



Title: Construction Project Cash Flow

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Abstract: This project is concerned with the cash flow of a construction project. The study develops cost estimates and cash flow for a real construction project. It also shows some economical techniques that could be used by the construction contractors.

**Construction Project Cash Flow
A Real Life Project Case**

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EMP-P9741

Construction Project Cash Flow

A Real Life Project Case

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1. Introduction:

This project is concerned with the cash flow of a construction project. The study develops cost estimates and cash flow for a real construction project. It also shows some economical techniques that could be used by the construction contractors.

The study is based on data from an actual construction project in the United Arab Emirates (UAE). The team members came from the same area of the world and have similar backgrounds and interests in construction, so the project chosen was the Shahama Tower in the city of Abu Dhabi, the capital of the UAE. The team could access some of the needed information because one member had trained with the contractor some years ago. The team members may find this report useful in the future for job interviews.

The first section of this study shows the real construction project's information and data. The rest of the study shows the cost estimates and the development of cash flow.

Purpose:

The team is viewing the project from the contractor's point of view and emulating the contractor's situation in estimating and bidding the project and working out its projected cash flow. It is important to point out that this report studies the cash position for the construction project during the construction period.

The team decided to study the project in its original currency unit, Dirham. The US\$ = 3.67Dh.

2. The Importance of Cash Flow:

Cash flow is very important for construction companies because contractors need to forecast their cash flow needs in order to know the future revenues and loans.

In addition, cash flow is important for lenders, which are mostly banks, in determining whether to finance the project or not. Many contractors have real problems in proving to lenders their real cash flow needs (6.)

Cash flow forecasting is also crucial for upper management for predicting and controlling overall company cash flow and future bidding plans(3.)

3. General Information about the case project:

- The Shahama Tower project is a residential and commercial project in a prestigious area in the city of Abu Dhabi, the capital of the United Arab Emirates. The project is high-quality high rise building covering four blocks and has a retail commercial-residential area of 40,000 square meters.
- The duration of the project is 33 months.
- Project start date: 02.05.97
- Consultant fee: 4%
- Financial conditions:
 - Regular monthly payments: 90% of work done.
 - One month between payment approval and payment receipt.
 - Retention: 3% of each bill will be paid at the end of the project.

The contractor agreed to supply the team with the following data:

1. Main Bar Chart and CPM for the project activities.
2. The direct cost for each activity. (The contractor did not agree to give the real direct cost for the activities; what we got are factored direct costs.)

4. The construction environment in the UAE:

In the UAE, the contractual relationship between owner, designer (architect), and contractor is traditional. The owner employs an architect consultant who first prepares the plans and specifications, and then exercises some degree of inspection and monitoring during the construction. Construction is the responsibility of the general contractor under contract to the owner. The general contractor can subcontract some of the work, but he is responsible to the owner for all the work, including that which is subcontracted. In this traditional relationship, the consultant represents the owner and is fully involved in quality, schedule, and payment issues.

In the U.S. this relationship is different. There is a construction management party that represents a client in the project. The designer or consultant does not have direct authority over the contractor during the project, the connection is maintained through the construction management office which has full authority of the project. This situation saves many problems that may raise between contractor and designer and at the same time prevents the contractor and consultant from agreeing to work together against the owner who usually doesn't have a technical background (3.)

5. Developing Cash Flow Statement :

5.1 Cost Estimation

An estimate is a calculation of various items of work and the expenses likely to be incurred thereon. The total of these probable expenses to be incurred on the work is known as the “estimated cost” of the work (5.) The cost estimate is the first step in developing the cash flow statement.

The cost estimation of the project consists of two main costs:

1. The direct cost, which includes the cost of materials, equipment, and labor.
2. The indirect cost, which is the project overhead.

Since the original contractor provided the team with the direct cost of the project, the team estimated the indirect cost of the project.

5.1.1 Project Overhead

Overhead costs are the indirect expenses that are incurred in achieving project completion, but do not apply directly to any specific work item (7.) The job overhead can be handled in different ways. It could be added to the estimates as some percentage of direct job cost. But to avoid uncertainty, the overhead is estimated in details after it is divided into basic items:

- a- Supervision
- b- Indirect Labor
- c- Camp and site offices
- d- Administrative expenses
- e- General equipment

5.1.1.1 Supervision:

It is the cost of technical and administrative staff of the project. This cost is listed in table 1

Table 1 cost of technical and administrative staff.

DESCRIPTION	NO.	PERIOD (MONTH)	TOTAL PERIOD (MONTH)	RATE DHS	AMOUNT DHS
Project Manager	1	35	35	35000	1225000
Architect	1	35	35	25000	875000
Structural engineer	2	30	60	20000	1200000
Construction engineer	3	30	90	20000	1800000
Office engineer	1	30	30	18000	540000
Site engineer	4	26	104	12000	1248000
QA	1	33	30	12000	396000
General Superintendent	3	26	78	18000	1404000
Forman	12	26	312	7000	2184000
Quantity surveyor	1	33	33	25000	825000
Asst. quantity surveyor	1	30	30	7000	210000
Lab technician	1	26	26	8000	208000
Land surveyor	1	24	24	7000	168000
Drawing man	4	28	112	3500	392000
Project Accountant	1	33	33	16000	528000
Administrator	1	33	33	10000	330000
Account clerk	3	33	99	3500	346500
Store keeper	3	32	96	5000	480000
Secretary/Costing clerks	5	33	165	4000	660000
Purchaser	2	28	56	7000	392000
Camp supervisor	1	30	30	7000	210000
				Total	16,442,000

5.1.1.2 Indirect Labors:

Indirect labors whom expense can not chargeable directly to the project(7.)

