



مدیریت مالی، حسابداری و هزینه در پروژه ها و سازمان های پروژه محور

بخش پنجم:

مدیریت حسابداری: مسائل تکمیلی حسابداری پروژه

ارائه دهنده:

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(PhD, PMP, CMIT)

What you will learn?

- ☐ Purpose of this session
- ☐ Committed costs
- ☐ Estimated cost at completion (EAC)
- ☐ Estimated cost at completion – Example
- ☐ Underbillings and overbillings
- ☐ Calculating underbillings and overbillings
- ☐ Underbillings and overbillings – Example
- ☐ Accrual accounting – Example
- ☐ Percentage-of-completion accounting – Example
- ☐ Difference between accrual and percentage-of-completion accounting
- ☐ Internal controls
- ☐ Computerized accounting systems
- ☐ Selecting a project accounting systems

Purposes of the this session

- ☐ Learn to track committed costs outside the accounting system.
- ☐ Learn to use committed costs to project the estimated cost and profit at completion for projects.
- ☐ Learn to calculate over-and underbillings.
- ☐ Learn about the internal controls to protect your financial resources

Committed costs

- ❑ Costs that the **company** has **committed** to pay
- ❑ **Costs are known**, even if a **bill** has **not been received** for these costs
- ❑ **Occurs when:**
 - ❖ The company **signs** a **subcontract** for a **fixed and known amount**
 - ❖ The company **issues** a **purchase order** with a **known amount**



Committed costs

- ❑ Some accounting systems allow you to track committed costs in the job cost ledger, whereas **others do not**.
- ❑ Once a **bill** is **received** for a **committed cost**, it is **included** with the invoiced costs and **tracked** on the **job cost ledger**.
- ❑ If a **company's accounting system** does not track committed costs:

unbilled committed costs must be **manually combined** with the job cost ledger to get an **accurate picture** of the **project's financial status**.

Method of accounting – Percentage of completion

❑ How to estimate?

- ❖ Total cost to date = total cost of this period + cumulative cost of last period
- ➡ ❖ Total expected costs for the project = total cost to date + costs of remained work
- ❖ POC = total cost to date / total expected costs for the project
- ❖ Total expected revenue for the project = updated contract price
- ❖ Total estimated revenue to date = POC × total expected revenue for the project
- ❖ ***Estimated Profit to date = total estimated revenue to date – total cost to date***
- ❖ Period Cost = total cost of this period
- ❖ Estimated Period Revenue = total estimated revenue to date – cumulative estimated revenue of last year
- ❖ ***Estimated Period profit = Estimated Period Revenue – Period Cost***

Estimated cost at completion (EAC)

- ☐ Each **cost code** is entered on a **separate line**.
- ☐ The **cost codes** may or may not be **separated** by **cost type**—labor, materials, equipment, subcontract, and other.
- ☐ **Original estimate** is the **best estimate** of **final cost**
- ☐ **Change orders** that are **approved**
- ☐ **Committed costs** commonly include **subcontract amounts** and **purchase orders** with **known costs**.
- ☐ The costs from the **job cost ledger** are then **divided** into **Column G** and **Column H**.
- ☐ When setting up a **company's cost codes**, it is a **good idea** to set them up in such a manner that makes it **easy to separate committed** from **noncommitted costs**.

Committed Cost Worksheet

	A	B	C	D	E	F	G	H	I	J	K	L
1									Total		Total	
2									Committed		Estimated	
3								Non-	and Non-	Estimated	Cost	Variance
4					Total		Committed	Committed	Committed	Cost	at	Over /
5			Original	Change	Estimate	Committed	Costs	Costs	Costs	To	Completion	(Under)
6	Code	Description	Estimate	Orders	(C + D)	Costs	Invoiced	Invoiced	(F + H)	Complete	(I + J)	(K - E)
7					—				—		—	—
8					—				—		—	—
9			—	—	—	—	—	—	—	—	—	—

Estimated cost at completion (EAC)

❑ **Noncommitted costs** typically include:

1. **Change orders** to the SCs (Added to both **Column D and H**)
2. **In-house costs** for GC (Added to **Column H**)
3. **Contracts with SCs** with **unknown costs** and based on invoices (Added to **Column H**)

❑ If noncommitted costs have **not been invoiced yet**

❖ **Not included** in the **non-committed costs invoiced**

But

❖ Included in **estimated cost to complete**

Committed Cost Worksheet

	A	B	C	D	E	F	G	H	I	J	K	L
1									Total		Total	
2									Committed		Estimated	
3								Non-	and Non-	Estimated	Cost	Variance
4					Total		Committed	Committed	Committed	Cost	at	Over /
5			Original	Change	Estimate	Committed	Costs	Costs	Costs	To	Completion	(Under)
6	Code	Description	Estimate	Orders	(C + D)	Costs	Invoiced	Invoiced	(F + H)	Complete	(I + J)	(K - E)
7					—				—		—	—
8					—				—		—	—
9			—	—	—	—	—	—	—	—	—	—

Estimated cost at completion (EAC)

❑ Cost to complete (ETC) is the **non-committed** costs that we **expect to incur** to **complete the project**

❖ **New estimate of remained cost** that **not committed yet**

- ✓ **Including** **change orders expected** for the **future**
- ✓ **Committed costs** should **not be included** because they **have already been included** in the worksheet.

Committed Cost Worksheet

	A	B	C	D	E	F	G	H	I	J	K	L
1									Total		Total	
2									Committed		Estimated	
3								Non-	and Non-	Estimated	Cost	Variance
4					Total		Committed	Committed	Committed	Cost	at	Over /
5			Original	Change	Estimate	Committed	Costs	Costs	Costs	To	Completion	(Under)
6	Code	Description	Estimate	Orders	(C + D)	Costs	Invoiced	Invoiced	(F + H)	Complete	(I + J)	(K - E)
7					—				—		—	—
8					—				—		—	—
9			—	—	—	—	—	—	—	—	—	—

Estimated cost at completion (EAC)

$$\square EAC (K) = \text{Committed costs (F)} + \text{Non-committed costs invoiced (H)} + ETC (J)$$

Committed Cost Worksheet

	A	B	C	D	E	F	G	H	I	J	K	L
1									Total		Total	
2									Committed		Estimated	
3								Non-	and Non-	Estimated	Cost	Variance
4					Total		Committed	Committed	Committed	Cost	at	Over /
5			Original	Change	Estimate	Committed	Costs	Costs	Costs	To	Completion	(Under)
6	Code	Description	Estimate	Orders	(C + D)	Costs	Invoiced	Invoiced	(F + H)	Complete	(I + J)	(K - E)
7					—				—		—	—
8					—				—		—	—
9			—	—	—	—	—	—	—	—	—	—

Estimated cost at completion – Example 1

- ❑ A contractor has signed a contract to pour the footing, foundation, and slab floor for a building. The **original estimate** for the **labor** to complete the **footing and foundation** was **\$8,400** and the contractor has **subcontracted** this work out for **\$8,560**. The **subcontractor** has **billed** the **contractor** for **\$2,700** for this work. **No additional cost** commitments are **expected** to be made for this line item.

- ❑ *No change orders expected for the future*

	A	B	C	D	E	F	G	H	I	J	K	L
1									Total		Total	
2									Committed		Estimated	
3								Non-	and Non-	Estimated	Cost	Variance
4					Total		Committed	Committed	Committed	Cost	at	Over /
5			Original	Change	Estimate	Committed	Costs	Costs	Costs	To	Completion	(Under)
6	Code	Description	Estimate	Orders	(C + D)	Costs	Invoiced	Invoiced	(F + H)	Complete	(I + J)	(K - E)
7	3300	Footing & Found.-Labor	8,400	—	8,400	8,560	2,700	—	8,560	—	8,560	160
8	3400	Footing & Found.-Conc.	9,270	—	9,270	—	—	3,960	3,960	5,310	9,270	—
9	3500	Slab/Floor-Labor	20,000	100	20,100	—	—	—	—	20,100	20,100	—
10	3600	Slab/Floor-Conc.	23,456	118	23,574	—	—	—	—	23,338	23,338	(236)
11			61,126	218	61,344	8,560	2,700	3,960	12,520	48,748	61,268	(76)

Estimated cost at completion – Example 1

- ❑ The **original estimate** for **concrete** to complete the footings and foundation is **\$9,270**, **no costs have been committed**, and the contractor has **received a bill for \$3,960**. The contractor estimates that it **will cost an additional \$5,310** to **purchase the remaining concrete** for the footings and foundations.

	A	B	C	D	E	F	G	H	I	J	K	L
1									Total		Total	
2									Committed		Estimated	
3								Non-	and Non-	Estimated	Cost	Variance
4					Total		Committed	Committed	Committed	Cost	at	Over /
5			Original	Change	Estimate	Committed	Costs	Costs	Costs	To	Completion	(Under)
6	Code	Description	Estimate	Orders	(C + D)	Costs	Invoiced	Invoiced	(F + H)	Complete	(I + J)	(K - E)
7	3300	Footing & Found.-Labor	8,400	—	8,400	8,560	2,700	—	8,560	—	8,560	160
8	3400	Footing & Found.-Conc.	9,270	—	9,270	—	—	3,960	3,960	5,310	9,270	—
9	3500	Slab/Floor-Labor	20,000	100	20,100	—	—	—	—	20,100	20,100	—
10	3600	Slab/Floor-Conc.	23,456	118	23,574	—	—	—	—	23,338	23,338	(236)
11			61,126	218	61,344	8,560	2,700	3,960	12,520	48,748	61,268	(76)

Estimated cost at completion – Example 1

- ❑ The **original estimate** for the labor to complete the **slab floor** is **\$20,000** and a **\$100 change order** has been approved for **additional work**. This work will be performed by **in-house crews**. The work **has yet to be performed** and the **contractor estimates** that the cost to complete the work **is \$20,100**.

	A	B	C	D	E	F	G	H	I	J	K	L
1									Total		Total	
2									Committed		Estimated	
3								Non-	and Non-	Estimated	Cost	Variance
4					Total		Committed	Committed	Committed	Cost	at	Over /
5			Original	Change	Estimate	Committed	Costs	Costs	Costs	To	Completion	(Under)
6	Code	Description	Estimate	Orders	(C + D)	Costs	Invoiced	Invoiced	(F + H)	Complete	(I + J)	(K - E)
7	3300	Footing & Found.-Labor	8,400	—	8,400	8,560	2,700	—	8,560	—	8,560	160
8	3400	Footing & Found.-Conc.	9,270	—	9,270	—	—	3,960	3,960	5,310	9,270	—
9	3500	Slab/Floor-Labor	20,000	100	20,100	—	—	—	—	20,100	20,100	—
10	3600	Slab/Floor-Conc.	23,456	118	23,574	—	—	—	—	23,338	23,338	(236)
11			61,126	218	61,344	8,560	2,700	3,960	12,520	48,748	61,268	(76)

Estimated cost at completion – Example 1

- ❑ The **original estimate** for the **concrete** to complete the **slab floor** is **\$23,456** and a **\$118 change order** has been **approved for additional work**. The work has yet to be performed, but the contractor has been given a **1% price discount** for the slab concrete from the supplier, which reduces the **estimated cost to complete** and ultimately **total estimated cost at completion** for this item by 1%.

