. However, because the construction workload in that location is at its peak during the summer, there is less available labor from which to draw.
- ☐ Therefore, the Contractor may not be able to obtain enough labor to finish the work by the revised schedule for completion. This is particularly true of weather-related work such as exterior painting, site work, and landscaping.
- ☐ The inability to complete the work according to the original schedule may be a compounding delay and not have a component of inefficiency.
- ☐ Conversely, the Contractor may hire less-experienced crews or “travelers” and have either reduced efficiency for a portion of the work or a higher unit cost for the work.

Ways that delay can lead to inefficiencies – Additional manpower

- ☐ **Delays** to **specific activities** may **force the Contractor** to work on **more activities** than planned at one time and to **increase the levels of manpower** significantly for **a specific trade**.

- ☐ Also, as the Contractor **increases** the **crew size**, it is **not uncommon** for the **added personnel** to be less productive than the **original crew**.

- ☐ **Contractors often say** that as they **draw more personnel** from the union hall, they see a **decline in the level of productivity**.

Ways that delay can lead to inefficiencies – Unlevelled staffing

- ☐ In the face of a delay, a Contractor may **staff** a Project **erratically**.
- ☐ Theoretically, a Contractor would like to staff a Project in a bell curve fashion:
  - ❖ **Starting** with a **small crew**, **building up** to **optimum size**, and then **tapering down** toward the **end of the Project**.
- ☐ **Constant fluctuations** in the **size of the crew** on the site are **not desirable**.
  - ❖ However, the Contractor may in **some circumstances** be **forced**
    - ✓ In **such situations**, there may be a **measurable reduction in efficiency**.
- ☐ To demonstrate the **negative effect** of a **forced change** in **labor distribution**, the Contractor would be **well advised to**:
  - ❖ **Plot** the **planned distribution** of labor
  - ❖ **Plot** the **actual distribution** of labor caused by the delay

and compare the two.

Ways that delay can lead to inefficiencies – Preferred/Optimum crew size: Example

- ❑ A finish Contractor has a standing force of eight carpenters employed through the year.
- ❑ Because the crew works together throughout the year, they have established a smooth and efficient routine.

- ❑ If a delay now causes that Contractor to accelerate his work and increase his staff above his optimal crew, there can be some measured loss of efficiency as the original crew assimilates the new personnel and brings them "up to speed."

Ways that delay can lead to inefficiencies – Sequencing of work

- ☐ Delays to **critical** and **noncritical** **activities** can also force a Contractor to **resequencing the work**.

- ☐ The **resequencing itself is not a problem**, **but** its **effects** may reduce the Contractor's **productivity in a number of ways**.

- ☐ The **Contractor's crew** may be **hampered** in their work by the **presence of another trade**, or the **crew may be obstructed** by **material stockpiled** in the work area.

With such interferences, workers may experience some reduction in productivity.

Quantifying inefficiency

- The **Contractor** **must** be able to **measure** and **demonstrate** **how** the delays **adversely affected** the **workers' productivity** **if** it is to be **compensated** for the **additional costs**.

