Chapter 17

Construction Economics

17-1 INTRODUCTION

- The financial management of a construction company is equally as important to company success as is its technical management.
- The purpose of this chapter is to introduce the reader to:
  - the terminology and basic principles involved in determining the owning and operating costs of construction plants and equipment,
  - analyzing the feasibility of renting or leasing rather than purchasing equipment, and
  - the financial management of construction projects.

17-2 TIME VALUE OF MONEY

- The amount of money held in a savings account will increase with time if interest payments are allowed to remain on deposit (compound) in the account.
- The value of a sum of money left on deposit after any period of time may be calculated using Equation 17-1.
- $$F = P(1+i)^n \qquad (17\text{-}1)$$
- where
  - F =value at end of n periods (future value)
  - P =present value
  - i =interest rate per period
  - n =number of periods
- The expression $(1 + i)^n$ is often called the *single-payment compound interest factor.*

17-2 TIME VALUE OF MONEY

- Equation 17-1 can be solved to find the present value (present worth) of some future amount, resulting in Equation 17-2.

$$p = F/(1 + i)^n \qquad (17\text{-}2)$$

- The expression 1/(1 + i)n is called the *single-payment present worth factor.*

- The methods of engineering economy are widely used to:
  - analyze the economic feasibility of proposed projects,
  - to compare alternative investments, and
  - to determine the rate of return on an investment

17-3 EQUIPMENT COST

- **Elements of Equipment Cost**
  - **Owning Costs**
  - **Operating Costs**

Elements of Equipment Cost

- We have discussed the proper application of the major items of construction equipment and some methods for estimating equipment's hourly production.
- We then divided the equipment's hourly cost by its hourly production to obtain the cost per unit of production.
- we have simply assumed that we knew the hourly cost of operation of the equipment.
- In this section we consider methods for determining the hourly cost of operation of an item of equipment.
- it is necessary to estimate many factors, such as fuel consumption, tire life, and so on.

Elements of Equipment Cost

- The best basis for estimating such factors is the use of historical data, preferably those recorded by your construction company operating similar equipment under similar conditions.
- If such data are not available, consult the equipment manufacturer for recommendations.
- Equipment *owning and operating costs* (frequently referred to as 0 & 0 *costs),* as the name implies, are composed of owning costs and operating costs.
  - **Owning costs** are fixed costs that are incurred each year whether the equipment is operated or not.
  - **Operating costs** are incurred only when the equipment is used.

Owning Costs

- *Owning costs* are made up of the following principal elements:
  - Depreciation.
  - Investment (or interest) cost.
  - Insurance cost.
  - Taxes.
  - Storage cost.

Depreciation

- *Depreciation* represents the decline in market value of an item of equipment due to age, wear, deterioration, and obsolescence.
- Depreciation is used for two separate purposes:
  1. Evaluating tax and Zakat liability
  2. Determining the depreciation component of the hourly equipment cost.

Depreciation

- In calculating depreciation, the initial cost of an item of equipment should be the full delivered price, including:
  - transportation,
  - taxes, and
  - initial assembly and servicing.
- For rubber-tired equipment, the value of tires should be subtracted from the amount to be depreciated because tire cost will be computed separately as an element of operating cost.

Initial assembly

Depreciation

- Equipment salvage value should be estimated as realistically as possible based on historical data.
- The most commonly used depreciation methods are:
  - The straight-line method,
  - The sum-of-the-years'-digits method,
  - The double-declining balance method

Straight-Line Method

- The *straight-line method* of depreciation produces a uniform depreciation for each year of equipment life.
- Annual depreciation is thus calculated as the amount to be depreciated divided by the equipment life in years (Equation 17-3).

$$D_n = (\text{Cost - Salvage (- tires)}) / N \qquad (17\text{-}3)$$

- where
  - N =equipment expected life (years)
  - n = year of life (1, 2, 3, etc.)

EXAMPLE 17-1

Using the straight-line method of depreciation, find the annual depreciation and book value at the end of each year for a track loader having an initial cost of $50,000, a salvage value of $5000, and an expected life of 5 years.

EXAMPLE 17-1

- **Solution**

$D_{l, 2, 3, 4, 5}$ = (50,000- 5000)/5 = $9000

Year	Depreciation	Book Value (End of Period)
0	0	$50,000
1	$9,000	41,000
2	9,000	32,000
3	9,000	23,000
4	9,000	14,000
5	9,000	5,000

Sum-of-the-Years'-Digits Method

- The *sum-of-the-years'-digits method* of depreciation produces a nonuniform depreciation which is the highest in the first year of life and gradually decreases thereafter.
- The amount to be depreciated is the same as that used in the straight-line method (cost - salvage (- tires)).

D_n = [(N - (n-1))/(Sum of years ' digit)] × Amount to be depreciated (17-4)

EXAMPLE 17-2

- For the loader of Example 17-1, find the annual depreciation and book value at the end of each year using the sum-of-the-years'-digits method.

Solution

- Using Equation 17-4:

D_n = [(N - (n-1))/(Sum of years ' digit)] × Amount to be depreciated

  - D_1 = (5- (1-1)) /15 × (50,000 - 5000) = 15,000
  - D_2 = (5- (2-1)) /15 × (50,000 - 5000) = 12,000
  - D_3 = 3/15 × (50,000 - 5000) = 9,000
  - D_4 = 2/15 × (50,000 - 5000) = 6,000
  - D_5 = 1/15 × (50,000 - 5000) = 3,000

EXAMPLE 17-2

Year	Depreciation	Book Value (End of Period)
0	0	$50,000
1	$15,000	35,000
2	12,000	23,000
3	9,000	14,000
4	6,000	8,000
5	3,000	5,000

Double-Declining-Balance Method

- The *double-declining-balance method* of depreciation, like the sum-of-the-years' -digits method, produces its maximum depreciation in the first year of life,
- The annual depreciation factor is found by dividing 2 (or 200%) by the equipment life in years.
  - Thus for a 5-year life, the annual depreciation factor is 0.40 (or 40%).
- Unlike the other two depreciation methods, the double-declining-balance method does not automatically reduce the equipment's book value to its salvage value at the end of the depreciation period.

Double-Declining-Balance Method

- Since the book value of equipment is not permitted to go below the equipment's salvage value, care must be taken when performing the depreciation calculations to stop depreciation when the salvage value is reached. (Equation 17-5)

$D_n = 2 / N \times$ Book value at beginning of year n (17-5)

EXAMPLE 17-3

- For the loader of Example 17-1, find the annual depreciation and book value at the end of each year using the double-declining-balance method.