	A	B	C	D	E	F	G	H	I	J	K	L
1									Total		Total	
2									Committed		Estimated	
3								Non-	and Non-	Estimated	Cost	Variance
4					Total		Committed	Committed	Committed	Cost	at	Over /
5			Original	Change	Estimate	Committed	Costs	Costs	Costs	To	Completion	(Under)
6	Code	Description	Estimate	Orders	(C + D)	Costs	Invoiced	Invoiced	(F + H)	Complete	(I + J)	(K - E)
7	3300	Footing & Found.-Labor	8,400	—	8,400	8,560	2,700	—	8,560	—	8,560	160
8	3400	Footing & Found.-Conc.	9,270	—	9,270	—	—	3,960	3,960	5,310	9,270	—
9	3500	Slab/Floor-Labor	20,000	100	20,100	—	—	—	—	20,100	20,100	—
10	3600	Slab/Floor-Conc.	23,456	118	23,574	—	—	—	—	23,338	23,338	(236)
11			61,126	218	61,344	8,560	2,700	3,960	12,520	48,748	61,268	(76)

Estimated cost at completion – Example 1

We see that the project has a projected cost savings of \$76

	A	B	C	D	E	F	G	H	I	J	K	L
1									Total		Total	
2									Committed		Estimated	
3								Non-	and Non-	Estimated	Cost	Variance
4					Total		Committed	Committed	Committed	Cost	at	Over /
5			Original	Change	Estimate	Committed	Costs	Costs	Costs	To	Completion	(Under)
6	Code	Description	Estimate	Orders	(C + D)	Costs	Invoiced	Invoiced	(F + H)	Complete	(I + J)	(K - E)
7	3300	Footing & Found.-Labor	8,400	—	8,400	8,560	2,700	—	8,560	—	8,560	160
8	3400	Footing & Found.-Conc.	9,270	—	9,270	—	—	3,960	3,960	5,310	9,270	—
9	3500	Slab/Floor-Labor	20,000	100	20,100	—	—	—	—	20,100	20,100	—
10	3600	Slab/Floor-Conc.	23,456	118	23,574	—	—	—	—	23,338	23,338	(236)
11			61,126	218	61,344	8,560	2,700	3,960	12,520	48,748	61,268	(76)

Underbillings and overbillings

- ❑ Construction costs resulted in a **reduction** in the current period net income and profit, **whereas** these **losses** were **not offset until** the owner was billed for the work on the project.

Examples:

- ❖ A **company** that is **recording** material, labor, and subcontractor costs **throughout the month** and **not billing the owner** until the **first week** of the **following month** will have an understated profit at the **end of the month** because the company is **underbilled**.
- ❖ **Contractors who front-load a project** (raise prices in the early part of the project and lower them in the later part) are **receiving payment early** in the job for work they have not yet completed (overbilled).

Underbillings and overbillings

To **adjust** for these situations and get an **accurate picture** of a **company's finances**, the **financial statements** must take into account **over- and underbillings**.

Underbillings and overbillings

How to perform this calculation?

- ❑ Underbillings and overbillings must be calculated for **each project** to prepare the **monthly** and **annual** balance sheets
- ❑ The **underbillings** are recorded as **costs and profits in excess of billings** (**Assets**)
- ❑ The **overbillings** are recorded as **billings in excess of costs and profit** (**Liabilities**)

Let's look at how we will do this!

Balance sheet – Liabilities

❑ Billings in Excess of Costs and Profits (Overbillings) (مبلغ مازاد پیمانها)

- ❖ May also be referred to as billings in excess of costs and estimated earnings
- ❖ Occur when the company bills more than the costs incurred + the estimated profits
- ❖ Not included for cash or accrual **accounting method**
- ❖ Billings in Excess of Costs for completed contract accounting method

LIABILITIES

Current Liabilities

Accounts Payable-Trade	325,458	228,585
Accounts Payable-Retention	22,546	18,254
Billings in Excess of Costs and Profits	5,218	11,562
Notes Payable	15,514	45,250
Accrued Payables	15,648	16,658
Accrued Taxes	10,521	8,254
Accrued Vacation	3,564	3,002
Capital Lease Payable	0	0
Warranty Reserves	0	0
Other Current Liabilities	25,438	35,648
Total Current Liabilities	423,907	367,213
Long-Term Liabilities	153,215	99,073
Total Liabilities	577,122	466,286

Balance sheet – Current Assets

❑ Costs and Profits in Excess of Billings (Underbillings) (مبلغ قابل بازیافت پیمانها)

- ❖ Occur when the company **bills less** than the **costs incurred + the estimated profits**
- ❖ If the **billings** are in **excess of the costs and estimated profits**, the difference is recorded as a **liability** under the **billings in excess of costs and profits category**.
- ❖ Not included for **cash** or **accrual** accounting method
- ❖ Item replaced by **Cost in Excess of Billings** for **completed contract accounting method**.

	Current Year	Last Year
ASSETS		
CURRENT ASSETS		
Cash	200,492	144,254
Accounts Receivable-Trade	402,854	308,253
Accounts Receivable-Retention	25,365	21,885
Inventory	0	0
Costs and Profits in Excess of Billings	32,586	15,234
Notes Receivable	12,548	0
Prepaid Expenses	5,621	4,825
Other Current Assets	11,254	7,225
Total Current Assets	690,720	501,676

Underbillings

- ☐ Costs and profits in excess of billings
- ☐ The project is underbilled
- ☐ We **may pay taxes** on profit even though it has not been paid by the owner
 - ❖ Because it shows **more progress for percentage of completion** (actual cost divided by total estimated cost)
- ☐ It is an asset to the company

Overbillings

- ☐ Billings in excess of costs and profit
- ☐ The project is overbilled
- ☐ We have billed for more profit that we have earned
- ☐ **Taxes may be deferred** on profit even though it has been paid
 - ❖ Because it shows **less progress for percentage of completion** (actual cost divided by total estimated cost)
- ☐ It is a liability to the company

Method of accounting – Percentage of completion

❑ How to estimate?

- ❖ Total cost to date = total cost of this period + cumulative cost of last period
- ➡ ❖ Total expected costs for the project = total cost to date + costs of remained work
- ❖ POC = total cost to date / total expected costs for the project
- ❖ Total expected revenue for the project = updated contract price
- ❖ Total estimated revenue to date = POC × total expected revenue for the project
- ➡ ❖ Estimated Profit to date = total estimated revenue to date – total cost to date
- ❖ Period Cost = total cost of this period
- ❖ Estimated Period Revenue = total estimated revenue to date – cumulative estimated revenue of last year
- ❖ **Estimated Period profit = Estimated Period Revenue – Period Cost**

Calculating underbillings and overbillings

- ☐ Should be done for **each project** usually at the end of **each year**
- ☐ Use the **same Job#** as used in Job Cost Ledger
- ☐ The Current Contract Amount should **include** all approved change orders
- ☐ Column D comes from **previous Excel Sheet** (Committed and Non-committed costs)
- ☐ The Actual Costs To Date should include all construction costs included in **Income Statement** for the project (look at next slide)
- ❖ **Unbilled committed costs** should **not be included** in these costs
- ☐ *Percentage of completion = Actual Costs to Date / Total Estimated Cost at Completion*

Work on Hand Worksheet

	A	B	C	D	E	F	G	H	I	J	K	L
1										Costs &	Billings in	
2				Total		Actual		Costs &		Profits in	Excess of	
3			Current	Estimated	Estimated	Costs	Earned	Earned		Excess of	Costs &	Percent
4	Job		Contract	Cost at	Profit	To	Profit	Profit	Total	Billings	Profits	Complete
5	#	Job Name	Amount	Completion	(C – D)	Date	(E × F / D)	(F + G)	Billed	(H – I)	(I – H)	(F × 100 / D)
6					—		—	—		—	—	—
7					—		—	—		—	—	—
8				—		—				—	—	



Income Statement

☐ Represents the **transactions**

☐ Includes:

❖ **Revenues**

❖ **Construction Costs**

❖ **Equipment Costs**

❖ **Overhead (General overhead)**

❖ **Other Income and Expense**

❖ **Income Tax**

☐ Like the balance sheet, multiple accounts on the income statement may be **combined** and **unneeded accounts left out**.

BIG W CONSTRUCTION INCOME STATEMENT		
REVENUES	3,698,945	100.0%
CONSTRUCTION COSTS		
Materials	712,564	19.3%
Labor	896,514	24.2%
Subcontract	1,452,352	39.3%
Equipment	119,575	3.2%
Other	5,452	0.1%
Total Construction Costs	3,186,457	86.1%
EQUIPMENT COSTS		
Rent and Lease Payments	35,425	1.0%
Depreciation	32,397	0.9%
Repairs and Maintenance	21,254	0.6%
Fuel and Lubrication	29,245	0.8%
Taxes, Licenses, and Insurance	1,254	0.0%
Equipment Costs Charged to Jobs	119,575	3.2%
Equipment Costs Charged to Employees	0	0.0%
Total Equipment Costs	0	0.0%
GROSS PROFIT	512,488	13.9%
OVERHEAD	422,562	11.4%
NET PROFIT FROM OPERATIONS	89,926	2.4%
OTHER INCOME AND EXPENSE	21,521	0.6%
PROFIT BEFORE TAXES	111,447	3.0%
INCOME TAX	33,434	0.9%
PROFIT AFTER TAXES	78,013	2.1%

Underbillings and overbillings – Example 2

❑ Determine over- and underbillings for a company with the following information:

❑ **Job Number: 301**

- Job Name: Henderson Remodel
- Current Contract Amount: \$122,500
- Total Estimate Cost at Completion: \$101,256 (**Previous Excel Sheet**)
- Actual Costs to Date: \$95,265 (**Income Statement – Unbilled committed not included**)
- Total Billed: \$110,687 (**Accounts Receivable in Assets for each project**)

❑ **Job Number: 302**

- Job Name: Weston Offices
- Current Contract Amount: \$25,265
- Total Estimate Cost at Completion: \$18,000
- Actual Costs to Date: \$11,542
- Total Billed: \$17,253

❑ **Job Number: 303**

- Job Name: Johnson Warehouse
- Current Contract Amount: \$255,202
- Total Estimate Cost at Completion: \$229,564
- Actual Costs to Date: \$35,264
- Total Billed: \$41,200

Underbillings and overbillings – Example 2

❑ First project

- Job Number: 301
- Job Name: Henderson Remodel
- Current Contract Amount: \$122,500
- Total Estimate Cost at Completion: \$101,256
- Actual Costs to Date: \$95,265
- Total Billed: \$110,687