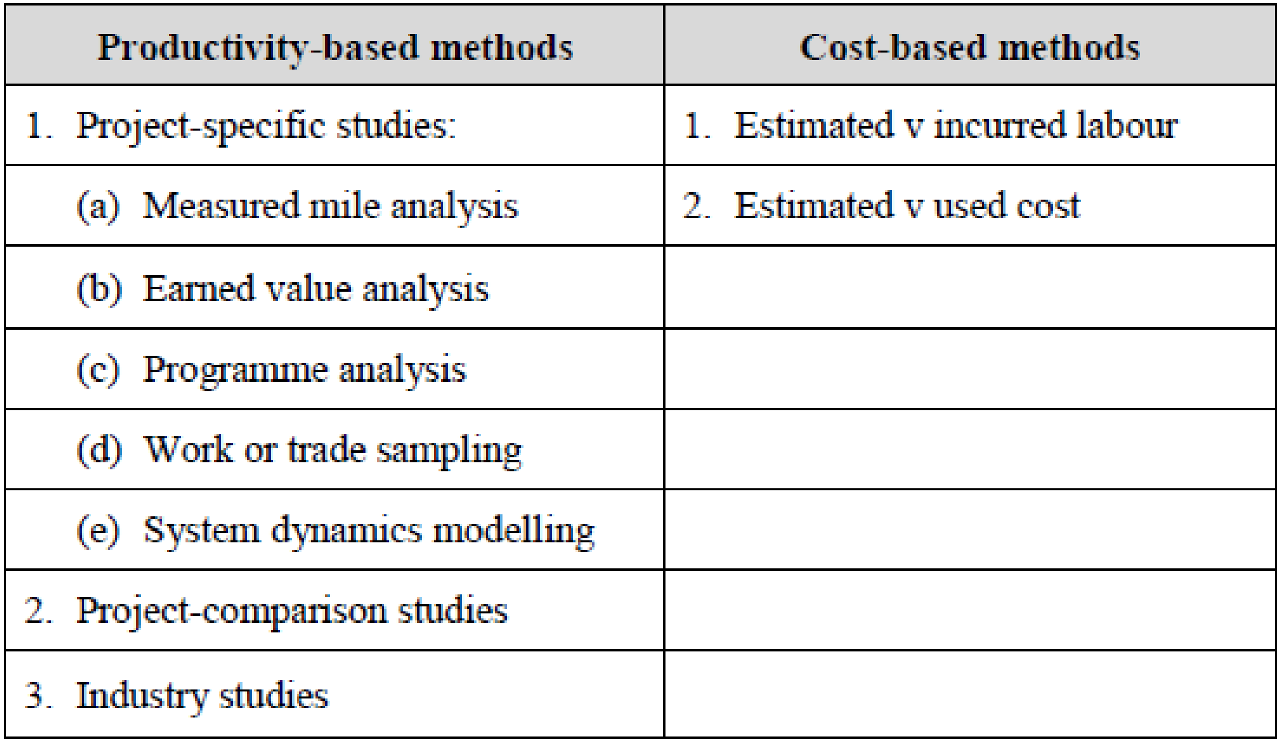
- There are **several methods** for **quantifying productivity loss**.

- The **SCL Protocol** does **not recommend** the use of **percentage additions**.
  - The **contractor** should be **capable** of **doing analysis** in:
    1. **Quantifying** **inefficiency**
    2. **Quantifying** the **costs** of inefficiency

Delay analysis does not measure and identify disruption!

Quantifying inefficiency

- There are **several methods** for the calculation of lost productivity resulting from disruption events, each with **varying** **accuracy** and **general acceptance**.
- **Productivity-based methods** are **more accurate** and **common** compared to Cost-based methods.



Productivity-based methods	Cost-based methods
1. Project-specific studies:	1. Estimated v incurred labour
(a) Measured mile analysis	2. Estimated v used cost
(b) Earned value analysis	
(c) Programme analysis	
(d) Work or trade sampling	
(e) System dynamics modelling	
2. Project-comparison studies	
3. Industry studies	

Quantifying inefficiency

- ☐ **Additionally**, a number of **industry studies** have been published by **various organizations** providing standard losses.
- ☐ A **contractor** must establish the **relevance of these studies if** they are to be used for **claiming losses** due to disruption, prospectively or forensically.
- ☐ **The following bodies are some of them:**
  - ❖ The Mechanical Contractors Association (MCA) **(this is accepted by many courts and the guidelines set expected loss of efficiency for 16 disruption factors)**
  - ❖ The Business Roundtable, Bulletin 917
  - ❖ The National Electrical Contractors Association
  - ❖ The Chartered Institute of Building (CIOB)
  - ❖ US Department of Labor

Each of these studies has different applications and should be used cautiously in conjunction with factual evidence demonstrating that disruption in fact occurred.

Quantifying inefficiency – Productivity-based methods

1. **Measured mile analysis:**

- ❑ The measured mile approach **compares** **work performed in one period not impacted** by events or factors causing loss of productivity with the same, or similar, **work performed in another period that was impacted** by disruptive events or factors.

This approach has been relied on by the Court more than any other in recent years.