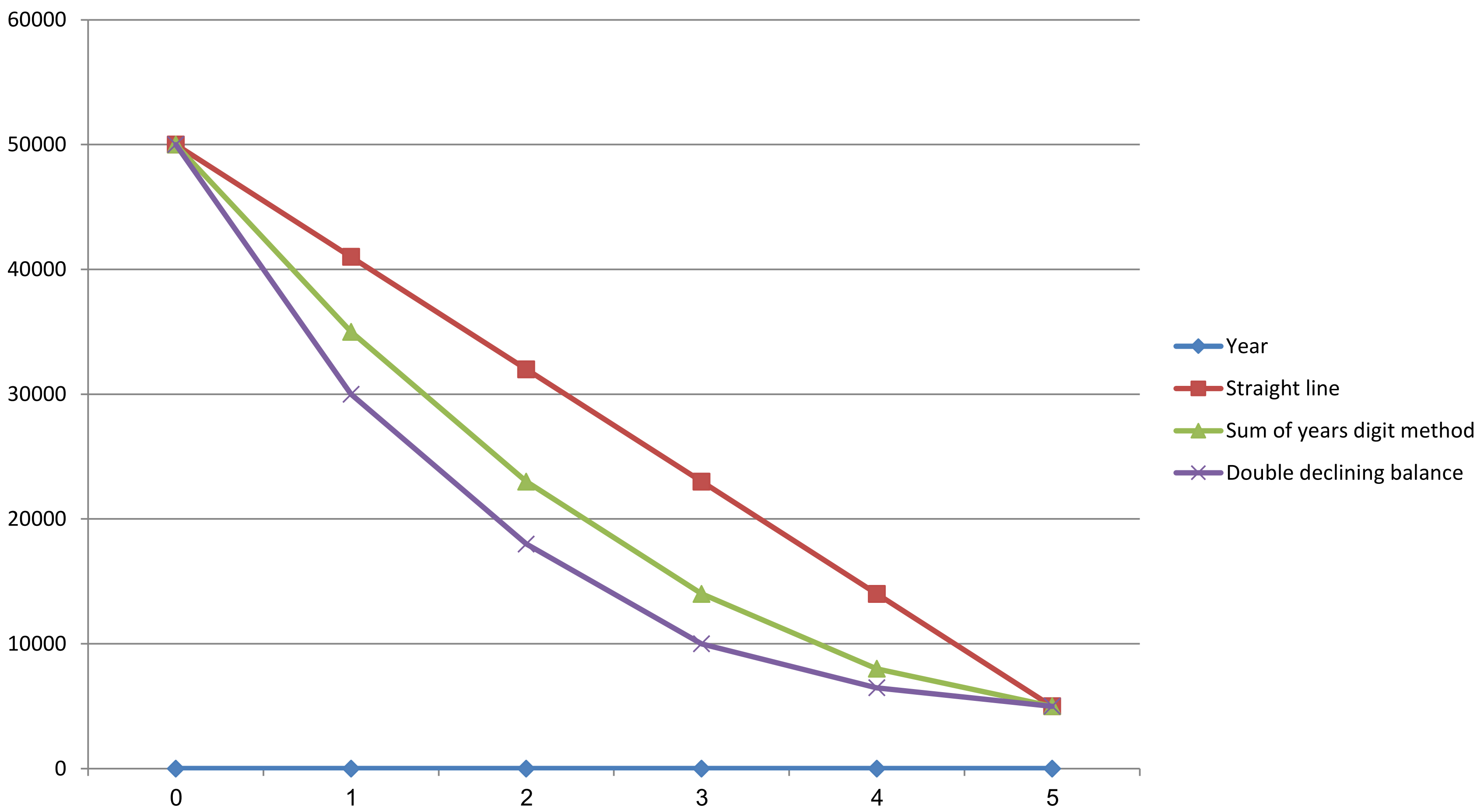
Solution

- Annual depreciation factor = 2.00/5 = 0.40
  - D_1 =0.40 × 50,000 = 20,000
  - D_2 = 0.40 × 30,000 = 12,000
  - D_3 = 0.40 × 18,000 = 7,200
  - D_4 = 0.40 × 10,800 = 4,320
  - D_5 = 0.40 × 6,480 = 2,592 use $1,480*

Year	Depreciation	Book Value (End of Period)
0	0	$50,000
1	$20,000	30,000
2	12,000	18,000
3	7,200	10,800
4	4,320	6,480
5	1,480*	5,000

*Because a depreciation of $2592 in the fifth year would reduce the book value to less than $5000, only $1480 ($6480 - $5000) may be taken as depreciation.

Book Value


60000
50000
40000
30000
20000
10000
0
0
1
2
3
4
5
Year
Straight line
Sum of years digit method
Double declining balance

Investment Cost

- *Investment cost* (or interest) represents the annual cost (converted to an hourly cost) of the capital invested in a machine.
- Investment cost is computed as the product of an interest rate multiplied by the value of the equipment, then converted to cost per hour.
- The average hourly investment cost may be more easily calculated by Equation 17-6.

Average investment = (Initial cost + Salvage) / 2 (17-6)

Insurance, Tax, and Storage

- *Insurance cost* represents the cost of insurance for fire, theft, accident, and liability for the equipment.
- *Tax cost* represents the cost of property tax and licenses for the equipment.
- *Storage cost* represents the cost of rent and maintenance for equipment storage yards and facilities.

Operating Costs

- *Operating costs* are incurred only when equipment is operated.
- Therefore, costs vary with the amount of equipment use and job operating conditions.
- The major elements of operating cost include:
  - Fuel cost.
  - Service cost.
  - Repair cost.
  - Tire cost.
  - Cost of special items.
  - Operators' wages.

Fuel Cost

- The *hourly cost of fuel* is simply fuel consumption per hour multiplied by the cost per unit of fuel (gallon or liter) . Table 17-l.

TABLE 17-1: Fuel consumption factors (gal/h/hp) or *l/h/ kW*

	Load Conditions*		
Type of Equipment	Low	Average	Severe
Clamshell and dragline	0.024	0.030	0.036
Compactor, self-propelled	0.038	0.052	0.060
Crane	0.018	0.024	0.030
Excavator, hoe, or shovel	0.035	0.040	0.048
Loader			
Track	0.030	0.042	0.051
Wheel	0.024	0.036	0.047
Motor grader	0.025	0.035	0.047
Scraper	0.026	0.035	0.044
Tractor			
Crawler	0.028	0.037	0.046
Wheel	0.028	0.038	0.052
Truck, off-highway	0.014	0.020	0.029
Wagon	0.029	0.037	0.046

*Low, light work or considerable idling; average, normal load and operating conditions; severe, heavy work, little idling

Service Cost

- *Service cost* represents the cost of oil, hydraulic fluids, grease, and filters as well as the labor required to perform routine maintenance service. Table.17-2

TABLE 17-2: Service cost factors (% of hourly fuel cost)

Operating Conditions	Service Cost Factor
Favorable	20
Average	33
Severe	50

Repair Cost

- *Repair cost* represents the cost of all equipment repair and maintenance except for tire repair and replacement, routine service, and the replacement of high-wear items, such as ripper teeth.
- It should be noted that repair cost usually constitutes the largest item of operating expense for construction equipment.
- *Lifetime repair cost* is usually estimated as a percentage of the equipment's initial cost less tires (Table 17-3).

Repair Cost

- it is suggested that Equation 17-7 be used to obtain a more accurate estimate of repair cost during a particular year of equipment life.