	A	B	C	D	E	F	G	H	I	J	K	L
1										Costs &	Billings in	
2				Total		Actual		Costs &		Profits in	Excess of	
3			Current	Estimated	Estimated	Costs	Earned	Earned		Excess of	Costs &	Percentage
4	Job		Contract	Cost at	Profit	To	Profit	Profit	Total	Billings	Profits	Complete
5	#	Job Name	Amount	Completion	(C – D)	Date	(E × F / D)	(F + G)	Billed	(H – I)	(I – H)	(F × 100 / D)
6	301	Henderson Remodel	122,500	101,256	21,244	95,265	19,987	115,252	110,687	4,565	—	94
	302	Weston Offices	25,265	18,000	7,265	11,542	4,658	16,200	17,253	—	1,053	64
7	303	Johnson Warehouse	255,202	229,564	25,638	35,264	3,938	39,202	41,200	—	1,998	15
8				348,820		142,071				4,565	3,050	

Underbillings and overbillings – Example 2

❑ Second project

- Job Number: 302
- Job Name: Weston Offices
- Current Contract Amount: \$25,265
- Total Estimate Cost at Completion: \$18,000
- Actual Costs to Date: \$11,542
- Total Billed: \$17,253

	A	B	C	D	E	F	G	H	I	J	K	L
1										Costs &	Billings in	
2				Total		Actual		Costs &		Profits in	Excess of	
3			Current	Estimated	Estimated	Costs	Earned	Earned		Excess of	Costs &	Percentage
4	Job		Contract	Cost at	Profit	To	Profit	Profit	Total	Billings	Profits	Complete
5	#	Job Name	Amount	Completion	(C – D)	Date	(E × F / D)	(F + G)	Billed	(H – I)	(I – H)	(F × 100 / D)
6	301	Henderson Remodel	122,500	101,256	21,244	95,265	19,987	115,252	110,687	4,565	—	94
	302	Weston Offices	25,265	18,000	7,265	11,542	4,658	16,200	17,253	—	1,053	64
7	303	Johnson Warehouse	255,202	229,564	25,638	35,264	3,938	39,202	41,200	—	1,998	15
8				348,820		142,071				4,565	3,050	

Underbillings and overbillings – Example 2

❑ Third project

- Job Number: 303
- Job Name: Johnson Warehouse
- Current Contract Amount: \$255,202
- Total Estimate Cost at Completion: \$229,564
- Actual Costs to Date: \$35,264
- Total Billed: \$41,200

	A	B	C	D	E	F	G	H	I	J	K	L
1										Costs &	Billings in	
2				Total		Actual		Costs &		Profits in	Excess of	
3			Current	Estimated	Estimated	Costs	Earned	Earned		Excess of	Costs &	Percentage
4	Job		Contract	Cost at	Profit	To	Profit	Profit	Total	Billings	Profits	Complete
5	#	Job Name	Amount	Completion	(C – D)	Date	(E × F / D)	(F + G)	Billed	(H – I)	(I – H)	(F × 100 / D)
6	301	Henderson Remodel	122,500	101,256	21,244	95,265	19,987	115,252	110,687	4,565	—	94
	302	Weston Offices	25,265	18,000	7,265	11,542	4,658	16,200	17,253	—	1,053	64
7	303	Johnson Warehouse	255,202	229,564	25,638	35,264	3,938	39,202	41,200	—	1,998	15
8				348,820		142,071				4,565	3,050	



Accrual accounting – Example 3

- ❑ Let's suppose that you just started a construction management company, and obtained your **first job**, which **begins** midway through **July** and will be **complete** in the **middle of September**. On this job, you provided the **management of the project**, **taking the profit** from the job as **payment for your services in lieu of wages**, and **hire subcontractors** to perform **all of the work**. In accordance with the contract, **you bill the owner** for the **entire contract amount of \$70,000** at the **completion of the job**. The **monthly subcontractor bills** for **July** are **\$13,000**, for **August \$30,000**, and for **September \$17,000**.

Balance Sheet		Income Statement	
Cash	100,000	Revenues	0
Accounts Receivable	0	Construction Costs	0
Total Assets	100,000	Profit	0
Accounts Payable	0		
Total Liabilities	0		
Equity	100,000		

July 1st Balance Sheet and Income Statement

Accrual accounting – Example 3

- ☐ If the **company were to use** the **accrual accounting method**, which **does not use** **over-** and **underbillings**.
- ☐ The **monthly subcontractor bills** for **July** are **\$13,000**

Balance Sheet		Income Statement	
Cash	100,000	Revenues	0
Accounts Receivable	0	Construction Costs	13,000
Total Assets	100,000	Profit	(13,000)
Accounts Payable	13,000		
Total Liabilities	13,000		
Equity	87,000		

August 1st Accrual Balance Sheet and Income Statement

Accrual accounting – Example 3

- ❑ During August, the company would pay the expenses from the previous month and recognize another \$30,000 in expenses.

Balance Sheet		Income Statement	
Cash	87,000	Revenues	0
Accounts Receivable	0	Construction Costs	43,000
Total Assets	87,000	Profit	(43,000)
Accounts Payable	30,000		
Total Liabilities	30,000		
Equity	57,000		

September 1st Accrual Balance Sheet and
Income Statement

Accrual accounting – Example 3

❑ During September, the company would pay the expenses from the previous month, recognize another \$17,000 in expenses and bill the owner \$70,000 for the project.

- ❑ What is next when SC is paid? **Cash = \$40,000 and Accounts Payable = 0**
- ❑ What is next when GC is paid? **Cash = \$110,000 and Accounts Receivable = 0**
- ❖ Remember that *Assets = Liabilities + Equity*

Balance Sheet		Income Statement	
Cash	57,000	Revenues	70,000
Accounts Receivable	70,000	Construction Costs	60,000
Total Assets	127,000	Profit	10,000
Accounts Payable	17,000		
Total Liabilities	17,000		
Equity	110,000		

October 1st Accrual Balance Sheet and Income Statement

Percentage-of-completion accounting vs. accrual – Example 4

- ❑ If the company were to use the **percentage-of-completion accounting method**, which uses **over- and underbillings**, at the **end of July** the project is **21.667%** ($\$13,000/\$60,000$) **complete** and the company would **record \$13,000 of expenses**, **costs and profits in excess of billings** of \$15,167, and **revenues of \$15,167** ($0.21667 \times \$70,000$).

Balance Sheet		Income Statement	
Cash	100,000	Revenues	15,167
Accounts Receivable	0	Construction Costs	13,000
Costs and Profits in Excess of Billings	15,167	Profit	2,167
Total Assets	115,167		
Accounts Payable	13,000		
Total Liabilities	13,000		
Equity	102,167		

August 1st Percentage-of-Completion Balance Sheet and Income Statement

Balance Sheet		Income Statement	
Cash	100,000	Revenues	0
Accounts Receivable	0	Construction Costs	13,000
Total Assets	100,000	Profit	(13,000)
Accounts Payable	13,000		
Total Liabilities	13,000		
Equity	87,000		

August 1st Accrual Balance Sheet and Income Statement

Percentage-of-completion accounting vs. accrual – Example 4

- ❑ During August, the company would pay the expenses from the previous month and record another \$30,000 in expenses, **costs and profits in excess of billings of \$35,000**, and **revenues of \$35,000**, bringing the total costs and profits in excess of billings to \$50,167 (\$35,000 + \$15,167) or $(\$13,000 + \$30,000) / \$60,000 * \$70,000$

Balance Sheet		Income Statement	
Cash	87,000	Revenues	50,167
Accounts Receivable	0	Construction Costs	43,000
Costs and Profits in Excess of Billings	50,167	Profit	7,167
Total Assets	137,167		
Accounts Payable	30,000		
Total Liabilities	30,000		
Equity	107,167		

September 1st Percentage-of-Completion Balance Sheet and Income Statement

Balance Sheet		Income Statement	
Cash	87,000	Revenues	0
Accounts Receivable	0	Construction Costs	43,000
Total Assets	87,000	Profit	(43,000)
Accounts Payable	30,000		
Total Liabilities	30,000		
Equity	57,000		

September 1st Accrual Balance Sheet and Income Statement

Percentage-of-completion accounting vs. accrual – Example 4

- ❑ During September, the company would pay the expenses from the previous month, recognize another \$17,000 in expenses, **bill the owner \$70,000** for the project, and **reduce** the costs and profits in excess of billings by **\$50,167**, **because** the company is **no longer underbilled**.
- ❑ What is next when SC is paid? **Cash = \$40,000 and Accounts Payable = 0**
- ❑ What is next when GC is paid? **Cash = \$110,000 and Accounts Receivable = 0**
- ❖ Remember that *Assets = Liabilities + Equity*

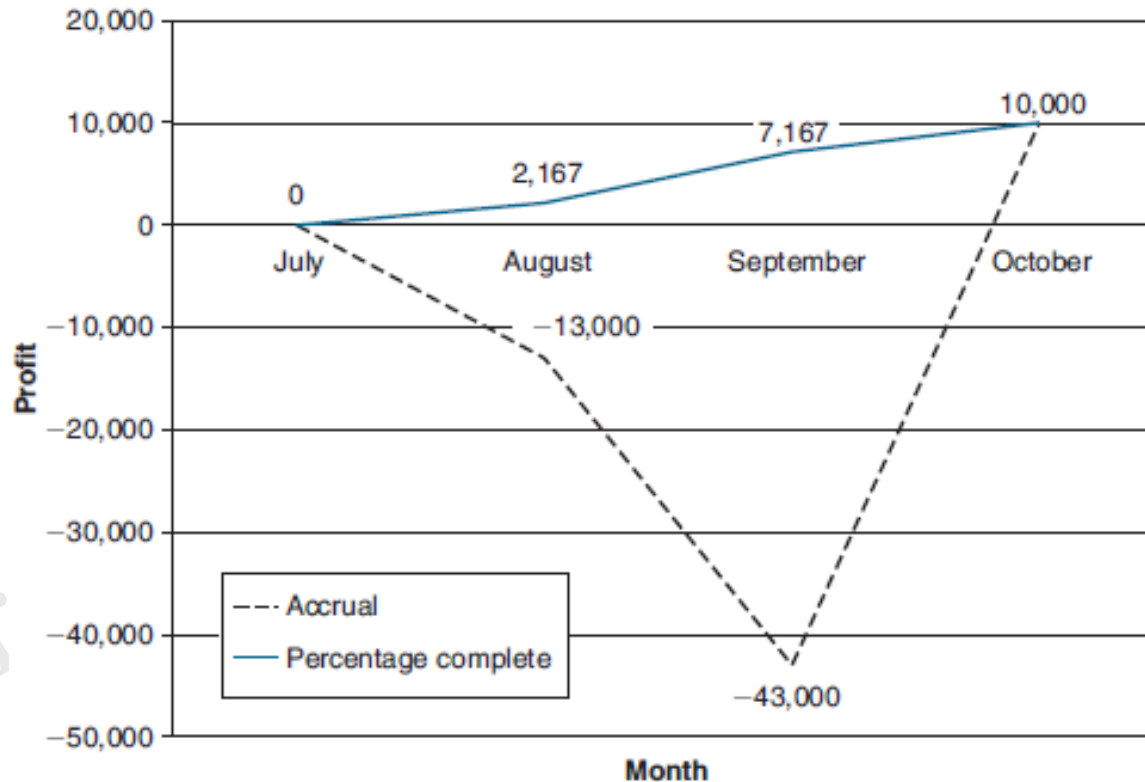
Balance Sheet		Income Statement	
Cash	57,000	Revenues	70,000
Accounts Receivable	70,000	Construction Costs	60,000
Costs and Profits in Excess of Billings	0	Profit	10,000
Total Assets	127,000		
Accounts Payable	17,000		
Total Liabilities	17,000		
Equity	110,000		

