

# Construction Project Cash Flow for Construction Managers

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# STUDENT & COURSE LEARNING OUTCOMES

ACCE (American Council for Construction Education) Student Learning Outcomes covered in this course:

- ▶ SLO 11- Understand construction accounting and cost control.
- ▶ SLO 13 - Understand construction project control processes.

Course Learning Outcome for this lecture:

- ▶ CLO 1 - Prepare and forecast a statement of cash flow for construction projects. Recommend project and cost control strategies.

# GOALS

- ▶ Construct accurate cash flow statements using real or simulated construction project data
- ▶ Identify potential financing needs to maintain financial stability throughout the project lifecycle.
- ▶ Identify cost control strategies to effectively manage project finances.

# **Resources needed to complete a construction project**

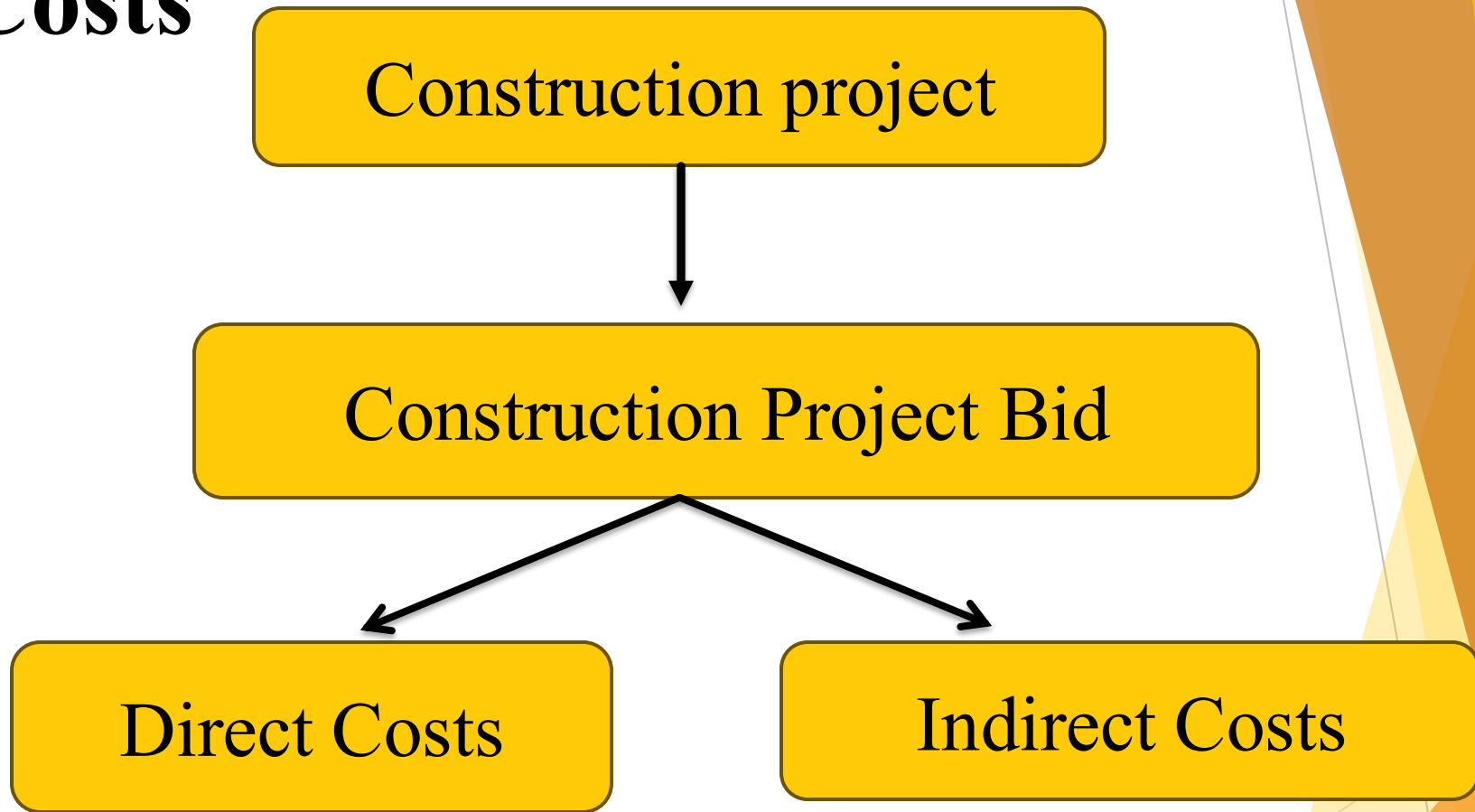
- ▶ Material
- ▶ Labor
- ▶ Equipment
- ▶ Sub-contractor
- ▶ Cash