Hourly Repair Cost =

[Year digit / Sum of years' digits] ×

x [Lifetime repair cost/ Hours operated] (17-7)

TABLE 17-3: Typical lifetime repair cost (% of initial cost less tires)

	Operating Conditions		
Type of Equipment	Favorable	Average	Severe
Clamshell and dragline	40	60	80
Compactor, self-propelled	60	70	90
Crane	40	50	60
Excavator, hoe, or shovel	50	70	90
Loader			
Track	85	90	105
Wheel	50	60	75
Motor grader	45	50	55
Scraper	85	90	105
Tractor			
Crawler	85	90	95
Wheel	50	60	75
Truck, off-highway	70	80	90
Wagon	45	50	55

EXAMPLE 17-5

- Estimate the hourly repair cost for the first year of operation of a crawler tractor costing $136,000 and having a 5-year life. Assume average operating conditions and 2000 hours of operation during the year.

Solution

- Lifetime repair cost factor = 0.90 (Table 17-3)
- Lifetime repair cost =0.90 × $136,000 = $122,400
- Hourly Repair Cost = [1/ 15] × [122,400/2000] = $4.08

Tire Cost

- *Tire cost* represents the cost of tire repair and replacement.
- Table 17-4 may be used as a guide to approximate tire life.
- Tire repair will add about 15% to tire replacement cost.
- Equation 17-8 may be used to estimate tire repair and replacement cost.

$$\text{Tire Cost} = 1.15 \times \text{Cost of a set of tires} / \text{Expected tire life (h)} \qquad (17\text{-}8)$$

TABLE 17-4: Typical tire life (hours)

	Operating Conditions		
Type of Equipment	Favorable	Average	Severe
Dozers and loaders	3,200	2,100	1,300
Motor graders	5,000	3,200	1,900
Scrapers			
Conventional	4,600	3,300	2,500
Twin engine	4,000	3,000	2,300
Push-pull and elevating	3,600	2,700	2,100
Trucks and wagons	3,500	2,100	1,100

Special Items

- The cost of replacing high-wear items such as dozer, grader, and scraper blade cutting edges and end bits, as well as ripper tips, shanks, and shank protectors, should be calculated as a separate item of operating expense.
- A unit cost is divided by expected life to yield cost per hour.

Operator

- The final item making up equipment operating cost is the operator's wage.
- Care must be taken to include all costs, such as:
  - worker's compensation insurance,
  - Social Security taxes,
  - overtime or premium pay, and
  - fringe benefits in the hourly wage figure.

Total Owning and Operating Costs

- After owning cost and operating cost have been calculated, these are totaled to yield total owning and operating cost per hour of operation.
- It does not include overhead or profit.

EXAMPLE 17-6

- Calculate the expected hourly owning and operating cost for the second year of operation of the twin-engine scraper described below.

- Cost delivered = $152,000
- Tire cost = $12,000
- Estimated life = 5 years
- Salvage value = $16,000
- Depreciation method = sum-of-the-years'-digits
- Investment (interest) rate = 10%
- Annual Working hours= 2000 h

- Tax, insurance, and storage rate = 8%
- Operating conditions = average
- Rated power =465 hp
- Fuel price=$1.3/gal
- Operator's wages = $8.00/h

EXAMPLE 17-6
Solution

- **Owning Cost**
  - Depreciation cost:

    D_2 =((5-(2-1)) /15) × (152,000 - 16,000 - 12,000) = $33,067

    Depreciation = 33,067/2000 =$16.53/h
  - Investment, tax, insurance, and storage cost:
  - Cost rate = Investment + tax, insurance, and storage

    = 10 + 8 = 18%
  - Average Investment = (152000 + 16000)/2 = $84,000 (17-6)
  - Investment, tax, Insurance, and storage =

    = (84000 × 0.18)/2000 = $7.56/h
  - Total owning cost = 16.53 + 7.56 =$24.09/h

- **Operating Cost**
- Fuel cost:
  - Estimated consumption = 0.035 x 465 = 16.3 gal/h (Table 17-1)
  - Fuel cost = 16.3 × 1.3 = $21.19/h
    - Fuel cost (Diesel) = SR 0.25/ *liter*
    - Rated horsepower = 350 kW
    - Fuel consumption factors = 0.052 *l* /h/kW
    - Fuel cost= 0.25 x 0.052 x 350 = SR 4.55 / h
- Service cost:
  - Service cost = 0.33 × 21.19 = $7.06/h (Table 17-2)
- Repair cost:
  - Lifetime repair cost = 0.90 × (152,000 - 12,000) = = $126,000 (Table 17-3)
  - Repair cost = 2/15 × (126000/2,000) = $8.40/h (17-7)

Service cost factors

Operating Conditions	Service Cost Factor
Favorable	20
Average	33
Severe	50

Typical tire life

	Operating Conditions		
Type of Equipment	Favorable	Average	Severe
Dozers and loaders	3,200	2,100	1,300
Motor graders	5,000	3,200	1,900
Scrapers			
Conventional	4,600	3,300	2,500
Twin engine	4,000	3,000	2,300
Push-pull and elevating	3,600	2,700	2,100
Trucks and wagons	3,500	2,100	1,100

Typical lifetime repair cost

	Operating Conditions		
Type of Equipment	Favorable	Average	Severe
Clamshell and dragline	40	60	80
Compactor, self-propelled	60	70	90
Crane	40	50	60
Excavator, hoe, or shovel	50	70	90
Loader			
Track	85	90	105
Wheel	50	60	75
Motor grader	45	50	55
Scraper	85	90	105
Tractor			
Crawler	85	90	95
Wheel	50	60	75
Truck, off-highway	70	80	90
Wagon	45	50	55

- Tire cost:
  - Estimated tire life =3000 h (Table 17-4)
  - Tire cost = 1.15× $12,000/3000 = $4.60/h
- Special item cost: None
- Operator wages =$32.00/h
- Total operating cost