The amounts of indirect labors is listed in table 2

Table 2 Indirect labors cost

DESCRIPTION	NO.	PERIOD (MONTH)	TOTAL PERIOD (MONTH)	RATE (DHS)	AMOUNT (DHS)
Electrician	1	33	33	1500	49500
Plumber	1	33	33	1500	49500
Carpenter	1	33	33	1500	49500
Store helper	2	33	66	1000	66000
Chain-men	3	33	99	1000	99000
Lab assistant	3	33	99	1000	99000
Office boys	10	33	330	1000	330000
Cooker	4	33	132	2000	264000
Watchman	2	33	66	1000	66000
Camp and site cleaners	6	33	198	1000	198000
Mechanics	2	33	66	1500	99000
Assistant mechanics	4	33	132	1200	158000
Light duty drivers	6	33	198	2000	396000
Labors for curing	6	20	120	1000	120000
Welders	2	33	66	1500	99000
				TOTAL	2142900

5.1.1.3 Camp and Site: (Table 3)

Table 3 Camp and site offices

DESCRIPTION	AMOUNT
Engineers Office	250000
Contractors Office	250000
Survey equipment	50000
Stationery	300000
Telephone	300000
Lab. Equipment	100000
Camp and food for technical, administration and indirect labors	1600000
Camp and food indirect cost of direct labors	1400000
Total = 4250000	

5.1.1.4 Administrative Expenses: (Table 4)

Table 4 Administrative expenses

DESCRIPTION	AAMOUNT
Bid bond	25000
Performance bond	750000
work Insurance	1000000
Workmen compensation	150000
Head office overhead	10000000
Finance	2000000
Allow payment to government departments.	1000000
Total = 14925000	

5.1.1.5 General Equipment: (Table 5)

Table 5 General Equipment

DESCRIPTION	NO.	PERIOD (MONTH)	TOTAL PERIOD	RATE	AMOUNT
Tower crane	4	30	120	10000	1200000
Hoist	4	24	96	5000	480000
Heavy duty Compressor	2	30	60	4000	240000
Water crane	1	28	28	15000	420000
Mobile crane	1	20	20	20000	400000
Carpentry Workshop	1	24	24	5000	120000
cars/pickups	18	30	540	3000	1620000
					Total = 4480000

Total job overhead :

a. Supervision	16,442,000 Dhs
b. Indirect labor	2,142,900 Dhs
c. Camp and site offices	4,250,000 Dhs
d. Administrative expenses	14,925,000 Dhs
e. General equipment	4,480,000 Dhs
<hr/>	
Total overhead	42,239,900 Dhs
Preliminaries	6,110,000 Dhs
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job overhead - preliminaries	36,129,900 Dhs

The preliminaries are included as a direct cost in the summary sheet. The owner allows the contractor to deduct this amount and distribute it through out the project life.

5.1.2 Summary Sheet:

To calculate the needed bid item prices, all the costs associated with the project were brought together in summary form. The summary sheet shows the direct cost of the project items, which was supplied by the main contractor, in addition to the job overhead.

The job's indirect costs and markup do not appear as line items on the summary sheet as they were distributed over the items that do appear. The distribution factor = Total project price / Total direct cost. Each item's price is multiplied by this factor to take its proportional share of the project indirect cost. The summary sheet analysis is listed in Table 6.

Table 6 Summary Sheet

Bill No.	Description	Direct Cost	Bid	
			Factor	Total
1	Preliminaries	6,110,000	1.379	8,425,690
2	Earth Work & Dewatering	600,000	1.379	827,400
3	Piling	3,500,000	1.379	4,826,500
4	Sub Structure	1,426,036	1.379	1,966,504
5	Super Structure	25,586,071	1.379	35,283,192
6	Block Work	2,612,755	1.379	3,602,989
7	Wall Plastering	75,838	1.379	104,581
8	Ceiling Finishes	3,200,000	1.379	4,412,800
9	Wall Finishes	2,300,000	1.379	3,171,700
10	Floor Finishes	5,400,000	1.379	7,446,600
11	Skirting & Thresholds	350,000	1.379	482,650
12	Joinery & Carpentry	5,300,000	1.379	7,308,700
13	Metal Work	600,000	1.379	827,400
14	Aluminium Work	1,000,000	1.379	1,379,000
15	Special Doors	1,000,000	1.379	1,379,000
16	Glass Reinforced Concrete	1,200,000	1.379	1,654,800
17	Construction Joints	350,000	1.379	482,650
18	Roofing & Insulation	700,000	1.379	965,300
19	Parking Floor Accessories	350,000	1.379	482,650
20	Furniture	150,000	1.379	206,850
21	Pssenger Left	125,000	1.379	172,375
22	Sub Station	140,000	1.379	193,060
23	Curtian Wall	30,000,000	1.379	41,370,000
24	Decoration	9,000,000	1.379	12,411,000
25	Kitchen & Pantry	3,300,000	1.379	4,550,700
26	Air-Conditioning Work	13,000,000	1.379	17,927,000
27	Plumbing & Drainage Work	6,000,000	1.379	8,274,000
28	Electrical Work	15,800,000	1.379	21,788,200
29	Sanitary Fixtures & Fittings	2,000,000	1.379	2,758,000
30	Facade Maintenance Unit	1,200,000	1.379	1,654,800
Total		142375700	-	196,336,090

5.1.3 Developing the total bid sum:

To get the fixed lump sum price of the project, the following calculations are followed:

Total direct cost	142,375,700 Dhs
Job overhead	36,129,900 Dhs
Total	<u>178,505,600 Dhs</u>
Markup 9.98875%	17,830,490 Dhs
Grand Total	<u>196,336,090 Dhs</u>
Add 4% consultant fee	7,853,444 Dhs
Total bid sum	<u>204,189,534 Dhs (\$55 million)</u>

$$\text{Up lift factor of bid} = \frac{196,336,090}{142,375,700} = 1.379$$

In real life markup represents the contractor's considered appraisal of a whole series of imponderables that may influence his chances of being the low bidder and his making of reasonable profit(2.) Many factors must be considered in deciding a markup figure and each can have an influence on the figure chosen. The size of the project and its complexity, its location, the contractor's evaluation of the risks and difficulties inherent in the work, the competition, and many other factors have a bearing on how a contractor may markup a job. In our case, being far from the real contractor environment, we choose the markup percent in the range of the average percent that most of the contractors use as we found in the literature.

The consultant fee, 4 percent, which appears in calculating the total bid sum is a percent that should be given to the project consultant by the winning contractor. So, this percent is added to the grand total of the project because it will be paid to the consultant in case of winning the project.