# Why is Cash needed ?

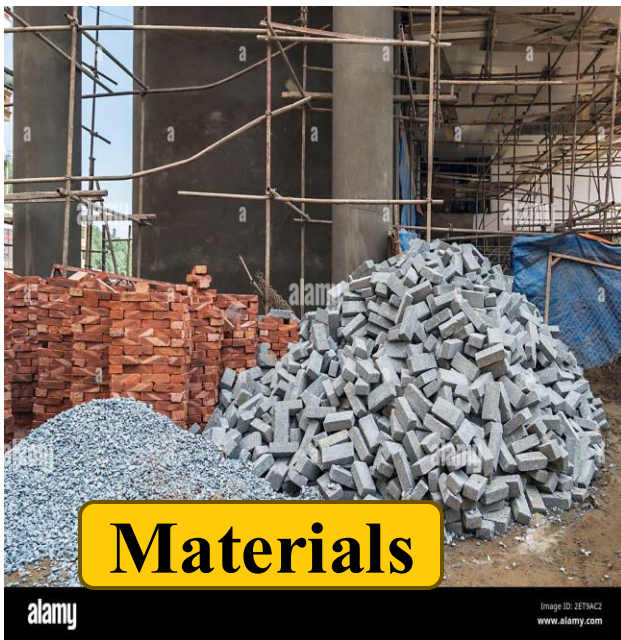
- ▶ To be able to pay your bills
- ▶ To stay in business
- ▶ To grow your business

Knowing how much cash is needed and when allows one to plan and be financially prepared.

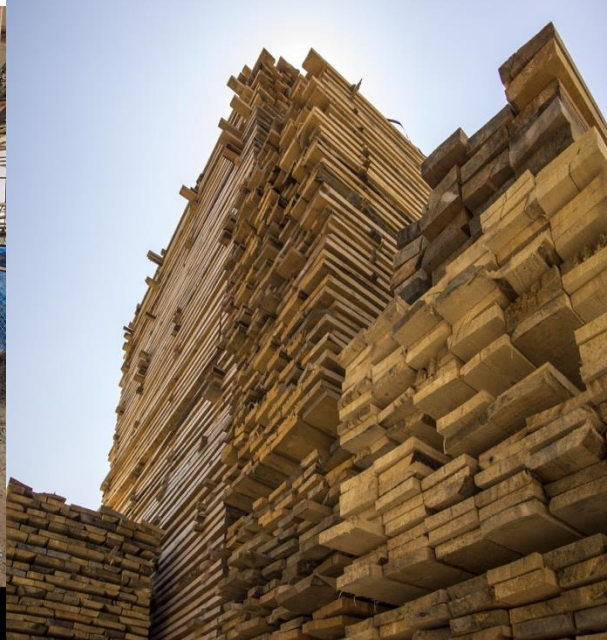
# Overview: Construction Projects Costs



Construction Project Bid Consists of Direct Costs of Construction and Indirect Costs of Business