  = 21.19 + 7.06 + 8.40 + 4.60 + 32.00 = $73.25/h
- **Total 0 & 0 Cost**

– Owning and operating cost = 24.09 + 73.25 = $97.34/h

17-4 THE RENT-LEASE-BUY DECISION

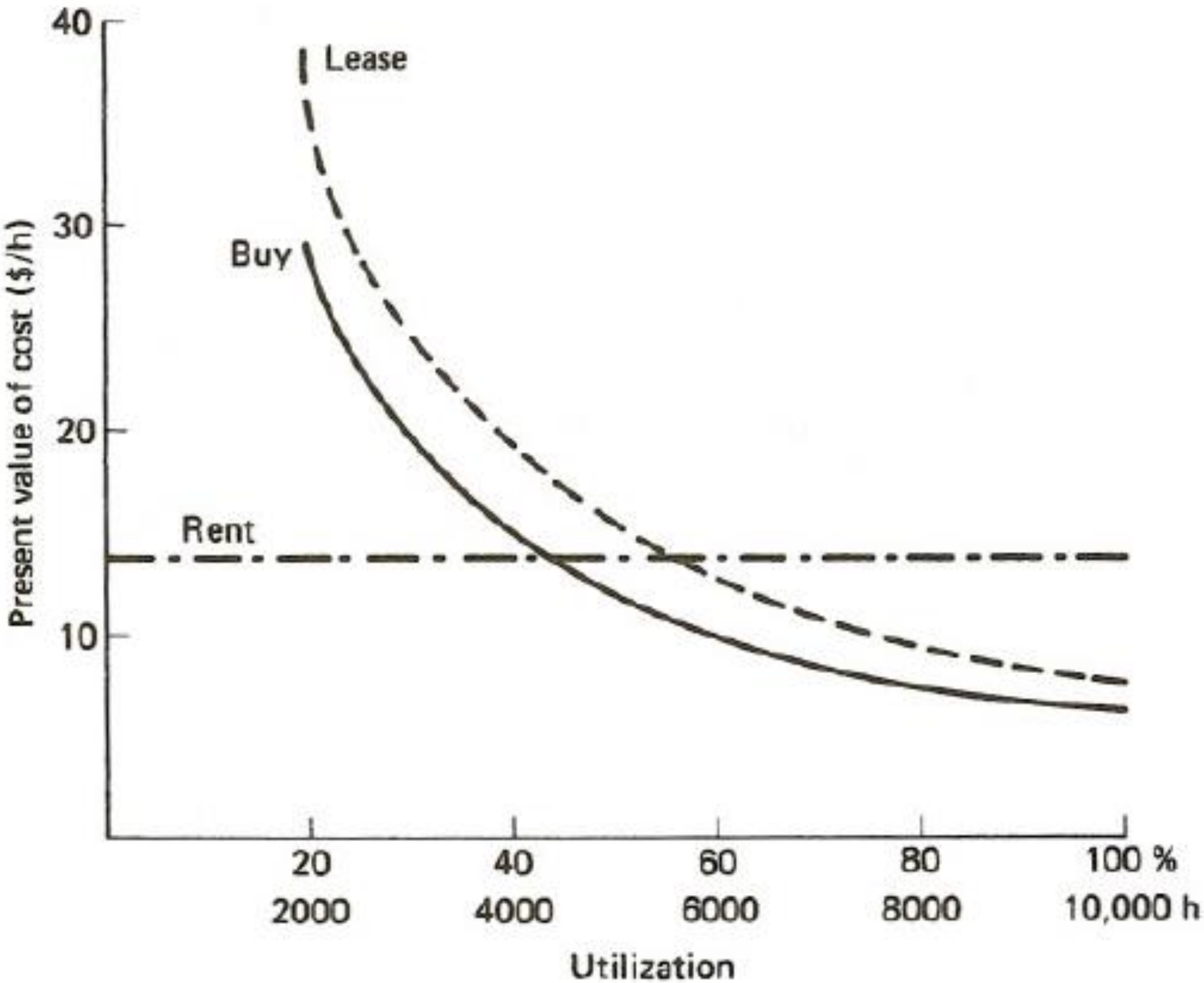
- The question of whether it is better to purchase a piece of construction equipment rather than renting or leasing the item is difficult to answer.
- Leasing involves a commitment for a fixed period and may include a purchase option in which a portion of the lease payments is credited toward the purchase price if the option is exercised.
- Renting is a short-term arrangement subject only to the availability of rental equipment and a minimum rental period (usually 1 day).

- In recent years there has been a trend toward increased leasing and renting of construction equipment.
- Some of the reasons for this trend include:
  - inflation,
  - the high cost of borrowed funds, and
  - the wide fluctuation in the rate of demand for construction services.
- There are some construction companies that make it a policy to rent or lease all major items of equipment.
- Advantages of equipment ownership include governmental tax incentives (investment credit and depreciation), full control of equipment resources, and availability of equipment when needed.

- Leasing and renting require little initial capital (usually none for renting) and equipment costs are fully tax deductible as project expenses.
- In general, purchasing equipment will result in the lowest hourly equipment cost if the equipment is properly maintained and fully utilized.
- equipment owning costs continue whether equipment is being utilized or sitting idle.
- Therefore, renting is usually least expensive for equipment which has low utilization.

- Leasing is intermediate between the two and may be the best solution when capital is limited and equipment utilization is high.
- The lease-with-purchase option may provide an attractive opportunity to purchase the equipment at low cost after lease costs have been paid under a cost-type contract.
- One approach to comparing the cost of buying, leasing, and renting an item of equipment is illustrated in Example 17-7.
- Under the particular circumstances of Example 17-7, buying is significantly less expensive than either leasing or renting if the equipment is fully utilized for the planned 5 years or 10,000 hours.

FIGURE 17-1: Hourly cost of buying, leasing, and renting for Example 17-7.



17-5 FINANCIAL MANAGEMENT OF CONSTRUCTION

- Construction company failure in the United States indicate that the four major factors of:
  - inadequate financing,
  - underestimating costs,
  - inadequate cost accounting, and
  - poor management

  These factors account for over 80% of all failures.
- The financial management of a construction company is equally as important to company success as is its technical management is apparent.

Financial Planning

- Financial planning for a construction project includes:

1. Cost estimating prior to bidding or negotiating a contract
2. Financial planning: forecasting project income and expenditure (or cash flow)
3. Determining the amount of work that a construction firm can safely undertake at one time

1. Cost estimating

- Cost estimating for a project, as the name implies, involves estimating the total cost to carry out a construction project in accordance with the plans and specifications.
- Costs that must be considered include:
  - labor,
  - equipment,
  - materials,
  - subcontracts and services,
  - indirect (or job management) costs, and
  - general overhead (off-site management and administration costs).

2. Financial Planning

- A finance schedule or cash flow schedule shows the planned rate of project expenditure and project income.
- It is common practice in the construction industry for the owner to withhold payment for a percentage of the value of completed work (referred to as "retainage") as a guarantee until acceptance of the entire project.
- Even when periodic progress payments are made for the value of completed work, such payments (less retainage) are not received until sometime after the end of each accounting period.

- project income will almost always lag behind project expenditure.
- The difference must be provided in cash from company assets or borrowed funds.
- The construction industry relies heavily on the use of borrowed funds for this purpose.
- the finance charges associated with the use of such funds, as well as the maximum amount of funds available, are important considerations in the financial planning for a construction project.

- The use of CPM procedures also makes it easy to determine the effect on cash flow of different project schedules.
- Figure 17-2 shows a graph of project cost versus time for three different schedules:
  – an early start schedule,
  – a late start schedule, and
  – a proposed schedule which is between these limits.
- Figure 17-3 illustrates a financial schedule showing project expenditures, value of completed work, and receipts for a particular project schedule.