  - ❖ It is the most **widely accepted method** because it considers **only actual effects** of the **disruption events** for which the **owner is responsible**.
  - ❖ This approach is **endorsed** by **SCL Protocol** and **US Federal courts.**

- ❑ Due to its reliance on relevant **factual evidence** and **historical data** for a particular project, the measured mile approach is one favored by many.
- ❑ This method requires a **period of uninterrupted performance** and **sufficient cost records** to measure productivity.

Quantifying inefficiency – Productivity-based methods

1. **Measured mile analysis:**

☐ When carrying out a measured mile analysis, the main goal is to **compare**

1. **Actual hours spent**, and **output achieved**, during a **period unaffected** by disruption events

With

2. **Hours spent** and **output achieved** in a **period which was affected** by disruptive events.

The production achieved during the unaffected period is said to be the measured mile.

☐ It is important to use **actual site productivity** during **unimpacted periods** as the comparative measure and **not tender rates/outputs.**

Quantifying inefficiency – Productivity-based methods

1. **Measured mile analysis:**

- ❑ The Contractor **must show** a **comparison** between **unimpacted** and **impacted** work.

For example, if a Contractor's work is shifted into a cold-weather season, it should compare the work during the cold-weather season with productivity during the more favorable weather.

Quantifying inefficiency – Productivity-based methods

1. **Measured mile analysis:**

❑ **Example:**

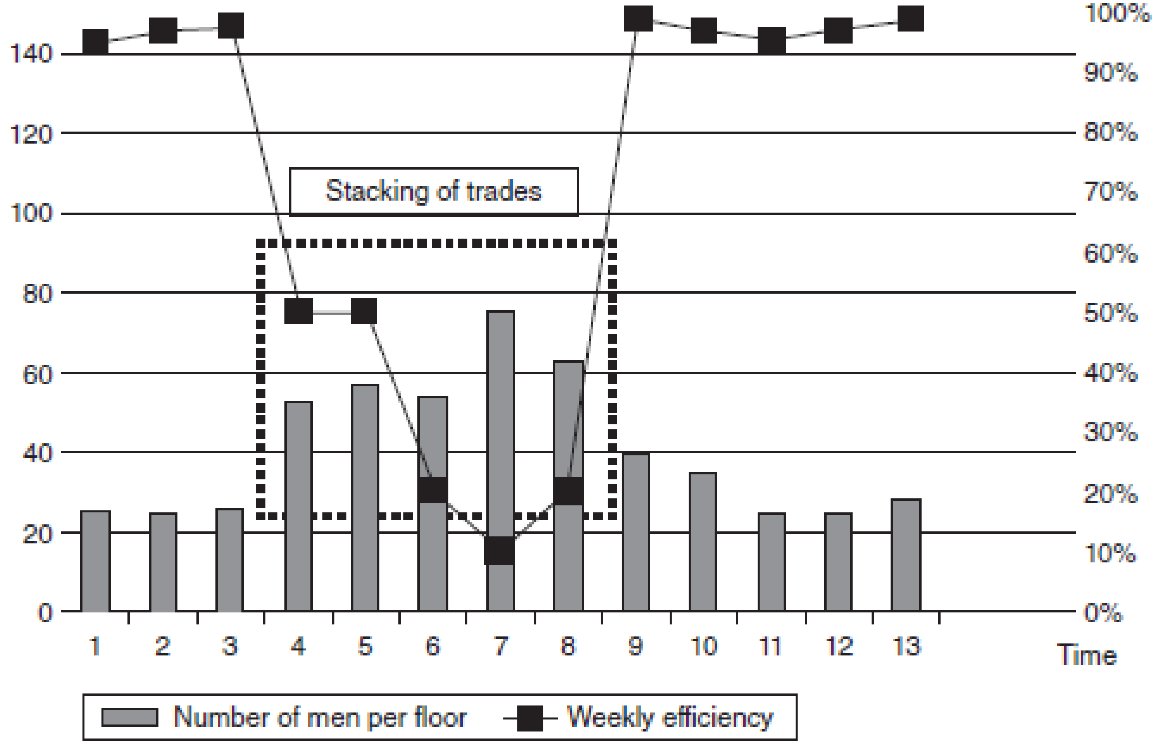
- ❖ A Contractor plans to set reinforcing steel during the summer.
- ❖ A delay pushes this activity into the winter months.
- ❖ The Contractor’s records show that during the favorable weather, the work crews were able to set two tons per crew-day.
- ❖ During the less favorable weather, however, the same crews are able to set only 1.5 tons per crew-day.