**Materials**



Volume 3, Book 3, 2024, IIP Se



**Equipment**

# DIRECT COSTS



**Sub-contractor**



**Project overhead**



**Labor**



# INDIRECT COSTS

**Net profit**

**General overhead**



# Project Implementation Planning

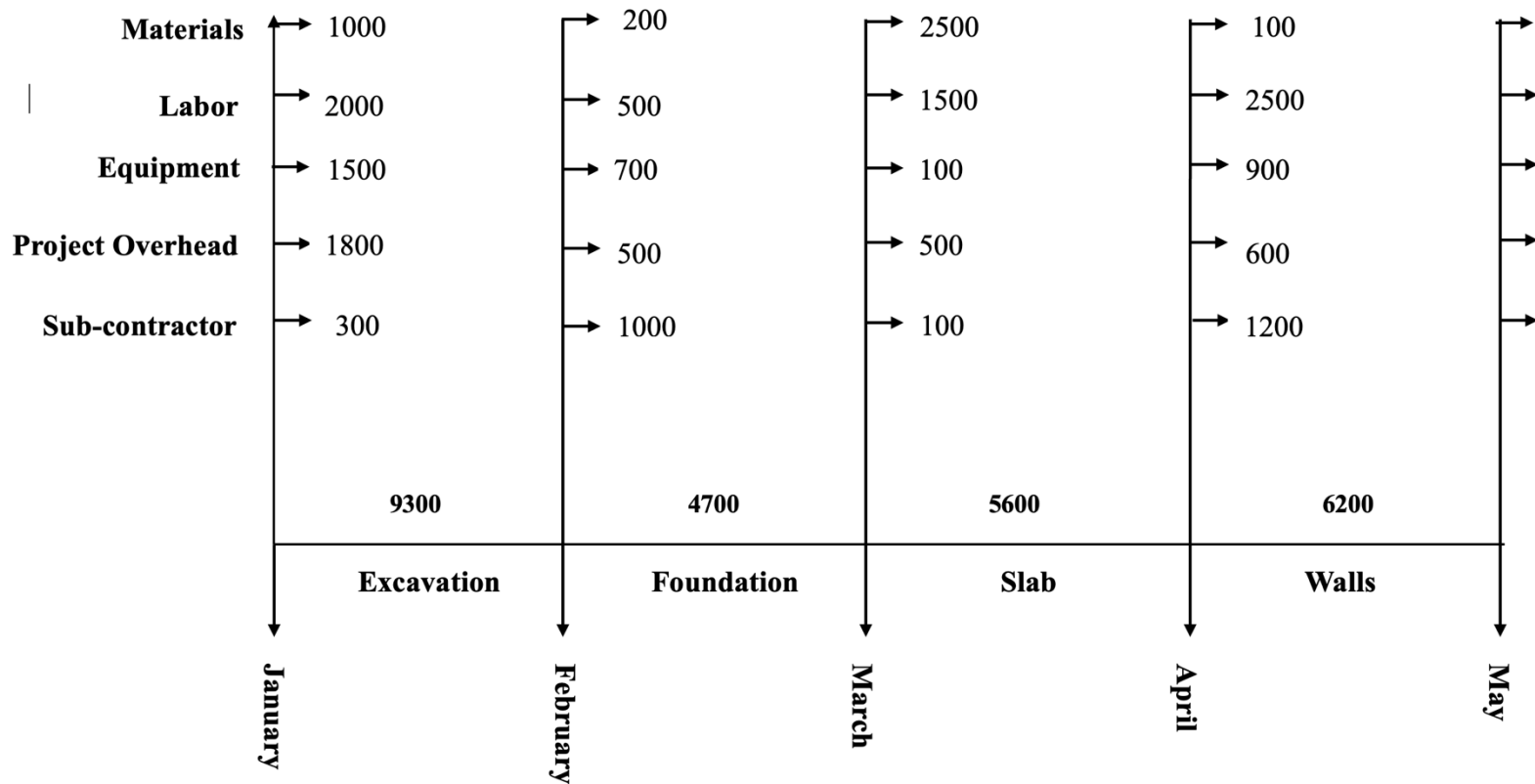
- ▶ Once a project is secured, cashflow becomes critical for its successful execution.
- ▶ Adequate cash is needed for labor, materials, equipment, and operations.
- ▶ Too much cash on hand = inefficiency and opportunity cost.
- ▶ Too little cash = delays, penalties, or project failure.
- ▶ Cash flow analysis helps predict inflows/outflows across the project lifecycle.
- ▶ It supports smart financing decisions to ensure cash is available when needed.

# What You Need for Forecasting Cash Flow

- ▶ Cost-Loaded Schedule
- ▶ Financial Contract Terms for:
  - ▶ Billing (Billing Stage)
  - ▶ Cash Receipt (Cash-In)
  - ▶ Payments (Cash-Out)

# Cost-Loaded Schedule

A cost-loaded schedule integrates the project's timeline with its budget, providing a comprehensive overview of both the financial and chronological aspects of the project.



The figure illustrates a cost-loaded schedule for a four-month project. Each month represents different scheduled activities, with corresponding costs derived from the quantity takeoff (estimate). The schedule serves as a basis for generating a table of direct costs.