October 1st Percentage-of-Completion
Balance Sheet and Income Statement

Balance Sheet		Income Statement	
Cash	57,000	Revenues	70,000
Accounts Receivable	70,000	Construction Costs	60,000
Total Assets	127,000	Profit	10,000
Accounts Payable	17,000		
Total Liabilities	17,000		
Equity	110,000		

October 1st Accrual Balance Sheet and Income
Statement

Percentage-of-completion accounting vs. accrual – Example 4



Difference between accrual and percentage-of-completion accounting

From this example, we can see that although **both methods** arrive at the **same balance sheet and income statement** at the end of the job, the percent complete method gives us a **more accurate picture** of the **profit and loss** on a project during its construction.

Internal controls

❑ Why?

- ❖ Internal theft
- ❖ Take advantage (misappropriation) of financial resources

Each year, **many companies** run into **financial difficulties**—some even ending up in **bankruptcy**—because a trusted employee is **stealing** from the **company** or misappropriating **financial resources**.

Internal controls

❑ Important keys:

1. Separation of duties
2. Proper paper trail
3. Review by owner or manager
4. Track all assets
5. Keep accounting current
6. Limit access

Internal controls – Separation of duties

- ❑ **Say over \$100**—requires the collaboration of two or more of the company's employees
- ❑ **Activities** such as purchase approval, receiving, check preparation, and check signing should be done by **separate persons**
- ❑ It is common to **allow the superintendent** to approve purchase orders to some limit—say \$100
- ❑ **Procedures** should be established to **identify each employee's duties** and what **authority** he or she has to approve purchases, disbursements, and other critical transactions



Internal controls – Proper paper trail

- ❑ Make it difficult to hide a theft by not documenting transactions or by destroying the paper trail
- ❑ All checks issued by the company should be **backed up** by the **proper documentation**
- ❑ Standard document processing procedures should be developed and followed for things such as **receiving payments** and **issuing credits**
 - ❖ This should not be delegated to **out-of-house accounting firms**

Internal controls – Review by owner or manager

- ☐ The owner, manager, or other appropriate person should review the transactions and modifications performed by the **accounting staff** as well as **other cash receipts** and **disbursement procedures**
- ☐ The owner, manager, or other appropriate person should hand-deliver payroll checks to all employees, at least annually

Internal controls – Track all assets

- ❑ All assets should be tracked and accounted for

Internal controls – Consistently perform all accounting functions

❑ Regularly and consistently perform all accounting functions, include:

- ❖ The **processing** of **invoices, checks, bills**, and **so forth**;
- ❖ The **balancing** of the **accounts**; and
- ❖ The **review** of the **accounting system**

Internal controls – Limit access

- ☐ Limit access to accounting information and documentation to **those who need** it to perform **their job functions**
- ☐ The **access** will be **different** for **each employee**
- ☐ **Similar controls** should be applied to **all employees**.

Computerized accounting systems

- ❑ Systems for **project accounting** are often **sold** in **modules or pieces**.
 - ❖ Because **not all** contractors will need **all of the modules**.
- ❑ Before **selecting** a **software package**, you need to decide **what features** your company **needs** in the **accounting package** and **what features** it can do without.
- ❑ Companies with **limited inventories** may find that it takes **more time to implement** and **maintain an inventory module** **than** it would take to track the **inventory** manually outside the accounting system.

Computerized accounting systems

GENERAL

- System is cloud based
- Easily backup to the cloud
- Has easy to use menus
- Provides standard workflow processes
- Exports data via xml, csv, and Excel
- Includes easy to use reporting features
- Allows reports to be accessed via the Internet, tablet, or smartphone

GENERAL LEDGER

- Allows for the customization of the general ledger accounts
- Allows for the customization of financial statements
- Allows the user to save multiple formats for the financial statements with different levels of detail
- Allows for the tracking of multiple companies
- Fully integrated with accounts receivable, accounts payable, payroll, job cost, equipment, inventory, and purchase orders
- Posts to multiple periods
- Provides standard balancing and monthly/yearly close-out procedures

ACCOUNTS RECEIVABLE

- Generates billings using standard AIA forms and the company's own custom invoices
- Generates time and materials billings
- Time and materials billings are integrated with job cost and inventory to prevent not billing items or the double billing of items
- Allows for the billing of labor at fixed labor rates or actual labor cost plus markup when preparing time and materials billings
- Allows for different cost types to be marked up at different rates when preparing time and materials billings
- Prepares unit prices bills
- Calculates finance charges for late bills
- Reports age of accounts receivable
- Tracks retention
- Tracks income by project, phase, and/or cost code
- Tracks sales and use taxes
- Posts invoices to multiple periods
- Posts directly to the general ledger, job cost ledger, and equipment ledger

Computerized accounting systems

ACCOUNTS PAYABLE

- Allows the user to set up new vendors while entering invoices
- Warns the user if the invoice exceeds the contract or purchase order amount
- Allows for holds to be placed on invoices and for invoices to be partially paid
- Allows user to select invoices to be paid by job, vendor, due date, discount date, suppliers only, subcontractors only, or a combination of these
- Tracks contract amount, change orders, billings, and payments for subcontracts
- Tracks license and workers' compensation insurance expiration dates for subcontractors
- Automatically withholds workers' compensation insurance and retention from subcontractor's invoices
- Tracks sales and use taxes
- Posts invoices to multiple periods
- Posts directly to the general ledger, job cost ledger, and equipment ledger
- Integrated with purchase order and inventory modules
- Includes procedures for reconciling outstanding checks
- Produces 1099s

PAYROLL

- Allows different pay rates for private work, union work, and prevailing wage (Davis-Bacon) work
- Allows an employee to be paid different rates for performing work in different work classes
- Allows an employee to work in different states during a pay period and prepares withholding and state unemployment insurance for each state
- Allows different workers' compensation and liability insurance rates to be paid for an employee during a pay period based on the state and class of work the employee performed
- Allows for customized deductions to be deducted from the employee's check and custom fringe benefits to be added to the labor burden
- Prepares certified payroll and union reports
- Prepares the payroll checks with detailed check stubs, including hours worked at the different pay rates
- Prepares federal and state unemployment reports
- Prepares W2s
- Tracks vacation accrued for each employee
- Maintains employee information, such as social security number, driver license number, birthday, and other customized fields
- Automatically posts payroll and burden to the job cost module, equipment module, and the general ledger
- Allows for the billing of equipment from the payroll module; for example, the superintendent's truck can be billed at the same time as the superintendent is billed
- Allows employees' time to be entered via the Internet, tablet, or smartphone

Computerized accounting systems

JOB COST

- Allows for the customization of the job cost codes
- Allows the user to duplicate job cost coding structure and/or budgets from existing jobs to new jobs, thus decreasing job setup time
- Tracks original contract amount, change orders to the contract, current contract amount, and income by project, phase, and/or cost code
- Tracks and reports original budget, change orders to the budget, and current budget by job, phase, cost code, and cost type
- Reports over and under variances by comparing the current job costs to the current budget
- Tracks unit pricing for individual cost codes
- Budgets and tracks labor units (e.g., hours) and production rates (e.g., hours per square foot)
- Reports over and under variances for labor units by comparing the current labor units to the current budget for labor units
- Reports over and under variances for production rates by comparing the current production rates to the current budget production rates
- Reports burden costs separately
- Reports overtime costs separately
- Allows for job cost reports to be customized
- Tracks unbilled committed costs
- Automatically receives data from accounts receivable, accounts payable, payroll, equipment, inventory, and purchase order modules
- Provides standard balancing procedures to balance the job cost ledger against the general ledger

Computerized accounting systems

EQUIPMENT

- Allows for the customization of the equipment cost codes
- Allows for different billing rates for different types of jobs
- Tracks profits and losses for each piece of equipment
- Tracks ownership and operation costs separately
- Automatically receives data from accounts payable, payroll, inventory, and purchase order modules
- Equipment can be billed from the payroll module to the job at the same time the operator is billed to the job
- Tracks license and insurance information for each piece of equipment
- Tracks and maintains service schedules for each piece of equipment based on mileage or hours of use
- Allows for equipment reports to be customized
- Provides standard balancing procedures to balance the equipment ledger against the general ledger
- Allows equipment time to be entered via the Internet, tablet, or smartphone
- Integrates with equipment management and tracking software

INVENTORY

- Allows materials to be moved from inventory to the job, from one job to another job, or from the job back to inventory (for unused materials)
- Allows items bought in bulk to be broken up into smaller units for billing purposes
- Allows for tracking inventory locations
- Allows for multiple levels of pricing for different customer classes
- Tracks inventory on an order that has not been received
- Integrated with time and materials billings
- Posts to job cost module, equipment module, and the general ledger
- Reports profit or loss on inventory
- Allows for the balancing of actual inventory quantities against reported inventory quantities

Computerized accounting systems

PURCHASE ORDERS

- Includes quantity, description, and unit/total price for each item on the purchase order
- Allows for lump sum pricing
- Includes sales tax, delivery charges, and other costs
- Allows for a purchase order to be divided between multiple projects
- Integrated with accounts payable, accounts receivable, job cost, and inventory

Selecting a project accounting systems

❑ When **looking** at an **accounting system**, one should take the **following** into account:

❖ **Reliability**

- ✓ A company should look for an accounting package with a **performance history without a lot of problems** and that is **virtually bug free**.

❖ **Cost**

1. Purchase price of the software,
2. Cost of training and support,
3. Cost of software upgrades, and
4. Setup costs.

❖ **Training and support**

- ✓ Good training and technical support come at a price and it is **not a good idea to cut corners in these areas**.

Selecting a project accounting systems

❑ When looking at an accounting system, one should take the following into account:

❖ Ease of use

- ✓ The **easier** and more **natural an accounting package** is to use, the easier it will be to implement.