Thus, the loss of productivity was 25 percent.

Quantifying inefficiency – Productivity-based methods

1. **Measured mile analysis:**

- ☐ **Example:**
- ☐ **This is a complicated one**

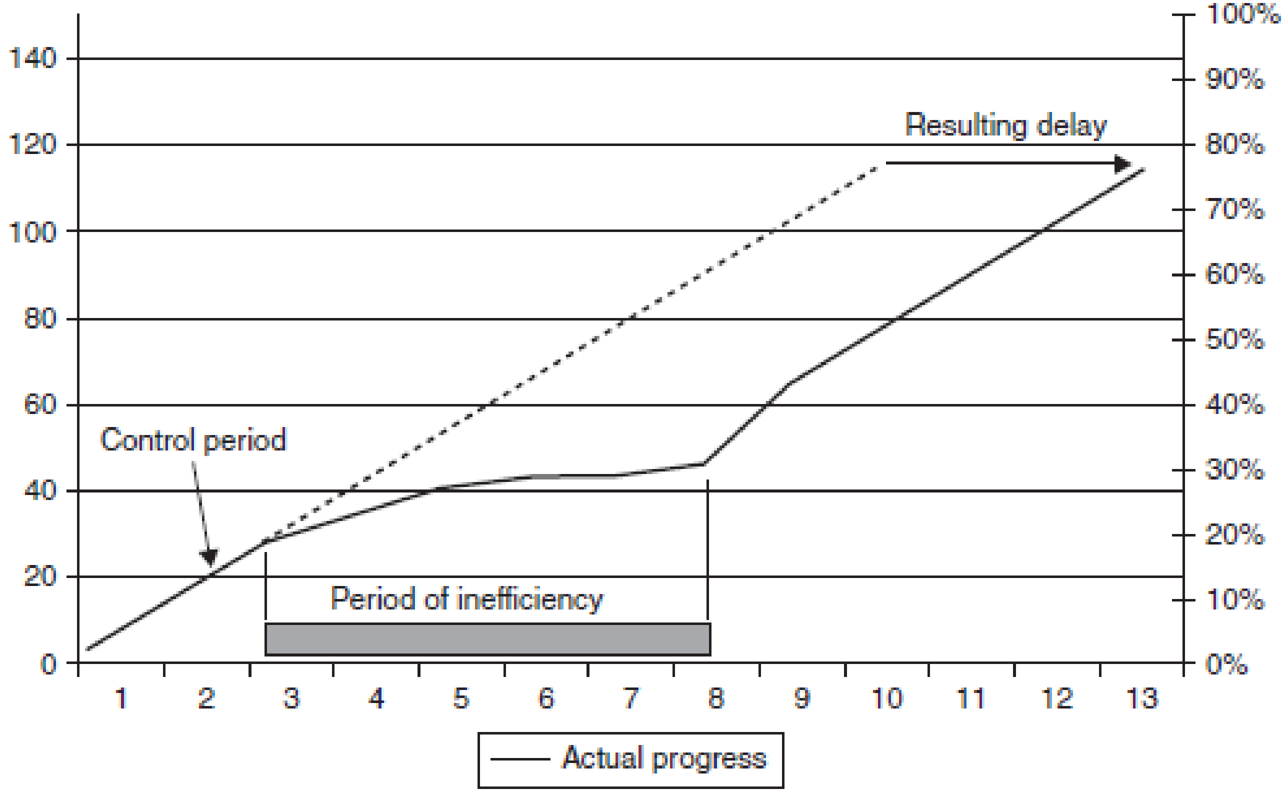


The line connecting each block is a measure of the efficiency of each man (measured in earned quantity for each hour expended) for the full duration of the 13-week task.