5.2 Cash Projection:

The projection of income and expenditure during the life of the project can be developed from time-scheduling. It can be computed by forecasting the time rate of expenses as the job proceeds and the schedule of progress payment to be received from the client.

The revenue per month is equal to work done for the month while the expenditure per month is derived from the direct cost plus job overhead on time basis, i.e.,

$$\begin{aligned} \text{Expenditure} &= \frac{\text{Revenue/month}}{\text{Bid factor}} + \frac{\text{Job overhead}}{\text{Duration of project}} \\ &= \frac{\text{Revenue/month}}{1.379} + \frac{36129900}{33} \end{aligned}$$

Table 7 shows monthly revenue against expenditure according to master bar chart of the project.

Table 7 Schedule of revenue and expenditure

Schedule of Revenue and Expenditure Balanced Bid

Bill No.	Description/Period in Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Preliminaries	4,212,845	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651
2	Earth Work & Dewatering		41,370	124,110	124,110	124,110	124,110	124,110	124,110	41,370									
3	Piling			965,300	1,930,600	1,930,600													
4	Sub Structure					196,950	294,976	393,301	393,301	393,301	294,976								
5	Super Structure							705,664	1,411,328	1,411,328	1,764,160	1,764,160	1,764,160	1,764,160	1,764,160	1,764,160	1,764,160	1,764,160	1,764,160
6	Block Work										180,149	180,149	180,149	180,149	180,149	180,149	180,149	180,149	180,149
7	Wall Plastering												3,137	4,183	6,275	6,275	6,275	6,275	6,275
8	Ceiling Finishes																176,512	308,896	308,896
9	Wall Finishes												95,151	126,868	190,302	190,302	190,302	190,302	190,302
10	Floor Finishes														297,864	446,796	446,796	446,796	446,796
11	Skirting & Thresholds														19,306	28,959	28,959	28,959	28,959
12	Joinery & Carpentry												219,261	292,348	438,522	438,522	438,522	438,522	438,522
13	Metal Work																		33,096
14	Aluminium Work																		55,160
15	Special Doors																		55,160
16	Glass Reinforced Concrete															66,192	115,836	115,836	115,836
17	Expansion and Construction Joints							9,653	19,306	19,306	24,133	24,133	24,133	24,133	24,133	24,133	24,133	24,133	24,133
18	Roofing & Insulation																		
19	Parking Floor Accessories															48,256	72,398	72,398	72,398
20	Furniture																		
21	Passenger Left																		
22	Sub Station																		
23	Curtain Wall																		
24	Decoration																		
25	Kitchen & Pantry																		
26	Air-Conditioning Work						179,270	179,270	179,270	179,270	179,270	179,270	179,270	358,540	358,540	358,540	358,540	358,540	358,540
27	Plumbing & Drainage Work						82,740	82,740	82,740	82,740	82,740	82,740	82,740	165,480	165,480	165,480	165,480	165,480	165,480
28	Electrical Work						217,882	217,882	217,882	217,882	217,882	217,882	217,882	435,764	435,764	435,764	435,764	435,764	435,764
29	Sanitary Fixtures & Fittings						27,580	27,580	27,580	27,580	27,580	27,580	27,580	55,160	55,160	55,160	55,160	55,160	55,160
30	Facade Maintenance Unit																		
	Revenue per month	4,212,845	173,021	1,221,061	2,186,361	2,383,311	1,058,209	1,871,851	2,587,168	2,504,428	2,902,541	2,607,565	2,925,114	3,538,436	4,067,306	4,340,339	4,590,637	4,723,021	4,866,437
	Expenditure per month	4,149,845	1,220,314	1,980,314	2,680,314	2,823,135	1,862,220	2,452,243	2,970,964	2,910,964	3,199,661	2,985,756	3,216,030	3,660,789	4,044,306	4,242,299	4,423,806	4,519,806	4,623,806

Table 7 "Continue"

Schedule of Revenue and Expenditure Balanced Bid

Bill No.	Description/Period in Month	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	Total
1	Preliminaries	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	131,651	8,425,690
2	Earth Work & Dewatering																827,400
3	Piling																4,826,500
4	Sub Structure																1,966,504
5	Super Structure	1,764,160	1,764,160	1,764,160	1,764,160	1,764,160	1,764,160	1,764,160	1,411,328	1,411,328	705,664						35,283,192
6	Block Work	180,149	180,149	180,149	180,149	180,149	180,149	180,149	180,149	180,149	180,149	180,149					3,602,989
7	Wall Plastering	6,275	6,275	6,275	6,275	6,275	6,275	6,275	6,275	6,275	4,183	3,137	2,092				104,581
8	Ceiling Finishes	308,896	308,896	308,896	308,896	308,896	308,896	308,896	308,896	308,896	308,896	308,896	220,640				4,412,800
9	Wall Finishes	190,302	190,302	190,302	190,302	190,302	190,302	190,302	190,302	190,302	126,868	95,151	63,434				3,171,700
10	Floor Finishes	446,796	446,796	446,796	446,796	446,796	446,796	446,796	446,796	446,796	446,796	446,796	446,796				7,446,600
11	Skirting & Thresholds	28,959	28,959	28,959	28,959	28,959	28,959	28,959	28,959	28,959	28,959	28,959	28,959				482,650
12	Joinery & Carpentry	438,522	438,522	438,522	438,522	438,522	438,522	438,522	438,522	438,522	292,348	219,261	146,174				7,308,700
13	Metal Work	57,918	57,918	57,918	57,918	57,918	57,918	57,918	57,918	57,918	57,918	57,918	57,918	57,918	41,370		827,400
14	Aluminium Work	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	68,950		1,379,000
15	Special Doors	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	68,950		1,379,000
16	Glass Reinforced Concrete	115,836	115,836	115,836	115,836	115,836	115,836	115,836	115,836	115,836	115,836	82,740					1,654,800
17	Expansion and Construction Joints	24,133	24,133	24,133	24,133	24,133	24,133	24,133	19,306	19,306	9,653						482,650
18	Roofing & Insulation				96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530	96,530			965,300
19	Parking Floor Accessories	72,398	72,398	72,398													482,650
20	Furniture												51,713	51,713	51,713	51,713	206,850
21	Passenger Left												43,094	43,094	43,094	43,094	172,375
22	Sub Station												48,265	48,265	48,265	48,265	193,060
23	Curtain Wall	1,654,800	2,895,900	2,895,900	2,895,900	2,895,900	2,895,900	2,895,900	2,895,900	2,895,900	2,895,900	2,895,900	2,895,900	2,895,900	2,895,900	2,068,500	41,370,000
24	Decoration	496,440	868,770	868,770	868,770	868,770	868,770	868,770	868,770	868,770	868,770	868,770	868,770	868,770	868,770	620,550	12,411,000
25	Kitchen & Pantry												1,137,675	1,137,675	1,137,675	1,137,675	4,550,700
26	Air-Conditioning Work	717,080	717,080	717,080	717,080	717,080	717,080	1,254,890	1,254,890	1,254,890	1,254,890	1,254,890	1,254,890	896,350	896,350	896,350	17,927,000
27	Plumbing & Drainage Work	330,960	330,960	330,960	330,960	330,960	330,960	579,180	579,180	579,180	579,180	579,180	579,180	413,700	413,700	413,700	8,274,000
28	Electrical Work	871,528	871,528	871,528	871,528	871,528	871,528	1,525,174	1,525,174	1,525,174	1,525,174	1,525,174	1,525,174	1,089,410	1,089,410	1,089,410	21,788,200
29	Sanitary Fixtures & Fittings	110,320	110,320	110,320	110,320	110,320	110,320	193,060	193,060	193,060	193,060	193,060	193,060	137,900	137,900	137,900	2,758,000
30	Facade Maintenance Unit														827,400	827,400	1,654,800
	Revenue per month	8,140,183	9,753,613	9,753,613	9,777,745	9,777,745	9,777,745	11,300,161	10,942,502	10,942,502	10,015,485	9,161,222	9,984,975	8,061,936	8,721,098	7,466,208	196,336,091
	Expenditure per month	6,997,806	8,167,806	8,167,806	8,185,306	8,185,306	8,185,306	9,289,306	9,029,945	9,029,945	8,357,706	7,738,226	8,335,581	6,941,064	7,419,064	6,509,064	178,505,600