# Table of Direct Cost

Table of Direct Costs						
Direct costs	Months					
	1	2	3	4	5	Total
Material	\$1000	\$2000	\$2500	\$1000		\$6500
Labor	\$2000	\$500	\$1500	\$2500		\$6,500
Equipment	\$1500	\$700	\$100	\$900		\$3200
Project Overhead	\$1800	\$500	\$500	\$600		\$3400
Sub-contractor	\$3000	\$1000	\$1000	\$1200		\$6200
Total Direct Cost	\$9300	\$4700	\$5600	\$6200		\$25800

**Table:** Direct cost of construction each month for various project activities

# Bill to Owner

<b>Direct costs</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Total</b>
<b>Material</b>	\$1000	\$2000	\$2500	\$1000		\$6500
<b>Labor</b>	\$2000	\$500	\$1500	\$2500		\$6500
<b>Equipment</b>	\$1500	\$700	\$100	\$900		\$3200
<b>Project Overhead</b>	\$1800	\$500	\$500	\$600		\$3400
<b>Sub-contractor</b>	\$3000	\$1000	\$1000	\$1200		\$6200
<b>Total Direct Cost</b>	\$9300	\$4700	\$5600	\$6200		\$25800
<b>Indirect Costs</b>	\$1860	\$940	\$1120	\$1240		\$5160
<b>Bill to Owner</b>						
<b>Bill to Owner</b>	\$11160	\$5640	\$6720	\$7440		\$30960

Indirect costs are calculated @ 20% gross profit margin. The owner is billed monthly for direct and indirect costs

# Cash-in

Cash-In (Money Received from Owner)						
	1	2	3	4	5	Total
Money received from the owner	0	\$10267.20	\$5188.80	\$6182.40	\$6844.80	
Retention held by the owner	0	\$892.80	\$451.20	\$537.60	\$595.20	
Retention released to the GC	0	0	0	0	\$2476.80	
Total Cash in	0	\$10267.20	\$5188.80	\$6182.40	\$9321.50	\$30960

Cash in shows money received from the owner each month, retention held by the owner, and retention released by the owner based on the Cash-in contract terms agreed between the GC and the client. In this project, the owner releases the payment one month after the bill is received. The owner withholds 8% retention from the general contractor, which is released one month after the project is over. **Note:** the total cash-in always equals the project contract sum.

# Cash-out

<b>Cash-Out (Payment made to Vendors by GC)</b>						
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Total</b>
<b>Paid to Material</b>	0	\$1000	\$2000	\$2500	\$1000	\$6500
<b>Paid to Labor</b>	\$2000	\$500	\$1500	\$2500	0	\$6500
<b>Paid to Equipment</b>	0	\$1500	\$700	\$100	\$900	\$3200
<b>Paid for Project Overhead</b>	0	\$1800	\$500	\$500	\$600	\$3400
<b>Paid to subcontractor</b>	0	\$2700	\$900	\$900	\$1080	\$5580
<b>Retention held from Sub-contractor</b>	0	\$300	\$100	\$100	\$120	\$620
<b>Retention released to sub-contractor</b>	0	0	0	0	\$620	
<b>Total cash out</b>	\$2000	\$7500	\$5600	\$6500	\$4200	\$25800

Cash out shows the payments released for the direct costs - including material, labor, equipment, subcontractor, and project overhead- based on the terms outlined in the contract. In this project material, equipment, subcontractor, and project overhead payments are released with "pay when paid" clause. Labor is paid bi-weekly. A 10% retention is held from subcontractors and released one month after project completion.

**Note:** the total cash out MUST equal total direct costs.

# Cash Flow

## Cash Flow (Cah in – Cash out)

	1	2	3	4	5	Total
<b>Net Cash flow at month end after payments are received from the owner</b>	-\$2000	\$2767.2	-\$411.2	-\$317.6	\$5121.6	
<b>Cash generated at month end after payments are received from the owner</b>	-\$2000	\$767.2	\$365	\$38.4	\$5160	

The table shows the net cash flow (cash in minus cash out) at the end of each month, after payments have been received from the owner and made to the respective vendors. A positive net cash flow implies that the cash inflow was greater than the cash outflow.

The cash generated row indicates whether the project has begun generating its own cash. This project's cash can be used to pay next month's project expenses to reduce the out-of-pocket cash needs of the GC.

Ideally, this row should remain positive throughout, as it reflects the project's financial health.

**Note:** The cash generated during the last month, after all money transactions are complete, must equal the gross profit for the project.

# Cash Invested

## Cash Invested (Cash needed for payments each month)

	1	2	3	4	5	Total
Cash needed for the project before payment is received from the owner	-\$2000	-\$500	-\$1500	-\$2500		
Effective cash needed (invested) for the project before payment is received from the owner	-\$2000	-\$500	-\$732.8	-\$2144		
Cumulative (total) cash needed for the project before payment is received from the owner	-\$2000	-\$2500	-\$3232.8	-\$5376.8		

Cash invested (needed) reflects how much money the GC must invest out-of-pocket into the project. In this project, the only out-of-pocket expenses are the labor costs. The cash generated in the project reduces the out-of-pocket cash needed for the project.