❖ System protection

- ✓ The system should have **multiple levels of password protection**. Management personnel should be able to access the system and generate reports for their projects, without being able to access other projects or make changes in the accounting system.

❖ Integration

- ✓ The **modules** should be **integrated** in such a way that they do **not require items** to be **entered separately** in **different modules**.

Selecting a project accounting systems

❑ When looking at an accounting system, one should take the following into account:

❖ Backup and recover procedures

- ✓ The systems should allow for **easy backup** and **recovery** in the **event of a loss of data** due to **virus**, **hardware failure**, or **another unexpected event**.

❖ Customization

- ✓ The software should allow the user to create custom reports without having the **software vendor modify the program**.



مدیریت مالی، حسابداری و هزینه در پروژه ها و سازمان های پروژه محور

بخش ششم:

مدیریت حسابداری: محاسبه مالیات و استهلاک در پروژه

ارائه دهنده:

سید محمدرضا علوی پور

(PhD, PMP, CMIT)

What you will learn?

- ☐ Purpose of this session
- ☐ Purpose of depreciation
- ☐ Commonly used methods
- ☐ Straight line method
- ☐ Straight line method – example
- ☐ Sum of the years method
- ☐ Sum of the years method – example
- ☐ Declining balance method
- ☐ Declining balance method – example
- ☐ Comparison of depreciation methods
- ☐ Selling an asset
- ☐ Depreciation for nontax purposes
- ☐ Income tax
- ☐ Taxable income
- ☐ Taxable income – example
- ☐ Tax consequences of depreciation
- ☐ Tax consequences of depreciation - example

Purposes of the this session

- ❑ Learn the **differences** among the **methods** available for **depreciating construction assets**, including the **methods** used for **tax purposes**
- ❑ **Covers** the **basic principles** of **income tax**.
 - ❖ The **purpose** of this **Section** is to give you a **basic understanding** of the **principles of income tax**, **not turn** you into a **tax professional**

Purposes of depreciation

❑ For the **owners of depreciable assets**, such as **equipment** and **buildings**, it is important to **estimate the depreciation** of the assets for **four reasons**:

1. Financial statements

❖ The **company's managers** must accurately determine the **value of the company's assets** for **economic analysis**.

2. Cost allocation of equipment

❖ The **cost of owning** of equipment should be **calculated annually** for **economic analysis of equipment**.

3. Project cost determination

4. Taxes

Commonly used methods

1. Straight line method (SL) (روش خط مستقیم یا اقساط مساوی استهلاک)
2. Sum of the years method (SOY) (روش مجموع سنوات)
3. Declining balance method (روش نزولی یا شتابزده استهلاک)
4. MACRS (Modified Accelerated Cost Recovery System)

❑ جدول استهلاکات مالیاتی موضوع ماده ۱۴۹ اصلاحی قانون مالیاتی مستقیم مصوب ۹۴/۰۴/۳۱ (سال و روش برای هر دارایی)

❑ روش اول و سوم در ایران قابل استفاده بوده و روش دوم مرسوم نیست.

❑ روش چهارم؟

❑ هم **سال** و هم **روش** در این جداول برای **هر دارایی** مشخص شده است.

Commonly used methods

❑ Each of these depreciation methods uses the following variables:

- ❖ P = Purchase price
- ❖ F = Salvage Value
- ❖ N = Recovery period (years)
 - ✓ Set by code for tax purposes
- ❖ R_m = Percentage of depreciation taken in year m
- ❖ D_m = Depreciation for year m
- ❖ BV_m = Book value at the end of year m
 - ✓ Book value equals the purchase price less the depreciation recorded to date

Straight line method (SL)

❑ Depreciates **uniformly** over the life of the asset

❑ **Annual depreciation rate**

❖ $R_m = 1 / N$

✓ R_m = Percentage of depreciation taken in year m

✓ N = Recovery period (years)

❑ **Annual depreciation**

❖ $D_m = (P - F) / N$

✓ D_m = Depreciation for year m

✓ P = Purchase price

✓ F = Salvage Value

❑ **Book Value**

❖ $BV_m = P - m (D_m)$ -or- $BV_m = BV_{m-1} - D_m$

Straight line method (SL) – Example

- ❑ A dump truck is **purchased for \$110,000** and has an **estimated salvage value** of **\$10,000** at the end of the recovery period. Prepare a depreciation schedule for the dump truck using the **straight-line method** with a **recovery period of five years**.

m	R_m	D_m (\$)	BV_m (\$)
0			110,000
1	1/5	20,000	90,000
2	1/5	20,000	70,000
3	1/5	20,000	50,000
4	1/5	20,000	30,000
5	1/5	20,000	10,000

Sum of the years method (SOY)

❑ The sum-of-the-years (SOY) method is used to **accelerate the depreciation** of an asset.

❑ **Annual depreciation**

$$\diamond SOY = N(N + 1) / 2$$

$$\diamond R_m = (N - m + 1) / SOY$$

$$\diamond D_m = (P - F) R_m$$

❑ **Book Value**

$$\diamond BV_m = BV_{m-1} - D_m$$

Sum of the years method (SOY) – Example

- ❑ A dump truck is purchased for \$110,000 and has an estimated salvage value of \$10,000 at the end of the recovery period. Prepare a depreciation schedule for the dump truck using the **sum-of-the-years method** with a recovery period of **five years**.

m	R_m	D_m (\$)	BV_m (\$)
0		0	110,000
1	5/15	33,333	76,667
2	4/15	26,667	50,000
3	3/15	20,000	30,000
4	2/15	13,333	16,667
5	1/15	6,667	10,000

Declining balance method

❑ Accelerates depreciation

- ❖ Double Declining Balance (in Iran)
- ❖ Standard Declining Balance

❑ Annual depreciation

- ❖ $D_m = (BV_{m-1})R_m$
 - ✓ $R_m = 2.00 / N$ for 200% declining-balance
 - ✓ $R_m = 1.50 / N$ for 150% declining-balance
 - ✓ In **Iran** R_m is predefined and should be used accordingly.

❑ Book value

- ❖ $BV_m = BV_{m-1} - D_m$

Declining balance method

❑ Does not automatically reach salvage value

1. **Must stop depreciation** at salvage value when

1. **Any year** when *Book value* < *salvage value*

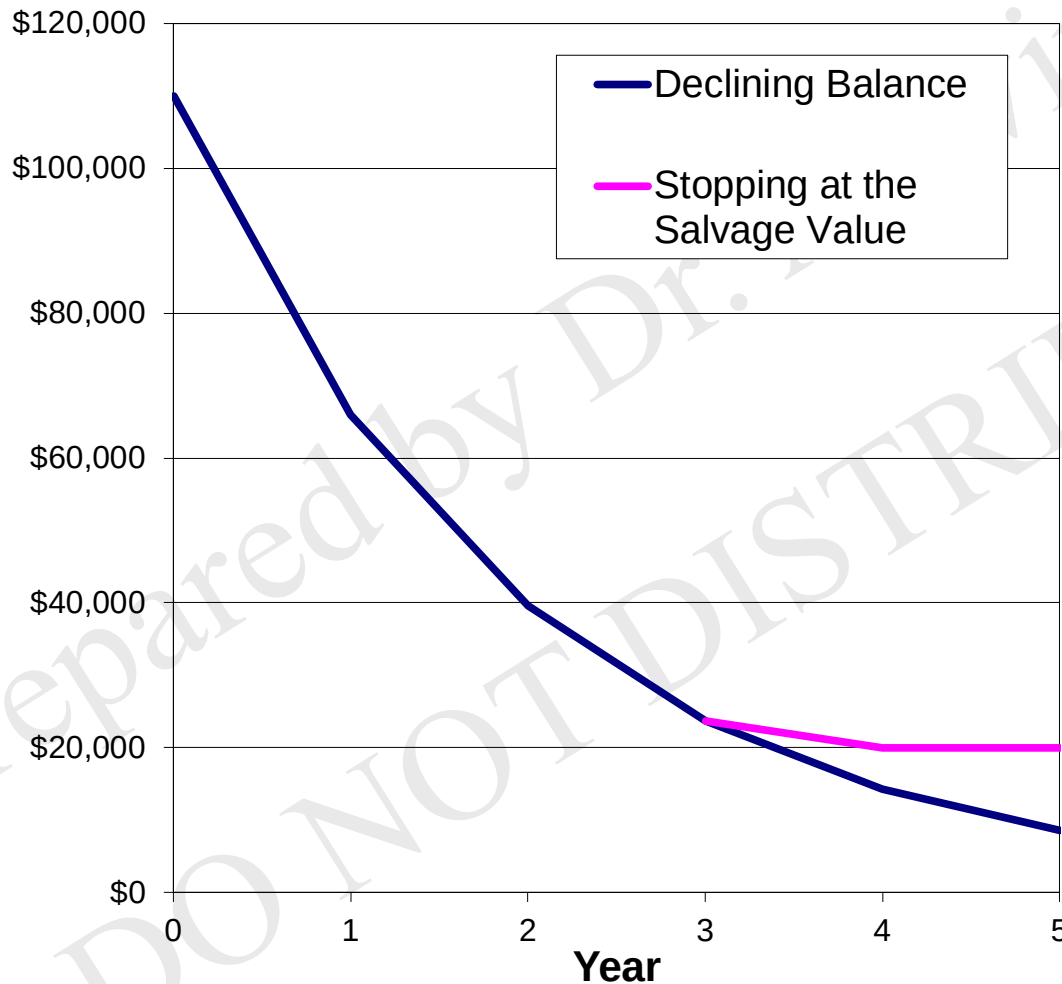
2. If in the **last year** *Book value* > *salvage value*