FIGURE 17-2 Project cost versus time

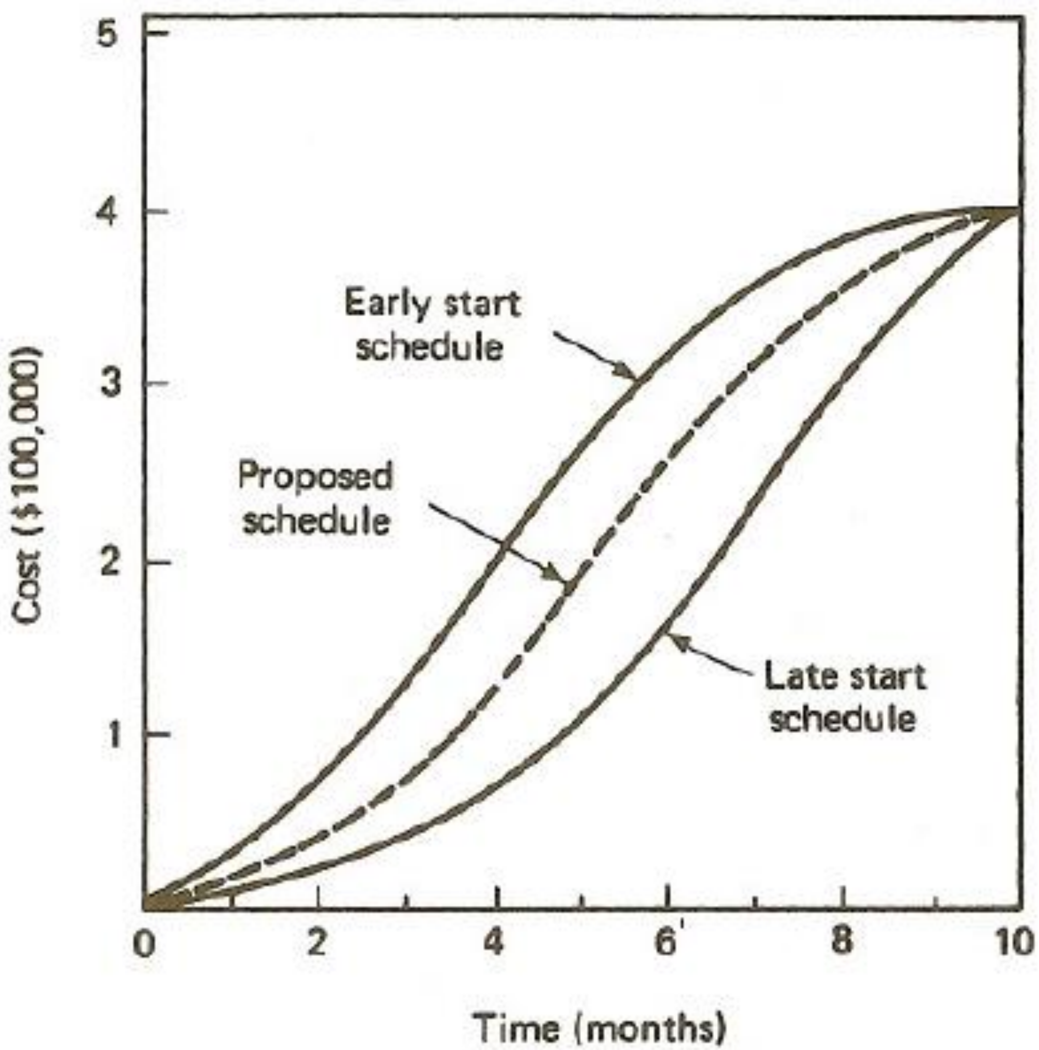
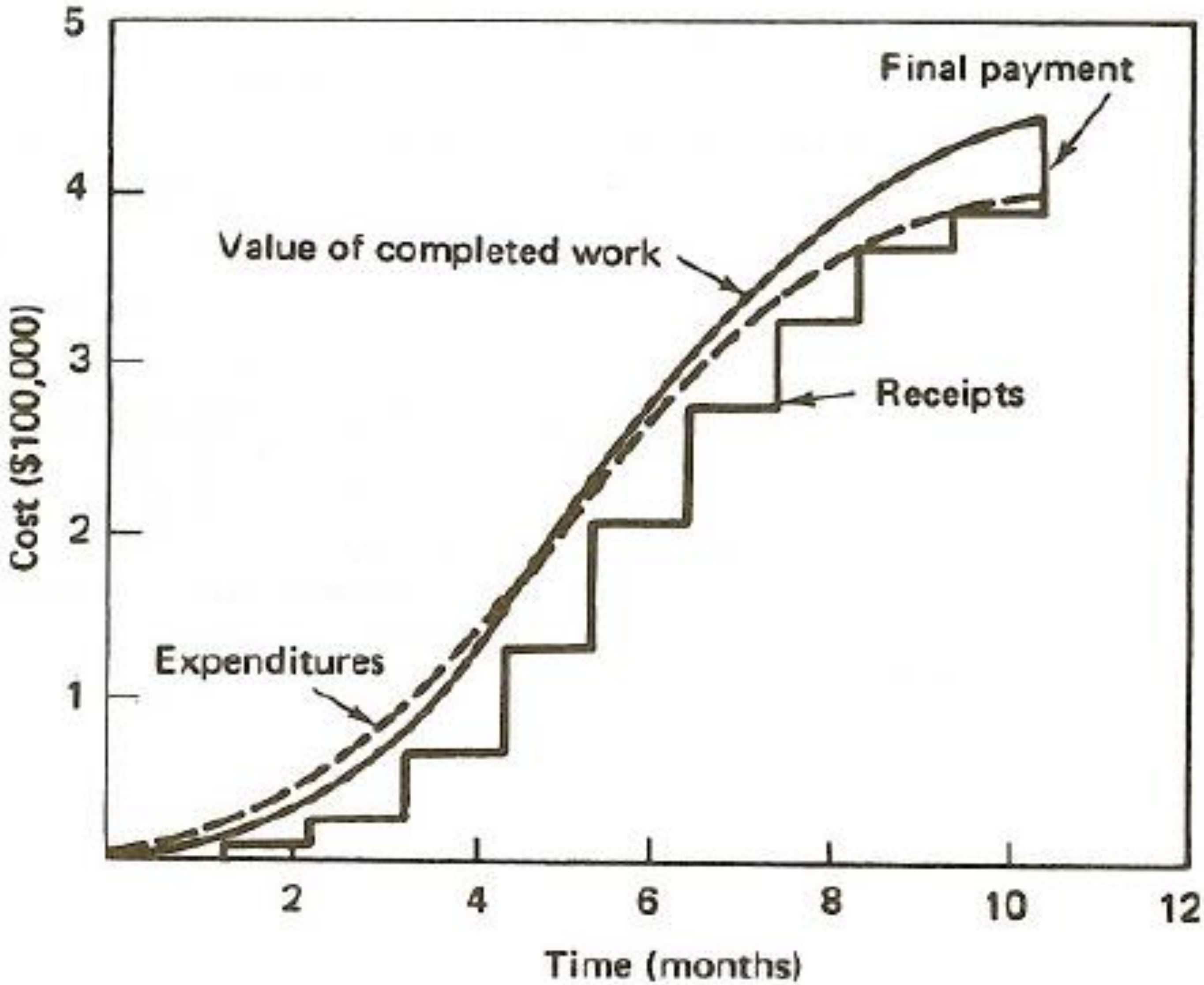