Quantifying inefficiency – Productivity-based methods

1. **Measured mile analysis:**

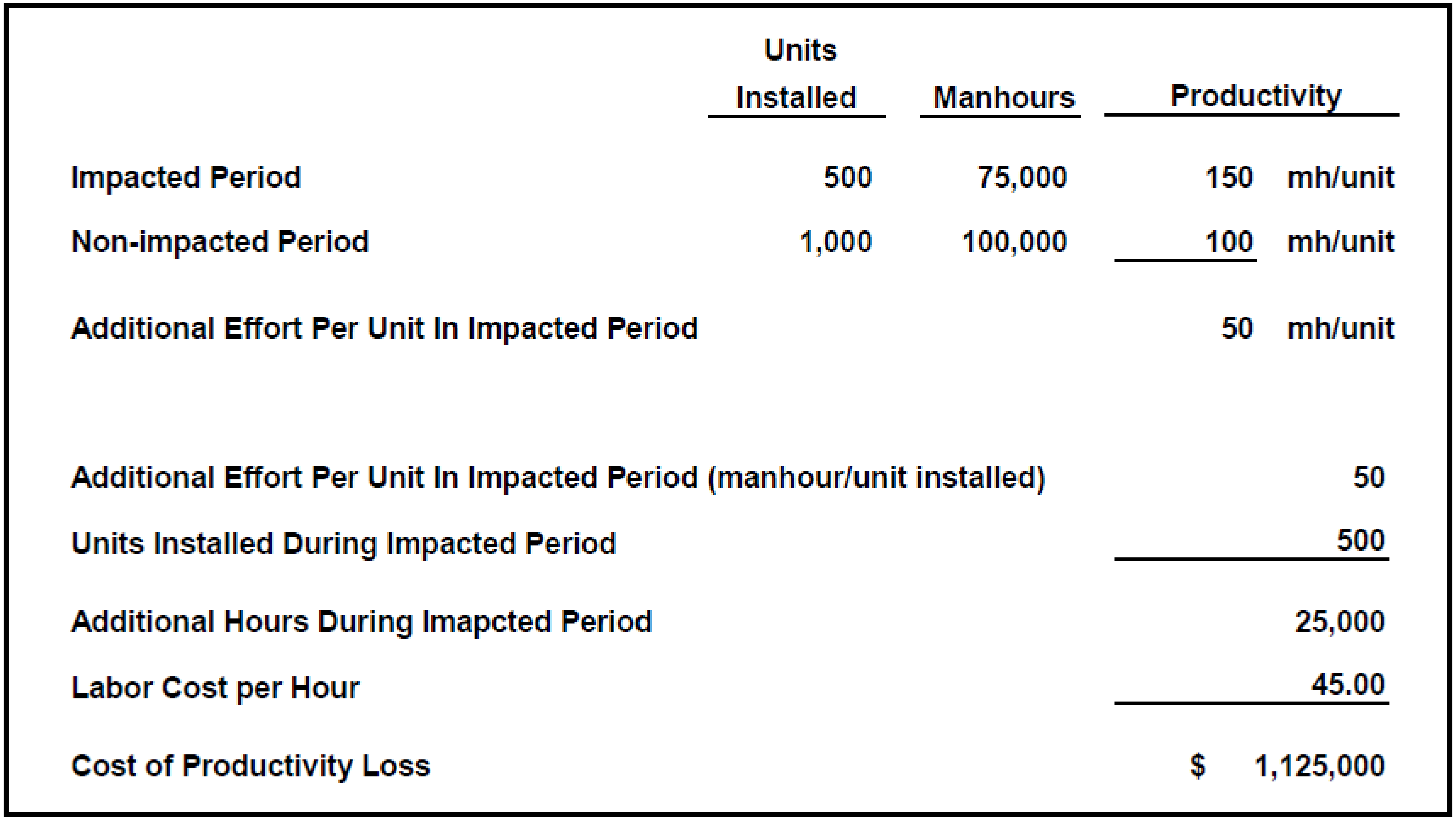
- ❑ **Example:**
- ❑ **This is a simple example**