5.3 Financial Cash Flow Statement:

Payment from client will be due within 30 days of valuations after deducting 3 percent retention which will be paid upon completion of the project. The income and expenditure per month is transmitted from the schedule of revenue and expenditure table.

The interest to and from the bank is assumed to be 6 percent per annum of the balance, and is added to the balance to give the actual balance at end of month. The cash flow statement is shown in Table 8 and drawn in Figure 1. Figure 1 shows that the net cash flow goes negative and increases month by month up to the twentieth month. From month 19 onward, portions of work will be executed in bigger volumes. Thus, negative balance will reduce to zero in month 31, and from month 32 on the net cash flow will be positive.

5.3.1 Unbalancing bid form items:

From literature and experience it is known that contractors needs what is called front money due to the heavy costs resulting from a long list of necessary steps toward the successful start-up of construction such as legal fees, building permits and bonding fees during construction, and making payroll until the first job draw is received. Therefore, the unbalancing of bid form items is done to get a better cash flow and reduce revenue financing costs (4.)

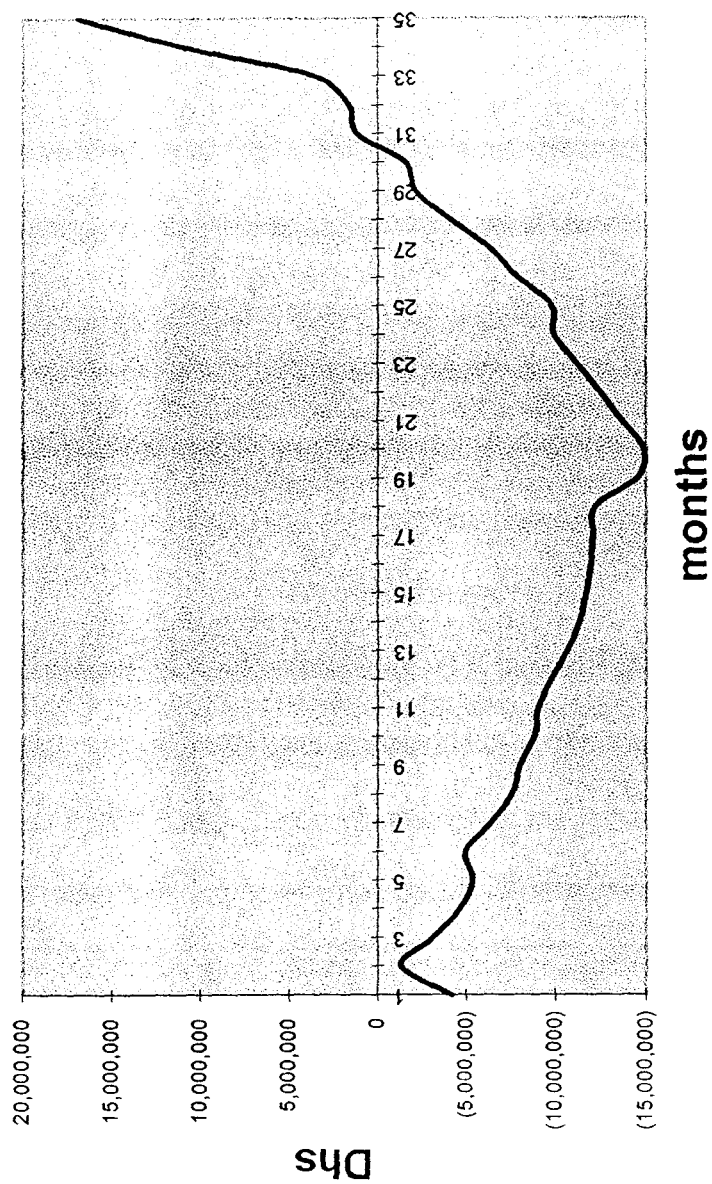
The unbalancing is done by redistributing bid factor in some other fashion among the work items without changing the overall total bid price. The bid factor of initial activities, i.e., preliminaries, earth works and de-watering, pilling,