FIGURE 17-3 Project financial schedule



3. Amount of work that a construction firm can safely undertake

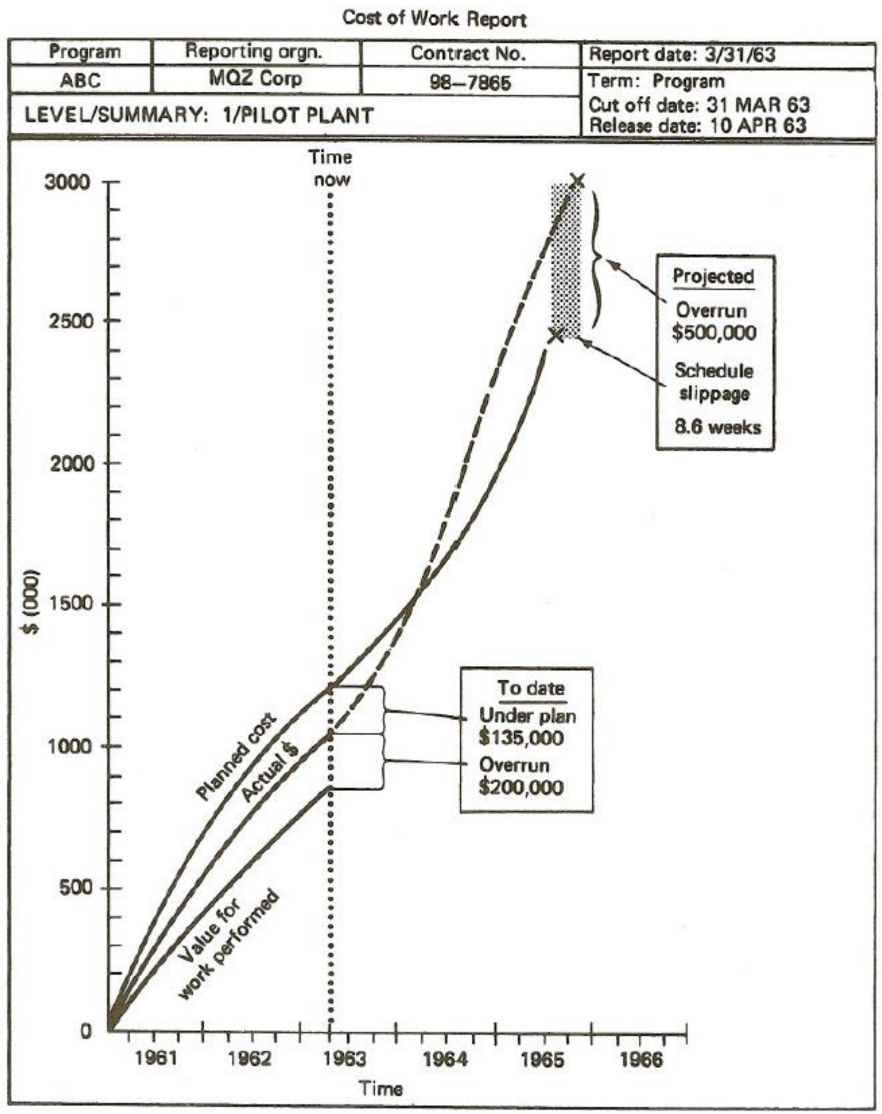
- Another important consideration in financial planning is the capacity of a firm to undertake additional projects.
- It has been found that most construction contracts require a minimum working capital of about 10% of the contract value.
- This working capital is needed to cover the difference between project income and project expenditures described above.
- The availability of working capital also affects the type of construction contract that might be appropriate for any additional work to be undertaken.
- When working capital is marginal, any additional work should be limited to low-risk projects such as cost-reimbursable contracts.

Project Cost Control

- Project cost control involves the measurement and recording of project costs and progress and a comparison between actual and planned performance.
- The principal objective of project cost control is to maximize profit while completing the project on time at a satisfactory level of quality.
- Proper cost control procedures will also result in the accumulation of historical cost data, which are invaluable in estimating and controlling future project costs.

- To carry out project cost control it is necessary to have a method for identifying cost and progress by project work element.
- The use of CPM procedures greatly simplifies this process, because major work items have already been identified as activities.
- To permit a comparison of project progress versus cost, it is necessary that progress reporting intervals coincide with cost reporting intervals.
- The interval between reports will depend on the nature and importance of the project.

FIGURE 17-4 PERT/Cost progress and cost report. (PERT Coordinating Group, U.S. Government)



Finance Schedule (Cash flow schedule)

Example

Financial data for a project is shown below. Plot the accumulated project expenditures, value of work, and progress payments received versus time. What is the contractor's maximum negative cash flow and when does it occur? and draw the negative cash flow profile. Progress payments are calculated at the end of each month and received the middle of the following month. Retainage is 10% until project completion. Assume that final project payment, including released retainage, is received the middle of the month following project completion.

Example

Financial data for a project is shown below. Plot the accumulated project expenditures, value of work, and progress payments received versus time. What is the contractor's maximum negative cash flow and when does it occur? and draw the negative cash flow profile. Progress payments are calculated at the end of each month and received the middle of the following month. Retainage is 10% until project completion. Assume that final project payment, including released retainage, is received the middle of the month following project completion.

Month	End of month cumulative		Actual	Negative cash flow	
	Expenditure	Value of work	Receipt	Before pmt	After pmt
1	SR 10000	SR 7500			
1.5	17500		6750	17500	10750
2	25000	20500			
2.5	34500		18450	27750	16050
3	44000	40000			
3.5	57000		36000	38550	21000
4	70000	75000			
4.5	86000		67500	50000	18500
5	102000	106000			
5.5	106000		95400	38500	10600
6	110000	120000			
6.5	112500		108000	17100	4500
7	115000	128000		7000	
7.5			128000		