Quantifying inefficiency – Productivity-based methods

1. Measured mile analysis:

- Compares productivity in impacted period to non-impacted period



	Units Installed	Manhours	Productivity	
Impacted Period	500	75,000	150	mh/unit
Non-impacted Period	1,000	100,000	100	mh/unit
Additional Effort Per Unit In Impacted Period			50	mh/unit

Additional Effort Per Unit In Impacted Period (manhour/unit installed)	50
Units Installed During Impacted Period	500
Additional Hours During Imapcted Period	25,000
Labor Cost per Hour	45.00
Cost of Productivity Loss	$ 1,125,000

Quantifying inefficiency – Productivity-based methods

2. **Earned value analysis:**

☐ Compare:

1. **Planned man-hours** included in **bidding** for certain work activities
2. **Actual man-hours** for **completing** certain work activities

☐ **Planned:** 20 man-hours to pour 10m3 of concrete

☐ **Actual:** 35 man-hours to pour 10m3 of concrete

- ❖ First, **exclude** any **flawed assumptions** and **disruption events** that are **contractor's responsibility**
- ❖ Then, the **additional man-hours** is the **consequence** of the **productivity loss**

Where details of planned and actual man-hours are not available, an earned value analysis might focus upon cost

Quantifying inefficiency – Productivity-based methods

3. **Programme analysis:**

- ❑ This is a **variant** of **earned value analysis**
- ❑ The **schedule software** assist in calculating
  - ❖ **Periodic percentage completion**
  - ❖ **Earned value for impacted activities**

- ❑ **Resources** including labor, plant, cost, quantities, etc. over the life of the project can be **allocated** and **tracked**.

Quantifying inefficiency – Productivity-based methods

You can read other methods of PRODUCTIVITY-BASED METHODS from SCL Protocol (Part B, 18.16 to 18.20)

Quantifying inefficiency – Cost-based methods

- ☐ **Cost-based methods** provide the **least robust support**
- ☐ This is **often applied** when **productivity-based methods cannot** be used.
  - ❖ **Cost-based methods** are **unlikely** to be **persuasive** where there are **productivity-based methods** that can reasonably be **deployed**.
- ☐ These methods focus on **project cost records** and **comparison** between
  1. **Incurred costs (labor cost paid)**
  2. **Estimated costs (labor cost planned)**

- ☐ **Overall**, this methods may provide **some assistance** if there is **sufficient proof** to show
  1. The **<u>estimated</u>** and **<u>incurred</u>** costs were **reasonable**
  2. The **costs of events** in which the **<u>contractor</u>** is **responsible** have been **excluded**.

Quantifying inefficiency – Total cost method

- ☐ In the **total cost method**, a **Contractor** **argues** that it estimated a **certain cost for its work**.
- ☐ Because of the **delay and the subsequent inefficiency** of a shift in **work seasons**, the **actual cost was higher**.
  - ❖ Therefore, the **Contractor claims** the **difference in damages**.
- ☐ **This method** **assumes** that the **Contractor's estimate** was **accurate**.
- ☐ It also **assumes** that the **Contractor** in **no way contributed** to the **reduced efficiency** and that **all additional costs** are **solely attributable** to the **delays cited**.

All of these assumptions may be challenged.

Quantifying inefficiency – Total cost method: Example

- ❑ A Contractor plans to set reinforcing steel during the summer.
- ❑ A delay pushes this activity into the winter months.
- ❑ The Contractor’s records show that during the favorable weather, the work crews were able to set two tons per crew-day.
- ❑ During the less favorable weather, however, the same crews are able to set only 1.5 tons per crew-day.

- ❑ This method is carried out as follows for previous example.
  - ❖ ***Actual cost of paving operation: $1,975,000***
  - ❖ ***Estimated cost of paving operation: $1,250,000***
  - ❖ ***Damages claimed because of inefficiency: $725,000***

Quantifying the costs of inefficiency

- ☐ The **costs associated with inefficiency** are **direct costs**.

- ☐ Therefore, the **costs associated with inefficiency** will be directly related to costs of **labor**, **equipment**, **materials**, **or** **subcontractor**.