Table 8 Cash Flow Statement

CASH FLOW STATEMENT - BALANCED BID											
NO.	Month/Year	Gross Income	3% Retention	Net Income	Cumulative Income	Monthly Expenditure	Cumulative Expenditure	Balance as at End of Month	Monthly Interest to Bank	Cumulative Interest from Bank	Net Cash Flow
1	Feb-97					4,149,845	4,149,845	(4,149,845)	(20,749)	(20,749)	(4,170,595)
2	March	4,212,845	126,385	4,086,460	4,086,460	1,220,314	5,370,159	(1,283,700)	(6,418)	(27,168)	(1,310,867)
3	April	173,021	5,191	167,830	4,254,290	1,980,314	7,350,473	(3,096,183)	(15,481)	(42,649)	(3,138,832)
4	May	1,221,061	36,632	1,184,429	5,438,719	2,680,314	10,030,787	(4,592,068)	(22,960)	(65,609)	(4,657,677)
5	June	2,186,361	65,591	2,120,770	7,559,489	2,822,918	12,853,705	(5,294,216)	(26,471)	(92,080)	(5,386,296)
6	July	2,383,012	71,490	2,311,522	9,871,011	1,862,220	14,715,925	(4,844,914)	(24,225)	(116,305)	(4,961,218)
7	August	1,058,209	31,746	1,026,463	10,897,474	2,452,243	17,168,168	(6,270,694)	(31,353)	(147,658)	(6,418,352)
8	September	1,871,851	56,156	1,815,695	12,713,169	2,970,964	20,139,132	(7,425,963)	(37,130)	(184,788)	(7,610,751)
9	October	2,587,168	77,615	2,509,553	15,222,722	2,910,964	23,050,096	(7,827,374)	(39,137)	(223,925)	(8,051,299)
10	November	2,504,428	75,133	2,429,295	17,652,017	3,199,661	26,249,758	(8,597,740)	(42,989)	(266,913)	(8,864,654)
11	December	2,902,541	87,076	2,815,465	20,467,482	2,985,756	29,235,513	(8,768,031)	(43,840)	(310,754)	(9,078,785)
12	Jan-98	2,607,565	78,227	2,529,338	22,996,820	3,216,030	32,451,544	(9,454,723)	(47,274)	(358,027)	(9,812,751)
13	February	2,925,114	87,753	2,837,361	25,834,181	3,660,789	36,112,332	(10,278,152)	(51,391)	(409,418)	(10,687,570)
14	March	3,538,436	106,153	3,432,283	29,266,464	4,044,306	40,156,638	(10,890,175)	(54,451)	(463,869)	(11,354,044)
15	April	4,067,306	122,019	3,945,287	33,211,750	4,242,306	44,398,944	(11,187,194)	(55,936)	(519,805)	(11,706,999)
16	May	4,340,348	130,210	4,210,138	37,421,888	4,423,806	48,822,750	(11,400,862)	(57,004)	(576,809)	(11,977,671)
17	June	4,590,636	137,719	4,452,917	41,874,805	4,519,806	53,342,555	(11,467,751)	(57,339)	(634,148)	(12,101,898)
18	July	4,723,020	141,691	4,581,329	46,456,134	4,623,806	57,966,361	(11,510,227)	(57,551)	(691,699)	(12,201,926)
19	August	4,866,436	145,993	4,720,443	51,176,577	6,997,806	64,964,167	(13,787,589)	(68,938)	(760,637)	(14,548,226)
20	September	8,140,182	244,205	7,895,977	59,072,554	8,167,806	73,131,972	(14,059,418)	(70,297)	(830,934)	(14,890,352)
21	October	9,753,612	292,608	9,461,004	68,533,557	8,167,806	81,299,778	(12,766,220)	(63,831)	(894,765)	(13,660,986)
22	November	9,753,612	292,608	9,461,004	77,994,561	8,185,306	89,485,084	(11,490,523)	(57,453)	(952,218)	(12,442,740)
23	December	9,777,745	293,332	9,484,413	87,478,974	8,185,306	97,670,390	(10,191,416)	(50,957)	(1,003,175)	(11,194,591)
24	Jan-99	9,777,745	293,332	9,484,413	96,963,386	8,185,306	105,855,696	(8,892,309)	(44,462)	(1,047,636)	(9,939,946)
25	February	9,777,745	293,332	9,484,413	106,447,799	9,289,307	115,145,002	(8,697,203)	(43,486)	(1,091,122)	(9,788,326)
26	March	11,300,162	339,005	10,961,157	117,408,956	9,029,945	124,174,947	(6,765,991)	(33,830)	(1,124,952)	(7,890,943)
27	April	10,942,502	328,275	10,614,227	128,023,183	9,029,945	133,204,892	(5,181,709)	(25,909)	(1,150,861)	(6,332,570)
28	May	10,942,502	328,275	10,614,227	138,637,410	8,357,707	141,562,599	(2,925,189)	(14,626)	(1,165,487)	(4,090,676)
29	June	10,015,486	300,465	9,715,021	148,352,431	7,738,227	149,300,826	(948,394)	(4,742)	(1,170,229)	(2,118,623)
30	July	9,161,223	274,837	8,886,386	157,238,818	8,335,581	157,636,406	(397,589)	(1,988)	(1,172,217)	(1,569,805)
31	August	9,984,974	299,549	9,685,425	166,924,243	6,941,064	164,577,471	2,346,772	11,734	(1,160,483)	1,186,289
32	September	8,061,936	241,858	7,820,078	174,744,320	7,419,064	171,996,535	2,747,785	13,739	(1,146,744)	1,601,041
33	October	8,721,098	261,633	8,459,465	183,203,786	6,509,064	178,505,600	4,698,186	23,491	(1,123,233)	3,574,933
34	November	7,466,208	223,986	7,242,222	190,446,007			11,940,408	59,702	(1,053,551)	10,876,856
35	December			5,890,083	196,336,090			17,830,490	89,152	(974,399)	16,856,092
36											
		196,336,090	5,890,083	196,336,090		178,505,600			(974,399)		

Figure 1

Net Cash Flow



— Net Cash Flow

sub-structure etc., are increased as shown on the unbalanced summary sheet (Table 9) to achieve better cash flow.