**Note:** The underlying goal is to minimize cash needs by improving project cash flow early in the project.

# Construction Project Cash Flow Table

Direct costs	1	2	3	4	5	Total
Material	1000	2000	2500	1000		6500
Labor	2000	500	1500	2500		6500
Equipment	1500	700	100	900		3200
Project Overhead	1800	500	500	600		3400
Sub-contractor	3000	1000	1000	1200		6200
Total Direct Cost	9300	4700	5600	6200		25800
Indirect Costs	1860	940	1120	1240		5160
<b>Bill to Owner</b>						
Bill to Owner	11160	5640	6720	7440		30960
<b>Cash in module</b>						
Money received from the owner	0	10267.2	5188.8	6182.4	6844.8	
Retention held by the owner	0	892.8	451.2	537.6	595.2	
Retention released to the GC	0	0	0	0	2476.8	
Total Cash in	0	10267.2	5188.8	6182.4	9321.5	30960
<b>Cash out module</b>						
Paid to Material	0	1000	2000	2500	1000	6500
Paid to Labor	2000	500	1500	2500	0	6500
Paid to Equipment	0	1500	700	100	900	3200
Paid for Project Overhead	0	1800	500	500	600	3400
Paid to subcontractor	0	2700	900	900	1080	5580
Retention held from Sub-contractor	0	300	100	100	120	620
Retention released to sub-contractor	0	0	0	0	620	
Total cash out	2000	7500	5600	6500	4200	25800
<b>Cash Flow Module</b>						
Net Cash flow at month end after payment are received from the owner	-2000	2767.2	-411.2	-317.6	5121.6	
Total (Cummulative ) Cash flow (generated) at month end after payments are received from the owner	-2000	767.2	365	38.4	5160	
<b>Cash needed</b>						
Cash needed for the project payment is received from the owner	-2000	-500	-1500	-2500		
Effective cash needed (invested) for the project before payment is received from the owner	-2000	-500	-732.8	-2144		
Cummulative (total) cash needed for the project before payment is received from the owner	-2000	-2500	-3232.8	-5376.8		

# Strategies to reduce cash needs for project

- ▶ Use more subcontractors with “pay-when-paid” terms
- ▶ Negotiate a lower retention rate with the owner
- ▶ Increase profit and overhead markup early on
- ▶ Front-load the schedule of values to bill more upfront
- ▶ Assign higher value to early work and lower to later work

These strategies help generate early cash flow and reduce the need for external financing.

# Miscellaneous Reading

- ▶ [Pay when paid in South Eastern States \\_ a comparison.pdf](#)
- ▶ [207 \\_ Gurney \\_ Pay when Paid.pdf](#)
- ▶ [ASA Contingent Payment Clauses \\_ 50 states.pdf](#)
- ▶ [analyzing the impact of negative cash flow on construction performance in Dubai.pdf](#)
- ▶ [Assessing the Impact of Front Loading on the CPI and EAC \\_ Humphreys & Associates.pdf](#)
- ▶ [Taking Risks with Numbers \\_ How Far Can You Go \\_ CFMA.pdf](#)

# For Further Reading

Use the hyperlinks provided below for detailed readings available via the library:

- ▶ [Understanding Cash Flow](#)
- ▶ [Cost Resource- Loaded Schedule](#)
- ▶ [Managing the Contractor's Cash flow](#)
- ▶ [Cash flow forecasting](#)
- ▶ [Cash flow analysis](#)
- ▶ [Payments in construction](#)

## **Construction Project Cash Flow for Construction Managers**

### **End of Lecture: Concept Review Questions**

- 1) What are the two cost categories for a construction project?
- 2) What are the five cost components of direct costs for a construction project?
- 3) Define project overhead? Provide three examples of project overhead.
- 4) What are the two cost components of indirect costs for a construction project?
- 5) Explain with examples difference between general overhead and project overhead.
- 6) What documents and specific information is needed to prepare a construction project cash flow? Provide the precise but complete list and state why it is needed.
- 7) What is financial or technical term for indirect costs of a construction project?
- 8) What is a cost-loaded schedule?
- 9) When billing the owner for work completed, do you bill for both direct and indirect costs? Why or why not?
- 10) Where do you find the information that determines when to send the bill to the project owner?
- 11) What documents you use to send the bill of work completed to the owner?
- 12) The small percentage of money that the owner holds onto when sending a payment to general contractor to ensure that work is done according to specifications and for quality checks is called \_\_\_\_\_.
- 13) How does the owner decide what percentage of retention to hold from the contractor's payment?
- 14) How does a contractor decide on gross profit margin for a construction project?
- 15) What are the two common industry standard forms that are used to send invoices for the work completed by the General Contractor to the Owner? What is another or technical term for these invoices?
- 16) When preparing a construction project cash flow table, the sum of the “total cash out” each month must equal \_\_\_\_\_.