- OR -

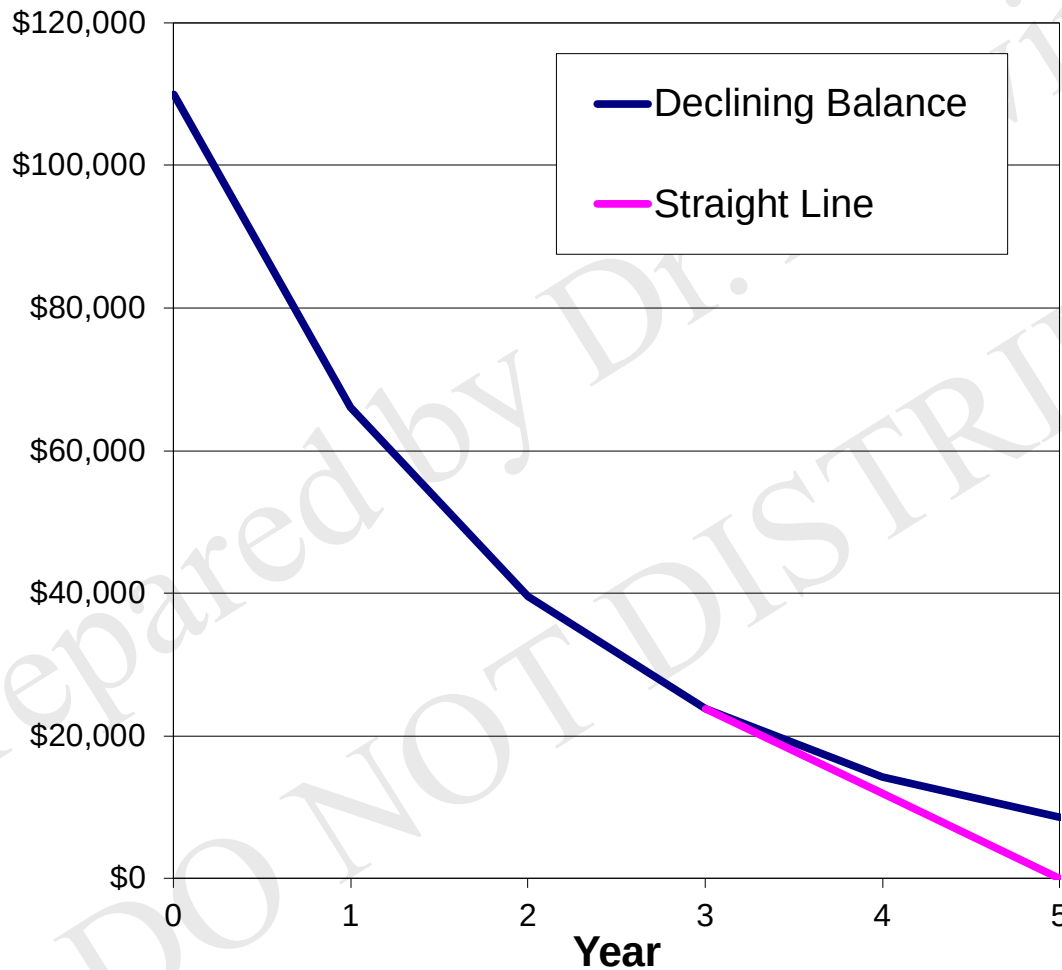
2. Must **switch to straight line depreciation** when

❖ *Depreciation of SL for the remaining years > declining-balance depreciation*

Declining balance method – Stopping at salvage value (\$20,000)



Declining balance method – Switching to straight line (SV = 0)

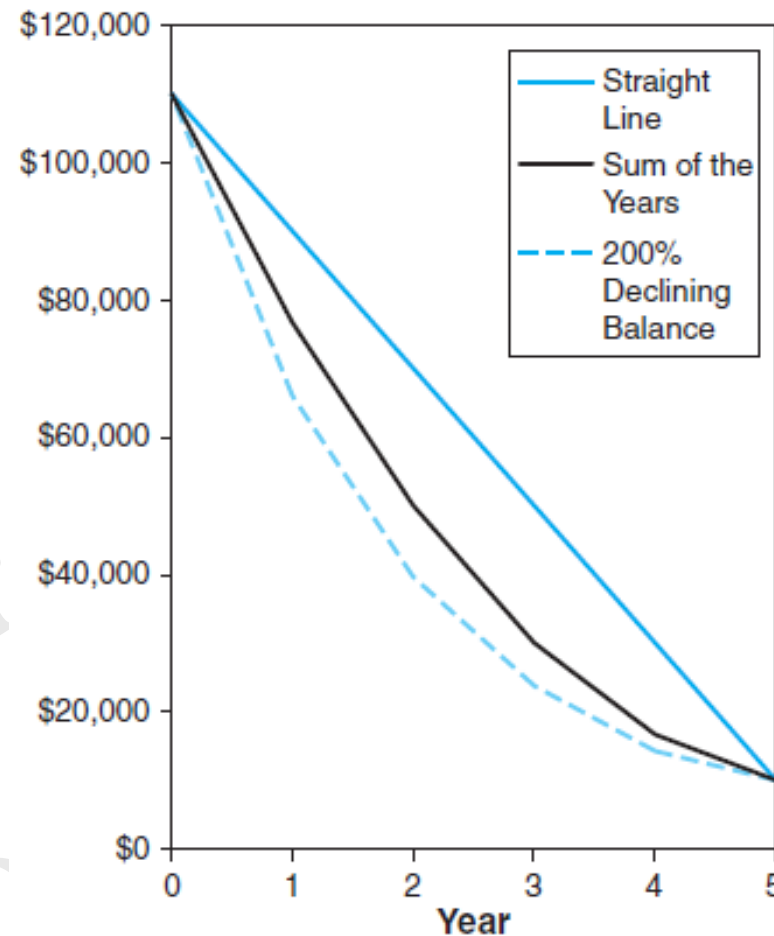


Declining balance method – Example

- ❑ A dump truck is purchased for **\$110,000** and has an **estimated salvage value** of **\$10,000** at the end of the recovery period. Prepare a depreciation schedule for the dump truck using the **200% declining-balance** method with a recovery period of **five years**.

m	R_m	D_m (\$)	BV_m (\$)
0		0	110,000
1	0.40	44,000	66,000
2	0.40	26,400	39,600
3	0.40	15,840	23,760
4	0.40	9,504	14,256
5	0.40	4,256	10,000

Comparison of depreciation methods – Book value



Comparison of Depreciation Methods

Selling an asset

❑ When an asset is **sold** for **more or less** than its **book value** that was **used for tax purposes**, an **adjustment must be made** **during** the **tax year** the **asset is disposed of**.

1. Less than book value

❖ If an *asset is sold < its book value*,

- ✓ The **difference** between the sales price and the book value is **recorded** as a **loss on the sale of an asset**.

2. More than book value

❖ If the *asset is sold > its book value*,

- ✓ The difference between the sales price and the book value is **recorded** as a **gain on the sale of an asset**.

Sale of equipment

❑ We should have sold for \$57,600 (\$120,000 - \$62,400), Profit = \$2,400

BALANCE SHEET		INCOME STATEMENT		EQUIPMENT
ASSETS	LIABILITIES	EXPENSES	REVENUES	EXPENSES
110 Cash 60,000.00			910 Other Income 2,400.00	
220 Construction Equipment (120,000.00)				
	EQUITY			
250 Less Acc. Depreciation (62,400.00)	430 Current Period Net Income 2,400.00	PROFIT 2,400.00		
2,400.00 =	2,400.00	2,400.00 =	2,400.00	

Because 250 Less Acc. Depreciation is a contra account, it is subtracted rather than added when totaling the column.

Depreciation for nontax purposes

❑ Depreciation may be calculated **differently** for financial statements and for use in the billing of equipment than the depreciation calculated for tax purposes. The calculations **may differ** for any of the following reasons:

1. A different depreciation method is being used.
2. A different recovery period is being used.
3. The salvage value has been included in the calculations.
4. The asset is exempt from depreciation **under law** but is **depreciated** for **other purposes**.
5. Special depreciation allowances are available for **tax purposes**, which allow even faster depreciation of an asset than is used for **financial purposes**.

Income tax

❑ Corporate income tax (مالیات بر درآمد اشخاص حقوقی)

❖ Pays at:

- ✓ Corporate level
- ✓ Personal level on dividends

❑ Personal income tax (مالیات بر درآمد اشخاص حقیقی)

- ❖ Income tax passes through the company to the individual

Taxable income

- ☐ ***Taxable income = income – tax deductions (such as expenses, interest, depreciation)***
- ☐ **Not all** cost are **tax deductible**
- ☐ **Unused (unallowed) losses** may be **carried forward**

Taxable income - Example

- ❑ A construction company is set up as a C corporation. The net income/loss for the first five years of the company's existence **before carrying back or forward** any losses—are as follows: **year 1**, -\$10,000; **year 2**, -\$25,000; year 3, \$20,000; **year 4**, **\$30,000**; and **year 5**, \$35,000.

What is the **taxable income** for the corporation after carrying back or carrying forward any losses for the years?

Taxable income - Example

❑ **Solution:** Because the **losses** occur in the **first two years of the company's existence**, the **losses cannot be carried back** and **must be carried forward** until there is a net income to offset the losses.

❖ **Year 1, -\$10,000; year 2, -\$25,000; year 3, \$20,000; year 4, \$30,000; and year 5, \$35,000.**

- ✓ First year, its tax liability is **zero** (- \$10,000 loss).
- ✓ Second year, its tax liability is **zero** (- \$10,000 loss - \$25,000 loss = -\$35,000,000).
- ✓ Third year, its tax liability is **zero** (\$20,000 - \$35,000 loss = -\$15,000).
- ✓ Fourth year, its tax liability is **\$15,000** (\$30,000 - \$15,000 loss = \$15,000).
- ✓ Fifth year, its tax liability is **\$35,000** (\$35,000 - \$0 loss).

Tax consequences of depreciation

- ☐ Spread **tax savings** out **over more years**
- ☐ Many times the **law** specifies the **assumed life of the asset**, as well as the **allowable depreciation methods**
- ☐ These **costs** are then used to
 - ❖ **Offset income**
 - ❖ **Reduce income that is taxable** and thereby
 - ❖ **Reduce income taxes**

Tax consequences of depreciation – Example

❑ An excavator with an initial cost of \$100,000 has a **salvage value of \$10,000** at the **end of 3 years**. If the contractor who purchases this excavator **earns \$50,000 per year (before depreciation)** and if the **effective tax rate** charged from the net income (after depreciation) is **50%**, **calculate the taxes** to be paid by the contractor at the **end of each year**.

- ❖ Determine **which method** is most **desirable** from the **point of view** of the **contractor** by computing the **annual equivalent values of the taxes paid**.
- ❖ Take $i = 12\%$.

Tax consequences of depreciation – Solution – SL method

m	R_m	D_m (\$)	BV_m (\$)	Yearly income (\$)	Taxable income (\$)	Tax
0		0	100,000	0	0	0
1	1/3	30,000	70,000	50,000	20,000	10,000
2	1/3	30,000	40,000	50,000	20,000	10,000
3	1/3	30,000	10,000	50,000	20,000	10,000

❖ Total tax paid = \$30,000

❖ Take $i = 12\%$. $AE(12\%) = \$10,000 / \text{yr.}$

Tax consequences of depreciation – Solution – DDB method

m	R_m	D_m (\$)	BV_m (\$)	Yearly income (\$)	Taxable income (\$)	Tax
0		0	100,000	0	0	0
1	0.6667	66,670	33,330	50,000	-16,670	0
2	0.6667	22,221	11,109	50,000	$27,779 - 16,670 = 11,109$	5,554.5
3	0.6667	1,109	10,000	50,000	48,891	24,445.5

❖ Total tax paid = \$30,000

❖ Take $i = 12\%$. $AE(12\%) = \$9,088 / \text{yr.}$



مدیریت مالی، حسابداری و هزینه در پروژه ها و سازمان های پروژه محور

بخش هفتم:

مدیریت هزینه: برآورد هزینه و قیمت پروژه

ارائه دهنده:

سید محمدرضا علوی پور

(PhD, PMP, CMIT)

What you will learn?