Table 10 shows monthly expenditure against revenue - unbalanced bid, Table 11 shows cash flow statement - unbalanced bid, and Figure 2 shows the cash flow chart - unbalanced bid.

The results of unbalancing are great:

1. The net cash flow becomes positive in month 29, where it was month 31 before unbalancing the bid.
2. Reducing high finance charges by reducing the bank borrowing to minimum.

The maximum borrowing becomes 9,211,530 Dhs while it was 14,890,352 Dhs before unbalancing the bid.

The positive jump in cash flow at the beginning of the project saves many problems for the contractor and enhances the positive amount of cash flow during the rest of the project duration.

6. Conclusion:

The cash flow statement is the company's financing key and must be as realistic as possible(1.) Thus, it is important for the contractor to have experienced estimators who can give true estimates for production rates, prices, and know the construction method of the project. The ability to maximize profit and minimize expenditure strongly correlated with the efficiency of playing with different techniques such as moving work items ideally throughout project duration, and unbalancing the bid form as this report demonstrated.

Table 9 Summary Sheet - Unbalanced Bid

Bill No.	Description	Direct Cost	Bid	
			Factor	Total
1	Preliminaries	6,110,000	2	12,220,000
2	Earth Work & Dewatering	600,000	2	1,200,000
3	Piling	3,500,000	1.6	5,600,000
4	Sub Structure	1,426,036	1.6	2,281,658
5	Super Structure	25,586,071	1.6	40,937,714
6	Block Work	2,612,755	2	5,225,510
7	Wall Plastering	75,838	2	151,676
8	Ceiling Finishes	3,200,000	1.256	4,019,200
9	Wall Finishes	2,300,000	1.256	2,888,800
10	Floor Finishes	5,400,000	1.256	6,782,400
11	Skirting & Thresholds	350,000	1.256	439,600
12	Joinery & Carpentry	5,300,000	1.256	6,656,800
13	Metal Work	600,000	1.256	753,600
14	Aluminium Work	1,000,000	1.256	1,256,000
15	Special Doors	1,000,000	1.256	1,256,000
16	Glass Reinforced Concrete	1,200,000	1.256	1,507,200
17	Construction Joints	350,000	1.256	439,600
18	Roofing & Insulation	700,000	1.256	879,200
19	Parking Floor Accessories	350,000	1.256	439,600
20	Furniture	150,000	1.256	188,400
21	Passenger Left	125,000	1.256	157,000
22	Sub Station	140,000	1.256	175,840
23	Curtian Wall	30,000,000	1.256	37,680,000
24	Decoration	9,000,000	1.256	11,304,000
25	Kitchen & Pantry	3,300,000	1.256	4,144,800
26	Air-Conditioning Work	13,000,000	1.256	16,328,000
27	Plumbing & Drainage Work	6,000,000	1.256	7,536,000
28	Electrical Work	15,800,000	1.256	19,844,800
29	Sanitary Fixtures & Fittings	2,000,000	1.256	2,512,000
30	Facade Maintenance Unit	1,200,000	1.276	1,531,200
Total		142375700	-	196,336,597

Table 10 Schedule of revenue and expenditure - Unbalanced bid

Schedule of Revenue and Expenditure Unbalanced Bid

Bill No.	Description/Period in Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Preliminaries	6,110,000	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938
2	Earth Work & Dewatering		80,000	180,000	180,000	180,000	180,000	180,000	180,000	60,000									
3	Piling			1,120,000	2,240,000	2,240,000													
4	Sub Structure					228,166	342,249	456,332	456,332	456,332	342,249								
5	Super Structure							618,754	1,637,509	1,637,509	2,046,888	2,046,888	2,046,888	2,046,888	2,046,888	2,046,888	2,046,888	2,046,888	2,046,888
6	Block Work										261,276	261,276	261,276	261,276	261,276	261,276	261,276	261,276	261,276
7	Wall Plastering												4,550	6,067	9,101	9,101	9,101	9,101	9,101
8	Ceiling Finishes																160,768	281,344	281,344
9	Wall Finishes												86,664	115,552	173,328	173,328	173,328	173,328	173,328
10	Floor Finishes														271,296	406,944	406,944	406,944	406,944
11	Skirting & Thresholds														17,584	26,376	26,376	26,376	26,376
12	Joinery & Carpentry												199,704	266,272	399,408	399,408	399,408	399,408	399,408
13	Metal Work																		30,144
14	Aluminium Work																		50,240
15	Special Doors															60,288	105,504	105,504	105,504
16	Glass Reinforced Concrete							8,792	17,584	17,584	21,980	21,980	21,980	21,980	21,980	21,980	21,980	21,980	21,980
17	Expansion and Construction Joints																		
18	Roofing & Insulation															43,960	65,940	65,940	65,940
19	Parking Floor Accessories																		
20	Furniture																		
21	Passenger Loft																		
22	Sub Station																		
23	Curtain Wall						163,280	163,280	163,280	163,280	163,280	163,280	163,280	326,560	326,560	326,560	326,560	326,560	326,560
24	Decoration						75,360	75,360	75,360	75,360	75,360	75,360	75,360	150,720	150,720	150,720	150,720	150,720	150,720
25	Kitchen & Pantry						198,448	198,448	198,448	198,448	198,448	198,448	198,448	396,896	396,896	396,896	396,896	396,896	396,896
26	Air-Conditioning Work						25,120	25,120	25,120	25,120	25,120	25,120	25,120	50,240	50,240	50,240	50,240	50,240	50,240
27	Plumbing & Drainage Work																		
28	Electrical Work																		
29	Sanitary Fixtures & Fittings																		
30	Facade Maintenance Unit																		
	Revenue per month	190,938	250,938	1,490,938	2,610,938	2,839,104	1,175,395	2,117,024	2,944,571	2,824,571	3,325,537	2,983,288	3,274,206	3,833,387	4,316,213	4,564,901	4,792,865	4,913,441	5,044,063
	Expenditure per month	4,149,845	1,220,314	1,980,314	2,680,314	2,822,918	1,662,220	2,452,243	2,970,964	2,910,964	3,199,681	2,985,756	3,218,031	3,660,789	4,044,306	4,242,306	4,423,806	4,519,806	4,623,806