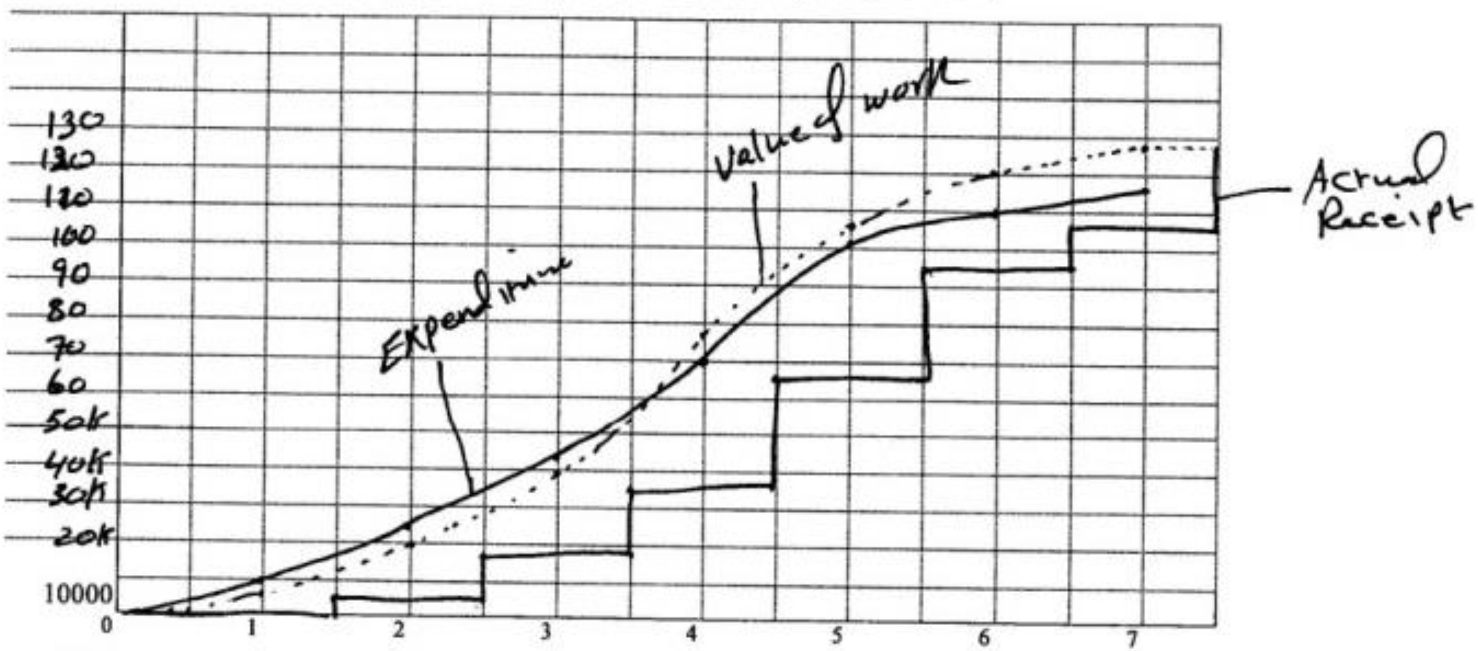
17500 − 0 = 17500
17500 − 6750 = 10750
34500 − 6750 = 27750
34500 − 18450 = 16050

Maximum −ve Cashflow = 50,000 at Month 4.5

Month	End of month cumulative		Actual	Negative cash flow	
	Expenditure	Value of work	Receipt	Before pmt	After pmt
1	SR 10000	SR 7500			
1.5	17500		6750	17500	10750
2	25000	20500			
2.5	34500		18450	27750	16050
3	44000	40000			
3.5	57000		36000	38550	21000
4	70000	75000			
4.5	86000		67500	50000	18500
5	102000	106000			
5.5	106000		95400	38500	10600
6	110000	120000			
6.5	112500		108000	17100	4500
7	115000	128000		7000	
7.5			128000		

1750…
17500 - 6750 =
34500 - 6750 = 2775
34500 - 18450 = 16050

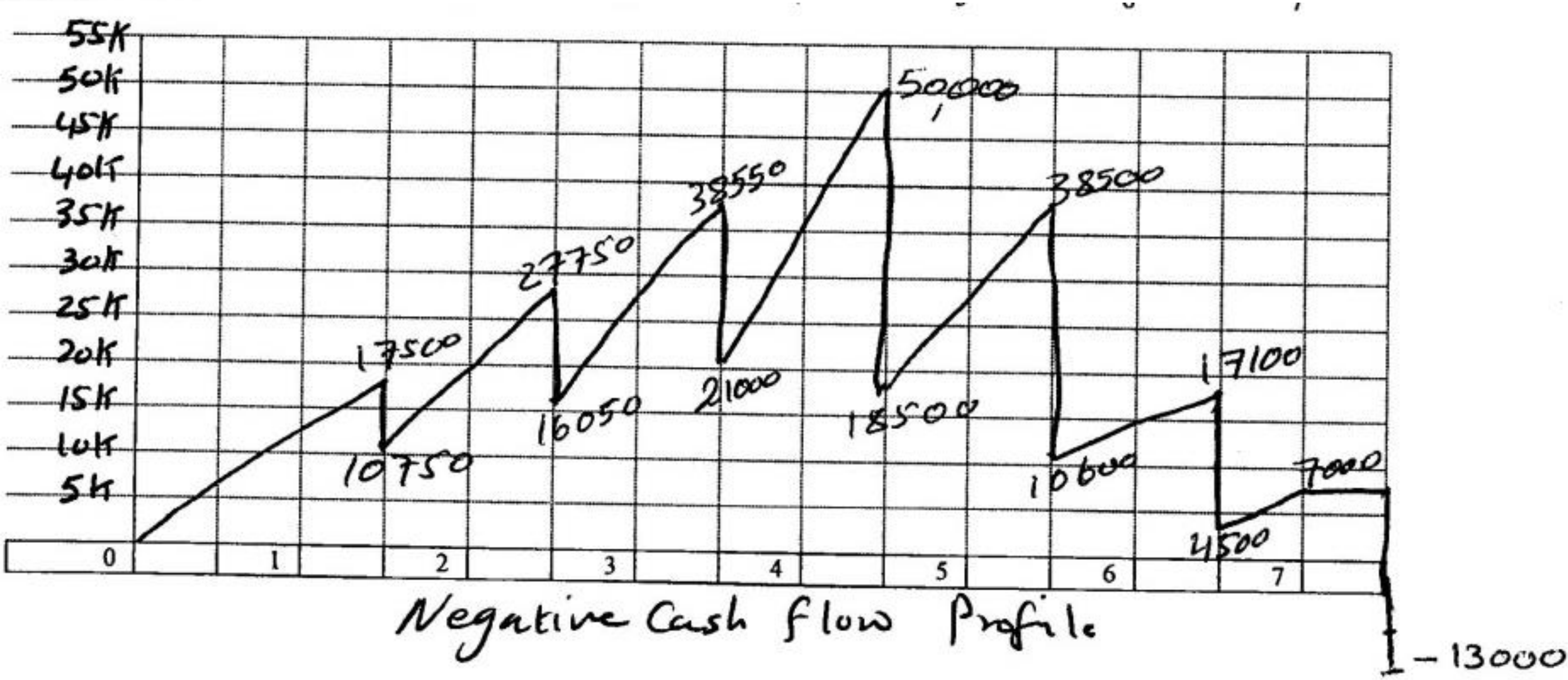
Maximum -ve Cashflow = 50,000 at Month 4.5



Month	End of month cumulative		Actual Receipt	Negative cash flow	
	Expenditure	Value of work		Before pmt	After pmt
1	SR 10000	SR 7500			
1.5	17500		6750	17500	10750
2	25000	20500			
2.5	34500		18450	27750	16050
3	44000	40000			
3.5	57000		36000	38550	21000
4	70000	75000			
4.5	86000		67500	50000	18500
5	102000	106000			
5.5	106000		95400	38500	10600
6	110000	120000			
6.5	112500		108000	17100	4500
7	115000	128000		7000	
7.5			128000		