- ☐ Purpose of this session
- ☐ Introduction to cost estimating
- ☐ Common types of estimates
- ☐ Other types of estimates
- ☐ Estimates during the life cycle of the project
- ☐ Types of costs
- ☐ Project time schedule
- ☐ Time-cost tradeoff
- ☐ Direct cost
- ☐ Indirect cost
- ☐ Bid price
- ☐ Computer-based estimating
- ☐ Cost models
- ☐ Project budget
- ☐ Key points

Purposes of the this session

- ☐ Learn about project cost estimating and several types of specialty estimates that are developed **during project life cycle**.
- ☐ Learn about **different types** and **categories** of project costs.
- ☐ Understand how the **project estimate** is **developed**.
- ☐ Learn how the **contract price** is estimated.

Introduction to cost estimating

❑ **Cost estimating** is one of the **most important steps** in **project management**.

❑ **Difference** between **industrial cost estimating** and **project cost estimating**:

❖ **Construction estimating** is a **relatively crude process** and **each job** can be **different** with

inherently complicating factors of **weather, materials, labor, transportation, etc.**

Introduction to cost estimating

❑ Two main sources:

1. American Society of Professional Estimators (ASPE) for Contractors

- ✓ Certificate of CPE (Certified Professional Estimator)

2. Association for the Advancement of Cost Engineering (AACE International) for Owners and Contractors of large companies

❖ Certified Cost Technician

- ✓ Formerly known as Interim Cost Consultant), (entry-level certification)

❖ Certified Cost Professional (formerly Certified Cost Consultant / Certified Cost Engineer)

❖ Certified Estimating Professional

Introduction to cost estimating

- ❑ A cost estimate establishes the **baseline** of the **project cost** at **different stages** of development of the project
 - ❖ In **competitive bidding**, low bidder, but not be priced so low
 - ❖ In **negotiated contracts**, the accurate estimating of costs with reliable advance cost information
- ❑ Advance estimation of costs is a necessary part of a **successful contracting business**.

Introduction to cost estimating

❑ Two approaches for assigning estimators:

1. Estimator/project managers for small companies

- ❖ Estimator/project managers have the responsibility to estimate the cost of potential projects and also manage the projects.
- ❖ When a new project is brought in, the estimator becomes the project manager for that project, as well as estimating new potential projects.

2. Estimator and project manager is separate for large companies

- ❖ The estimator hands the project off to a project manager and continues to focus on estimating new projects.
- ❖ The project manager will still be involved in estimating such things as change orders and claims, but the primary focus is to effectively manage the project.

Cost estimating steps

☐ References used:

- ❖ Government Accountability Office (GAO)
- ❖ United States Department of Homeland Security (DHS)
- ❖ United States Department of Defense (DOD)
- ❖ National Aeronautics and Space Administration (NASA)

BE CAREFUL THESE REFERENCES MENTIONED ABOVE ARE **PRACTICES FOR ALL INDUSTRIES AND **ONLY SOME PARTS** OF THEM ARE ADOPTABLE IN CONSTRUCTION PROJECTS**

- ❖ Cost Accounting and Financial Management for Construction Project Managers, written by Len Holm, **Routledge**, 2019.
- ❖ Project control for engineering (P 6-1), Construction Industry Institute (CII), 1986
- ❖ Project control for construction (RS 6-5), Construction Industry Institute (CII), 2012
- ❖ “Financial Management and Accounting Fundamentals for Construction” written by Halpin and Senior, **Wiley**, 2009.

Updated in 1401

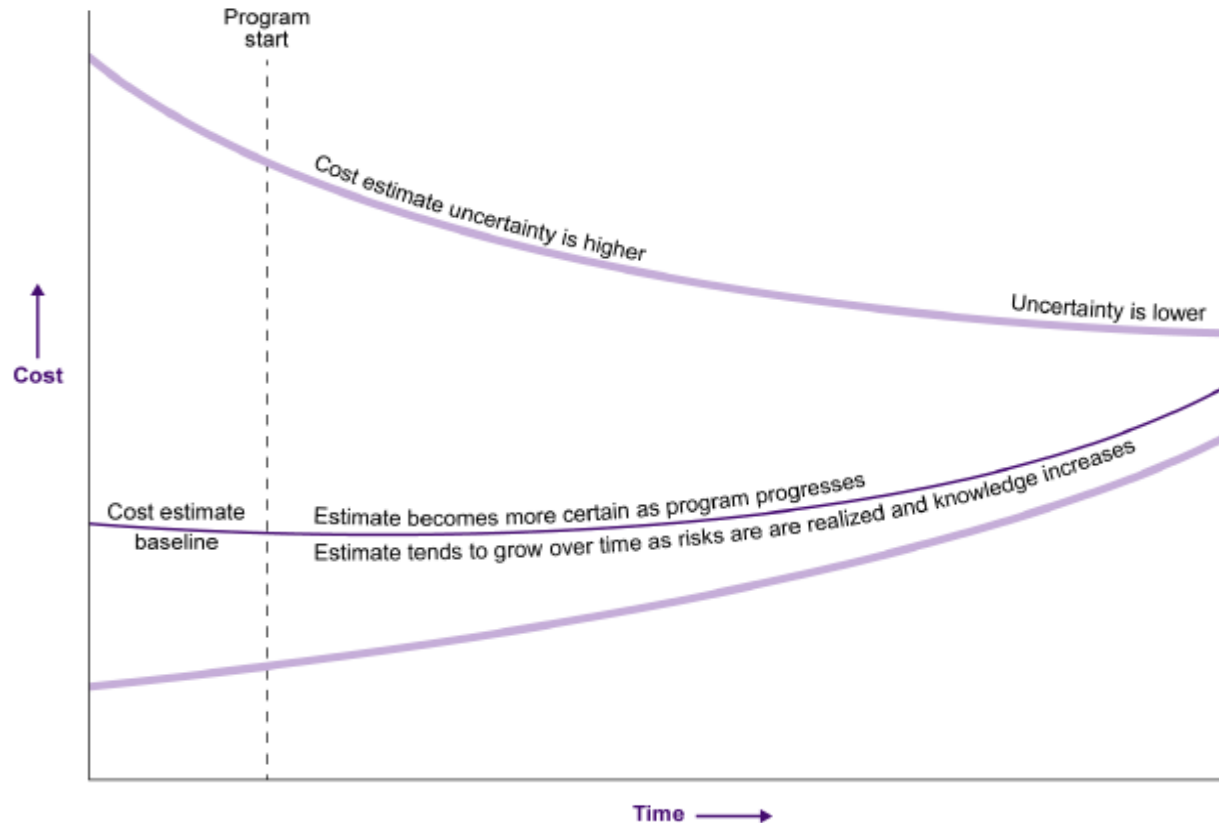
Cost estimating steps

☐ References used:

- ❖ Many RsMeans books and references
- ❖ Construction Project Management (book) by Sears et al., 2015
- ❖ Construction Contracting (book) by Clough et al., 2015
- ❖ Construction Cost Management (book) by Potts, 2014

Cost estimating process

Figure 3: Cone of Uncertainty

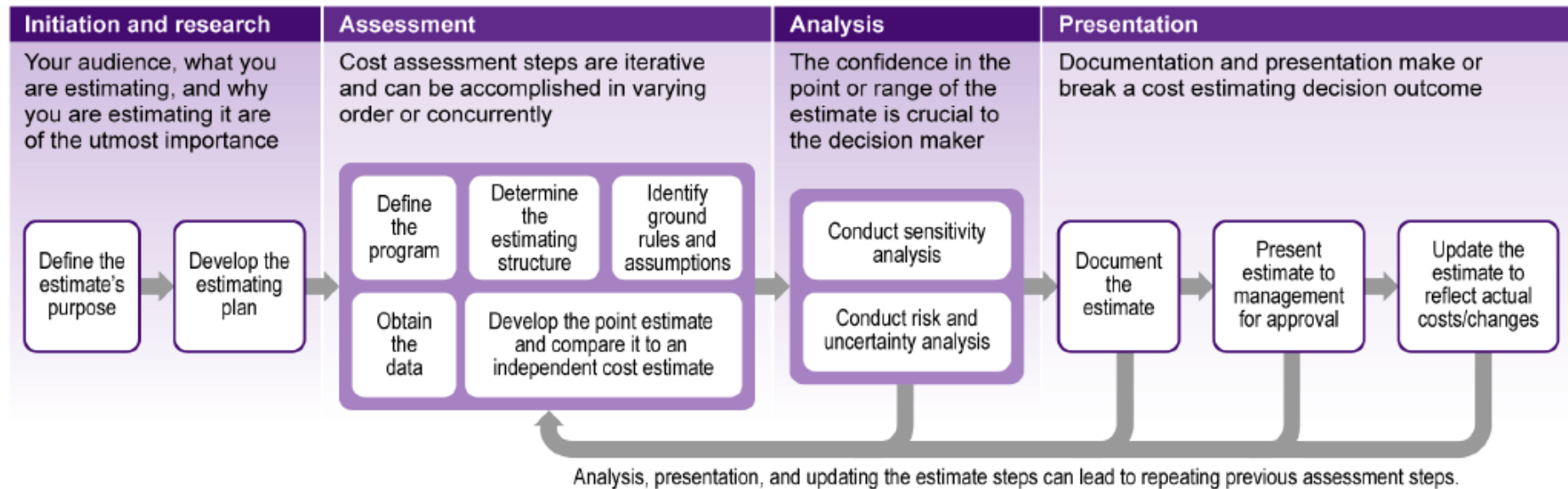


Source: GAO. | GAO-20-195G

For this reason, it is important to continually update estimates with actual costs, so that management has the best information available for making informed decisions. It is important to have a track record of the estimate in order to measure growth from the original estimate.

Cost estimating process

Figure 5: The Cost Estimating Process



Source: GAO. | GAO-20-195G

Cost estimating process

The 12 steps and the related 18 best practices are presented in table 3.

Table 3: The Twelve Steps and their Best Practices

Step ^a	Best Practice ^b
1. Define the estimate's purpose	The cost estimate includes all life cycle costs.
2. Develop the estimating plan	(See table note ^c)
3. Define the program	The technical baseline description completely defines the program, reflects the current schedule, and is technically reasonable.
4. Determine the estimating structure	The cost estimate WBS is product-oriented, traceable to the statement of work, and at an appropriate level of detail to ensure that cost elements are neither omitted nor double-counted.
5. Identify ground rules and assumptions	The estimate documents all cost-influencing ground rules and assumptions.
6. Obtain the data	The estimate is based on a historical record of cost estimating and actual experiences from other comparable programs. The estimate is adjusted properly for inflation.
7. Develop the point estimate	The cost model is developed by estimating each WBS element using the best methodology from the data collected. The estimate contains few, if any, minor mistakes. Major cost elements are cross checked to see if results are similar. An independent cost estimate is conducted by a group outside the acquiring organization to determine whether other estimating methods produce similar results.
8. Conduct sensitivity analysis	The cost estimate includes a sensitivity analysis that identifies a range of possible costs based on varying major assumptions and parameters.
9. Conduct risk and uncertainty analysis	A risk and uncertainty analysis is conducted that quantifies the imperfectly understood risks and identifies the effects of changing key cost driver assumptions and factors.
10. Document the estimate	The documentation shows the source data used, the reliability of the data, and the estimating methodology used to derive each element's cost. The documentation describes how the estimate was developed so that a cost analyst unfamiliar with the program could understand what was done and replicate it. The documentation discusses the technical baseline description and the data in the technical baseline are consistent with the cost estimate.