- 17) When preparing a construction project cash flow table, the sum of the “total cash in” each month must equal \_\_\_\_\_.
- 18) Assume a construction project for which all possible money receipts (money received by the general contractor) and payments (money paid to vendors), including the retention, are due two months after the project ends. For this project, the total amount of cash generated two months after the project is over (when all payments have been received, and all bills have been paid) will be equal to \_\_\_\_\_.
- 19) As a GC what strategies can you use to reduce your cash needs for a construction project?
- 20) The total of schedule of values on AIA form G703 must equal \_\_\_\_ on the project cash flow and \_\_\_\_ on the AIA form G702.
- 21) How to calculate net cash flow at any point in time? Show the formula.
- 22) What does negative net cash flow at any point in time mean?
- 23) How does the pay-when-paid clause affect the cash need for completing a construction project?

## **PROBLEM SOLVING**

### **Problem Statement**

A construction company is negotiating a 4-month construction project. The following contract terms are given.

- At the end of each month, the company will bill the owner for the work completed.
- The owner releases payments at the end of the following month.
- The owner withholds 6% retention, released in two installments:
  - At the end of Month 3 (covering Months 1, 2, and 3)
  - At the end of Month 7 (covering any retention not previously released).

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### **Additional Payment Rules**

1. Materials
  - 55% of material cost is paid at the time of delivery.
  - The remaining 45% is “pay when paid” (only when the owner pays the GC).
2. Project Overhead
  - 45% of project overhead is paid immediately (when cost is incurred).

- The remaining 55% is “pay when paid.”
- 3. Equipment
  - 25% of equipment cost is paid immediately (when cost is incurred).
  - The remaining 75% is “pay when paid.”
- 4. Subcontractors
  - Paid when the GC receives payment from the owner.
  - GC withholds 8% retention from subcontractors.
  - Subcontractor retention is released:
    - At the end of Month 3 (covering Months 1, 2, and 3).
    - At the end of Month 7 (covering any retention not previously released).
- 5. Labor
  - Paid weekly by the construction company.
- 6. Indirect Costs
  - Equal to 26%.

## Task

The projected monthly direct costs are provided in the table below.

 **Your assignment:** Complete the Project Cash Flow Table using the contract terms stated above.

Month	1	2	3	4	5	6	7	Totals
<b>Direct Costs</b>								
Materials	\$5,000	\$6,000	\$3,500	\$2,000				\$16,500
Labor	\$2,700	\$500	\$300	\$200				\$3,700
Equipment	\$1,000	\$1,700	\$200	\$300				\$3,200
Project Overhead	\$1,500	\$1,100	\$100	\$200				\$2,900
Sub Contractor	\$4,000	\$6,000	\$7,000	\$2,700				\$19,700
<b>Total Direct Costs</b>	<b>\$14,200</b>	<b>\$15,300</b>	<b>\$11,100</b>	<b>\$5,400</b>				<b>\$46,000</b>
<b>Profit &amp; GOH (Indirect Costs)</b>	<b>26*\$14,200=</b>							
<b>Bill To owner</b>								
<b>Money Received from Owner/GC (CASH IN)</b>								
Money Received from the owner								
Retention held by the owner								
Retention released by the owner								
<b>Total Money Received (Cash In)</b>								
<b>Payments made to suppliers, labor, and sub (CASH OUT)</b>								
Paid for Materials								
Paid for Labor								
Paid to Equipment Supplier								
Paid to Project Overhead								
Paid to Sub Contractor								
Retention held from Sub Contractor								
Retention released to the Sub								
<b>Total Payments (Cash out)</b>								
<b>CASH FLOW</b>								
Net Cash Flow at Month's end (Cash in - Cash out)								
<b>Total cash generated at Month's end (after payment is received from the owner)</b>								
<b>CASH NEEDED (INVESTED)</b>								
Cash needed for the project before payment is received from the owner								
Effective Cash needed for the project before payment is received from the owner								
Total Cash needed for the project before payment is received from the owner								
<b>Month with max cash need and the amount:</b>								
<b>Total amount of cash needed for the project is</b>								