Table 10 "Continue"

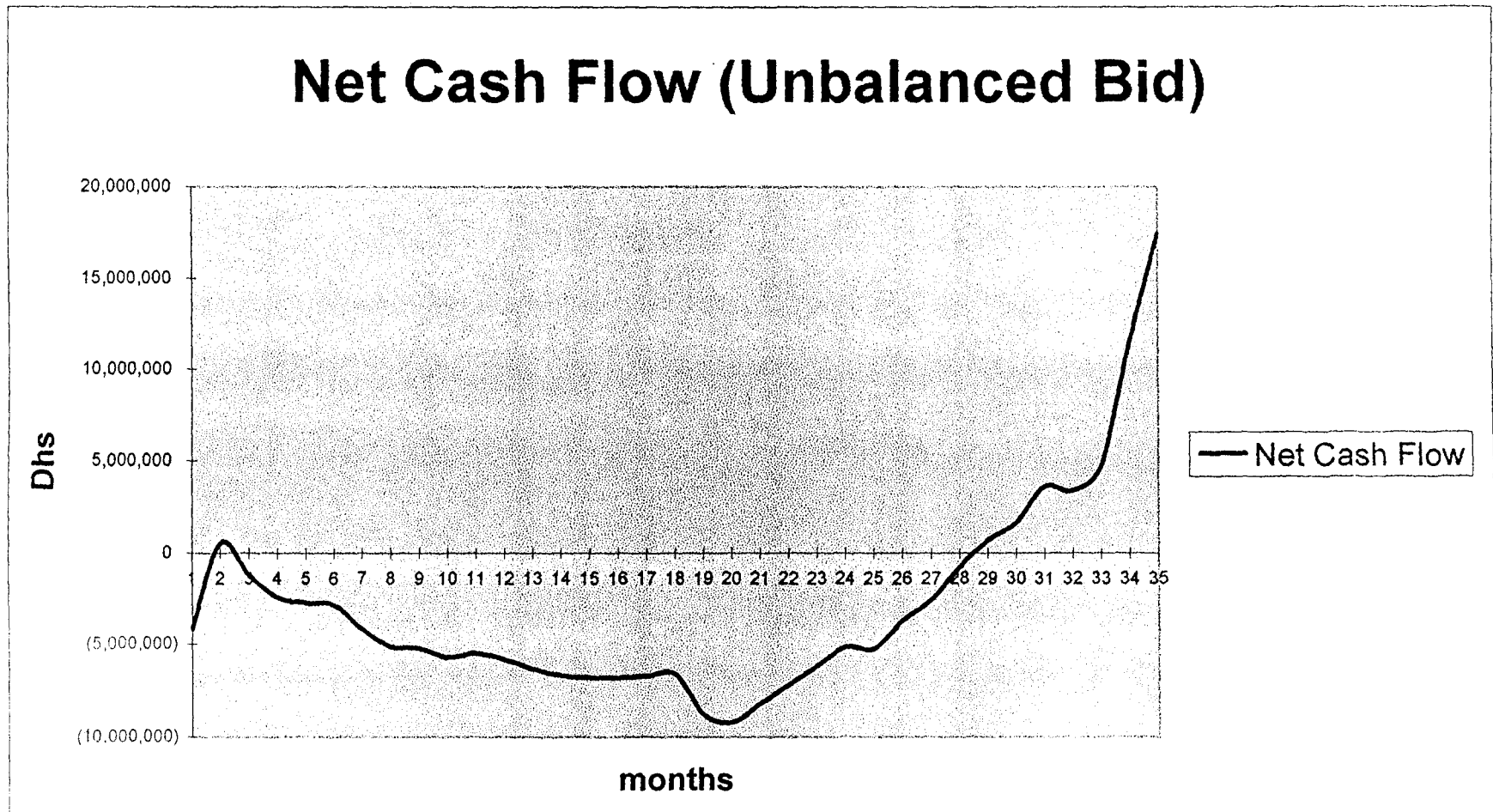
Schedule of Revenue and Expenditure Unbalanced Bid