Cost estimating process

Step ^a	Best Practice ^b
11. Present the estimate to management for approval	The documentation provides evidence that the cost estimate is reviewed and accepted by management.
12. Update the estimate to reflect actual costs and changes	The cost estimate is regularly updated to ensure it reflects program changes and actual costs. Variances between planned and actual costs are documented, explained, and reviewed.

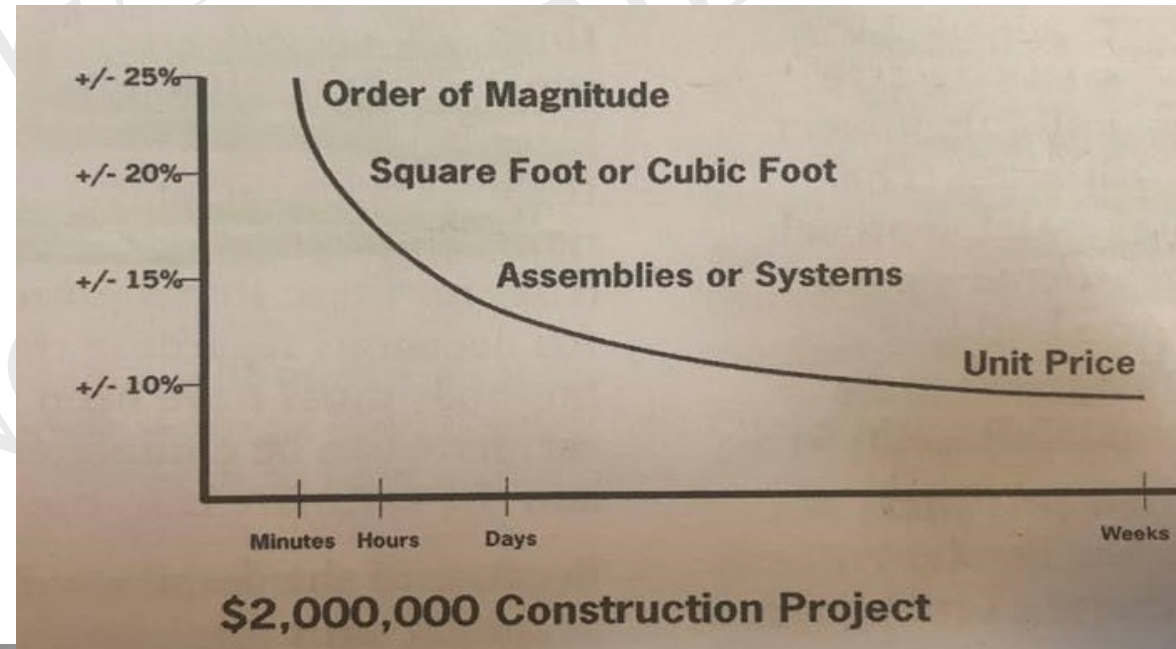
Source: GAO. | GAO-20-195G

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Common types of estimates

❑ **Cost estimation** is performed according to **one** or **some combination** of the following basic approaches:

- ❖ “Order of magnitude estimates” or “educated guess”
- ❖ Square foot and cubic foot estimates
- ❖ Assemblies (systems) estimate
- ❖ Unit price





❑ See Videos #1 and #2

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Common types of estimates – order of magnitude or educated guess

- ❑ It can be completed in a **matter of minutes**. **Accuracy is -30% to +50%.**
- ❑ It can be completed **when only minimal information is available.**
- ❑ The **use** and **size** of the proposed structure should be **known**.
 - ❖ For example, a **small office building** for a **service company** in a **suburban industrial park** will cost about **\$1,000,000.**
- ❑ This type of statement can be made after **drawing on experience**, **historical records**, and by **making comparisons to similar projects**.
- ❑ **Instead** of expressing **cost per foot**, costs may be expressed in **units** related to the **particular type of project**, such as **dollars per bed for hospitals**, **per student for schools**, **per car for parking garages**.
- ❑ While this rough figure might be **appropriate** for a project in **one region of the country**, an **adjustment** may be required for a **change of location** and for **cost changes over time** (price changes, inflation, etc.).

Common types of estimates – SF and CF estimates

- ❑ This type of estimate is **most often used** when only the proposed size and use of a planned building are known.
- ❑ While slightly **more time** is required than with order of magnitude estimates, a **greater accuracy** achieved due to **more definition** of the project. Accuracy is -20% to +30%.
- ❑ The use is **most appropriate** prior to the **preparation of plans** or **preliminary drawings**, when budgetary parameters are being **analyzed** and **established**.
- ❑ Costs may be **broken down** into **different components or elements**.

While helpful for preparing preliminary budgets, square foot and cubic foot estimates **can** *also* be useful as checks against other, more detailed estimates.

Common types of estimates – SF and CF estimates

❑ See Files #1, #2, and #3



Square Foot Cost Estimate Report

Cost

Estimate Name:

Knik School_SF Estimate

10015 Dagg Drive

Knik

AK

99654

Building Type:

School, High, 2-3 Story with Decorative Concrete Block / Steel Frame

Location:

ANCHORAGE, AK

Stories Count (L.F.):

2.00

Stories Height

15.00

Floor Area (S.F.):

144,000.00

LaborType

STD

Basement Included:

No

Data Release:

Year 2011

Cost Per Square Foot

\$172.46

Total Building Cost

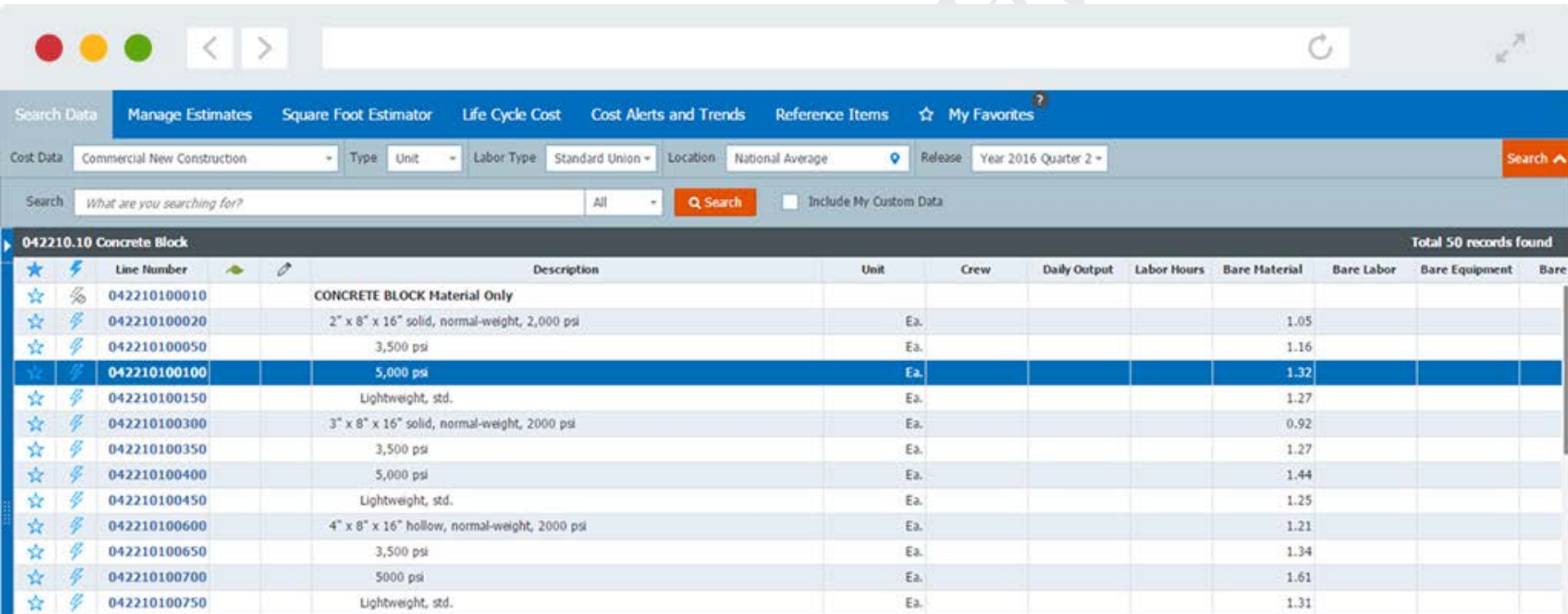
\$24,833,500.00



Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.

Computer-based estimating – SF and CF estimates

❑ See Video #3



Line Number	Description	Unit	Crew	Daily Output	Labor Hours	Bare Material	Bare Labor	Bare Equipment	Bare
042210.10 Concrete Block									
Total 50 records found									
042210100010	CONCRETE BLOCK Material Only								
042210100020	2" x 8" x 16" solid, normal-weight, 2,000 psi	Ea.				1.05			
042210100050	3,500 psi	Ea.				1.16			
042210100100	5,000 psi	Ea.				1.32			
042210100150	Lightweight, std.	Ea.				1.27			
042210100300	3" x 8" x 16" solid, normal-weight, 2000 psi	Ea.				0.92			
042210100350	3,500 psi	Ea.				1.27			
042210100400	5,000 psi	Ea.				1.44			
042210100450	Lightweight, std.	Ea.				1.25			
042210100600	4" x 8" x 16" hollow, normal-weight, 2000 psi	Ea.				1.21			
042210100650	3,500 psi	Ea.				1.34			
042210100700	5000 psi	Ea.				1.61			
042210100750	Lightweight, std.	Ea.				1.31			

Common types of estimates – Assemblies (systems) estimate

- ❑ An assemblies estimate is best used as a **budgetary tool** in the planning stages of a project. Accuracy is expected at -10% to +20%.
- ❑ **Can** be used when at least 25% to 30% of **design completed**.
- ❑ Unit price estimating, because of the time and detailed information required, is **not suited** as a budgetary or planning tool.
 - ❖ A **faster** and **more cost-effective** method for the planning phase of a project is the assemblies or systems estimate.
 - ❖ This approach is a **logical, sequential** approach that reflects how a project is constructed.

موسسه مهندسی و مدیریت ساخت علوی پور (ACEMI)

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