As such, if the analyst can reasonably measure the magnitude of the loss of efficiency, the cost calculations are straightforward.

It must be recognized that detailed, accurate, and contemporaneous information must be maintained in order to measure productivity impacts associated with a delay.

ACCELERATION COSTS

Acceleration costs

OTHER CATEGORIES OF DELAY DAMAGES

Other categories

- ☐ **SCL Protocol is used for this part.**

Guidance part C: Other financial heads of claim

Claims for payment of interest

- ❑ **Some standard forms of contract** make **provision** for the **way interest**, as a component of delay and disruption compensation, is payable.
  - ❖ *Was actually suffered as a result of a breach of the contract?*

- ❑ The following are **legitimate bases** for claims for interest under **many contracts** (especially subject to **English law**):
  - ❖ Interest pursuant to contract
  - ❖ Interest as damages/finance charges
  - ❖ Time when interest starts to run
  - ❖ Statutory interest on debts

Claims for payment of interest – Interest pursuant to contract

- ☐ The parties can **agree in the contract**:
  1. **Rate** of interest
  2. **Circumstances** in which it will be payable

- ☐ The rate may **not be enforceable** in some conditions.
  - ❖ **Various standard forms** of contracts contain an express **contractual right** to interest.

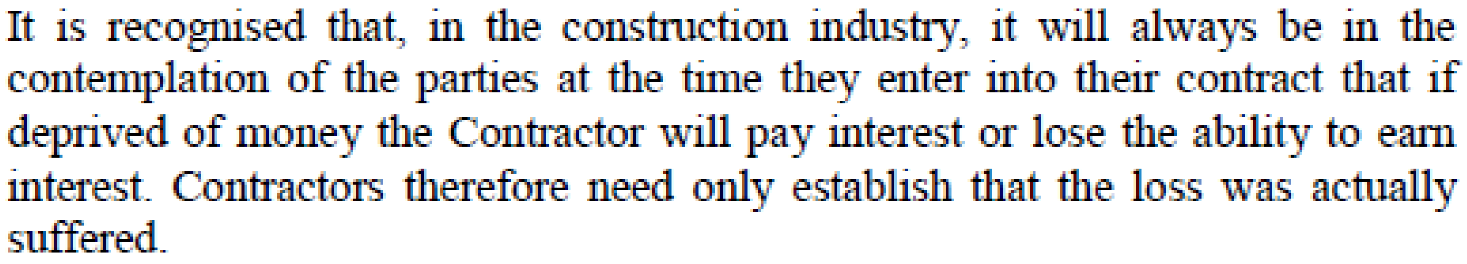
Claims for payment of interest – Interest as damages/finance charges

- ☐ In **most areas of business**:
  1. **Interest payable** on **bank borrowing** (to replace the money due)
  2. **Lost opportunity** to **earn interest** on bank deposits

  is **<u>quantifiable</u>** as damages where **claimant** can show:

  a) *Such loss has actually been suffered*

  b) *This loss was within the reasonable thought of the parties at the time of contracting*



It is recognised that, in the construction industry, it will always be in the contemplation of the parties at the time they enter into their contract that if deprived of money the Contractor will pay interest or lose the ability to earn interest. Contractors therefore need only establish that the loss was actually suffered.

Claims for payment of interest – Time when interest starts to run

- **Arguments** as to the **date** on which **interest** on a contractor’s claim **should start to run**.
  - ❖ **Contractors:** Date on which they **incurred expenditure** for which they are entitled to compensation.
  - ❖ **Owners:** Interest should run only from the date that the contractor has **provided all information** needed to satisfy them.

The appropriate starting date will not be the same in all circumstances, but generally should be the earliest date on which principal sum could have become payable.

SCL Protocol recommends that interest should start to run 30 days after the date the contractor suffered the loss and/or expense.

Claims for payment of interest – Statutory interest on debts

- ❑ In considering claims for **prolongation costs**
  - ❖ This statutory rights include the late payment of commercial debts (interest)

موسسه مهندسی و مدیریت ساخت علوی پور (ACEMI)

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