17500 - 6750 -
34500 - 6750 = 27750
34500 - 18450 = 16050

Maximum -ve cashflow
= 50,000
at Month 4.5

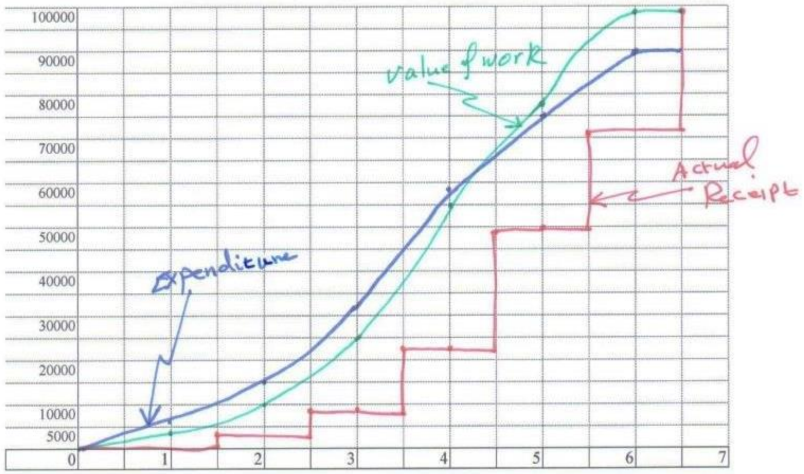


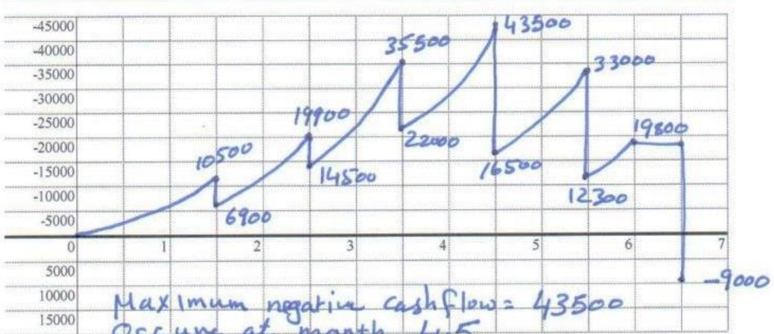
Negative Cash flow Profile

Financial data for a project is shown below. Plot the accumulated project expenditures, value of work, and progress payments received versus time. What is the contractor's maximum negative cash flow and when does it occur? and draw the negative cash flow profile. Progress payments are calculated at the end of each month and received the middle of the following month. Retainage is 10 % until project completion. Assume that final project payment, including released retainage, is received the middle of the month following project completion.

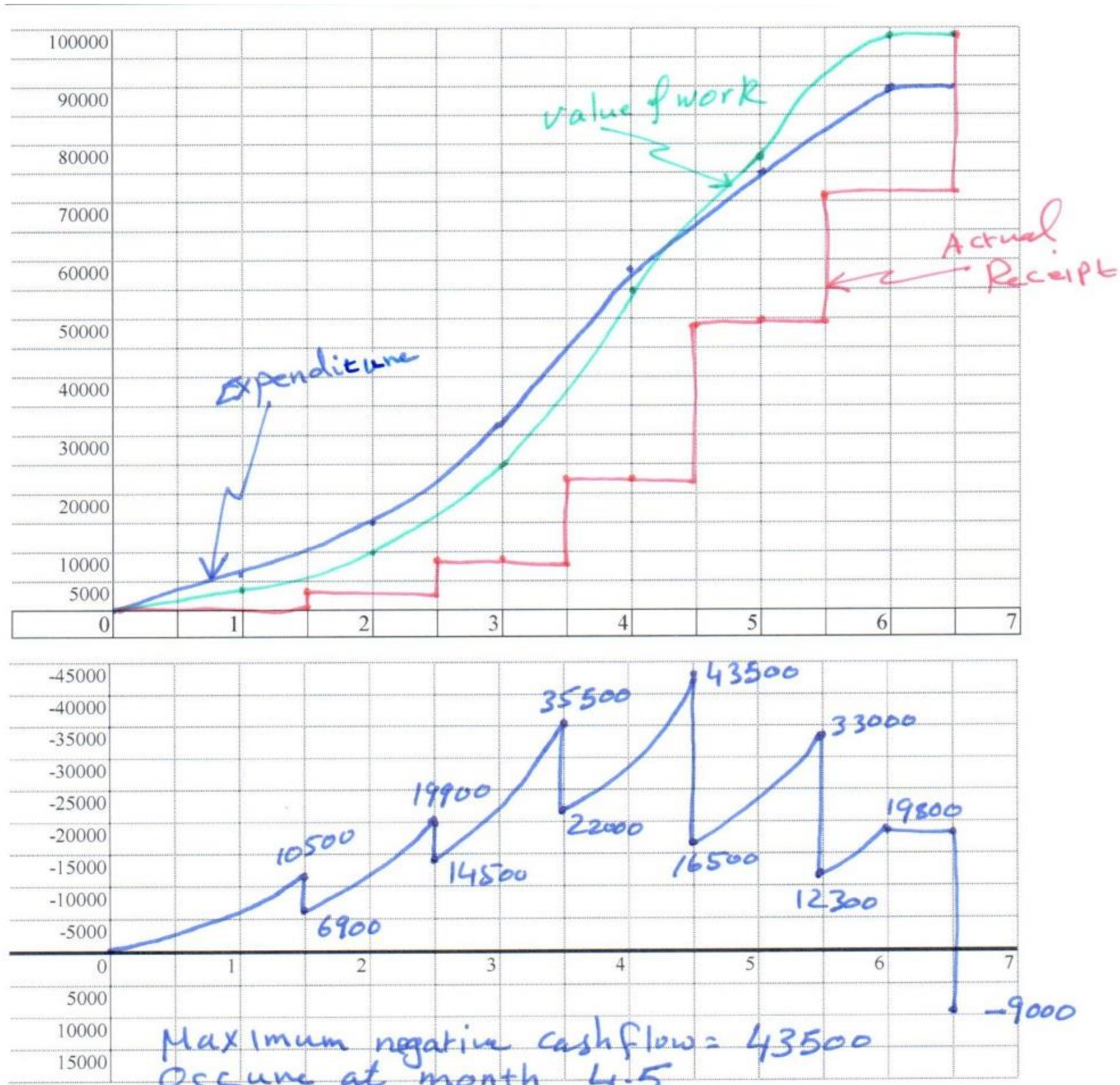
Month	End of month cumulative		Actual Receipt	Negative cash flow	
	Expenditure	Value of work		Before pmt	After pmt
1	SR 6000	SR 4000			
1.5	10500		*3600*	*10500*	*6900*
2	15000	10000			
2.5	23500		*9000*	*19900*	*14500*
3	32000	25000			
3.5	44500		*22500*	*35500*	*22000*
4	57000	55000			
4.5	66000		*49500*	*43500*	*16500*
5	75000	78000			
5.5	82500		*70200*	*33000*	*12300*
6	90000	99000		*19800*	
6.5	90000		*99000*	*19800*	*-9000*

Month	End of month cumulative		Actual Receipt	Negative cash flow	
	Expenditure	Value of work		Before pmt	After pmt
1	SR 6000	SR 4000			
1.5	10500		3600	10500	6900
2	15000	10000			
2.5	23500		9000	19900	14500
3	32000	25000			
3.5	44500		22500	35500	22000
4	57000	55000			
4.5	66000		49500	43500	16500
5	75000	78000			
5.5	82500		70200	33000	12300
6	90000	99000		19800	
6.5	90000		99000	19800	-9000





Negative Cash flow Profile



Negative Cash flow Profile