Bill No.	Description/Period in Month	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	Total
1	Preliminaries	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	190,938	12,220,000
2	Earth Work & Dewatering																1,200,000
3	Piling																5,600,000
4	Sub Structure																2,281,658
5	Super Structure	2,048,886	2,048,886	2,048,886	2,048,886	2,048,886	2,048,886	2,048,886	1,637,509	1,637,509	818,754						40,937,714
6	Block Work	261,276	261,276	261,276	261,276	261,276	261,276	261,276	261,276	261,276	261,276	261,276					5,225,510
7	Wall Plastering	9,101	9,101	9,101	9,101	9,101	9,101	9,101	9,101	9,101	6,067	4,550	3,034				151,676
8	Ceiling Finishes	281,344	281,344	281,344	281,344	281,344	281,344	281,344	281,344	281,344	281,344	281,344	200,960				4,019,200
9	Wall Finishes	173,328	173,328	173,328	173,328	173,328	173,328	173,328	173,328	173,328	115,552	86,664	57,776				2,888,800
10	Floor Finishes	406,944	406,944	406,944	406,944	406,944	406,944	406,944	406,944	406,944	406,944	406,944	406,944				6,782,400
11	Skirting & Thresholds	26,376	26,376	26,376	26,376	26,376	26,376	26,376	26,376	26,376	26,376	26,376	26,376				439,600
12	Joinery & Carpentry	399,408	399,408	399,408	399,408	399,408	399,408	399,408	399,408	399,408	266,272	199,704	133,136				6,656,800
13	Metal Work	52,752	52,752	52,752	52,752	52,752	52,752	52,752	52,752	52,752	52,752	52,752	52,752	52,752	37,680		753,600
14	Aluminium Work	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	62,800		1,256,000
15	Special Doors	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	62,800		1,256,000
16	Glass Reinforced Concrete	105,504	105,504	105,504	105,504	105,504	105,504	105,504	105,504	105,504	105,504	75,360					1,507,200
17	Expansion and Construction Joints	21,980	21,980	21,980	21,980	21,980	21,980	21,980	17,584	17,584	8,792						439,600
18	Roofing & Insulation				87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920	87,920			879,200
19	Parking Floor Accessories	65,940	65,940	65,940													439,600
20	Other Specialized Work												47,100	47,100	47,100	47,100	188,400
21	Miscellaneous												39,250	39,250	39,250	39,250	157,000
22	Sub Station												43,960	43,960	43,960	43,960	175,840
23	Curtain Wall	1,507,200	2,637,600	2,637,600	2,637,600	2,637,600	2,637,600	2,637,600	2,637,600	2,637,600	2,637,600	2,637,600	2,637,600	2,637,600	2,637,600	1,884,000	37,680,000
24	Decoration	452,160	791,280	791,280	791,280	791,280	791,280	791,280	791,280	791,280	791,280	791,280	791,280	791,280	791,280	565,200	11,304,000
25	Kitchen & Pantry												1,036,200	1,036,200	1,036,200	1,036,200	4,144,800
26	Air-Conditioning Work	653,120	653,120	653,120	653,120	653,120	653,120	1,142,960	1,142,960	1,142,960	1,142,960	1,142,960	1,142,960	816,400	816,400	816,400	16,328,000
27	Plumbing & Drainage Work	301,440	301,440	301,440	301,440	301,440	301,440	527,520	527,520	527,520	527,520	527,520	527,520	376,800	376,800	376,800	7,536,000
28	Electrical Work	793,792	793,792	793,792	793,792	793,792	793,792	1,389,136	1,389,136	1,389,136	1,389,136	1,389,136	1,389,136	992,240	992,240	992,240	19,844,800
29	Sanitary Fixtures & Fittings	100,480	100,480	100,480	100,480	100,480	100,480	175,840	175,840	175,840	175,840	175,840	175,840	125,600	125,600	125,600	2,512,000
30	Facade Maintenance Unit														765,347	765,347	1,530,693
	Revenue per month	8,027,809	9,497,329	9,497,329	9,519,309	9,519,309	9,519,309	10,905,933	10,490,160	10,490,160	9,468,667	8,514,004	9,166,522	7,413,880	8,027,995	6,883,035	196,336,091
	Expenditure per month	6,997,806	8,167,806	8,167,806	8,165,306	8,165,306	8,165,306	9,289,306	9,029,945	9,029,945	8,357,707	7,738,227	8,335,581	6,941,064	7,419,064	6,509,064	178,505,600

Table 11 Cash Flow Statement - Unbalanced Bid

CASH FLOW STATEMENT - UNBALANCED BID											
NO.	Month/Year	Gross Income	3% Retention	Net Income	Cumulative Income	Monthly Expenditure	Cumulative Expenditure	Balance as at End of Month	Monthly Interest to Bank	Cumulative Interest from Bank	Net Cash Flow
1	Feb-97					4,149,845	4,149,845	(4,149,845)	(20,749)	(20,749)	(4,170,594)
2	March	6,110,000	183,300	5,926,700	5,926,700	1,220,314	5,370,159	556,541	2,783	(17,967)	538,574
3	April	250,938	7,528	243,410	6,170,110	1,980,314	7,350,473	(1,180,363)	(5,902)	(23,868)	(1,204,231)
4	May	1,490,938	44,728	1,446,210	7,616,320	2,680,314	10,030,787	(2,414,467)	(12,072)	(35,941)	(2,450,408)
5	June	2,610,938	78,328	2,532,610	10,148,930	2,822,918	12,853,705	(2,704,775)	(13,524)	(49,465)	(2,754,240)
6	July	2,839,103	85,173	2,753,930	12,902,859	2,862,220	15,715,925	(2,813,066)	(14,065)	(63,530)	(2,876,596)
7	August	1,175,394	35,262	1,140,132	14,042,992	2,452,243	18,168,168	(4,125,176)	(20,626)	(84,156)	(4,209,332)
8	September	2,117,023	63,511	2,053,512	16,096,504	2,970,964	21,139,132	(5,042,628)	(25,213)	(109,369)	(5,151,997)
9	October	2,944,570	88,337	2,856,233	18,952,737	2,910,964	24,050,096	(5,097,359)	(25,487)	(134,856)	(5,232,215)
10	November	2,824,570	84,737	2,739,833	21,692,570	3,199,661	27,249,757	(5,557,187)	(27,786)	(162,642)	(5,719,829)
11	December	3,325,535	99,766	3,225,769	24,918,339	2,985,756	30,235,513	(5,317,174)	(26,586)	(189,228)	(5,506,402)
12	Jan-98	2,983,287	89,499	2,893,788	27,812,127	3,216,031	33,451,544	(5,639,417)	(28,197)	(217,425)	(5,856,841)
13	February	3,274,205	98,226	3,175,979	30,988,106	3,660,789	37,112,333	(6,124,227)	(30,621)	(248,046)	(6,372,273)
14	March	3,833,386	115,002	3,718,384	34,706,490	4,044,306	41,156,639	(6,450,149)	(32,251)	(280,296)	(6,730,445)
15	April	4,316,211	129,486	4,186,725	38,893,215	4,242,306	45,398,945	(6,505,730)	(32,529)	(312,825)	(6,818,555)
16	May	4,564,899	136,947	4,427,952	43,321,167	4,423,806	49,822,751	(6,501,584)	(32,508)	(345,333)	(6,846,917)
17	June	4,792,863	143,786	4,649,077	47,970,244	4,519,806	54,342,557	(6,372,313)	(31,862)	(377,195)	(6,749,507)
18	July	4,913,439	147,403	4,766,036	52,736,280	4,623,806	58,966,363	(6,230,083)	(31,150)	(408,345)	(6,638,428)
19	August	5,044,064	151,322	4,892,742	57,629,022	6,997,806	65,964,169	(8,335,147)	(41,676)	(450,021)	(8,785,168)
20	September	8,025,807	240,774	7,785,033	65,414,055	8,167,806	74,131,975	(8,717,920)	(43,590)	(493,610)	(9,211,530)
21	October	9,495,327	284,860	9,210,467	74,624,522	8,167,806	82,299,781	(7,675,259)	(38,376)	(531,987)	(8,207,246)
22	November	9,495,327	284,860	9,210,467	83,834,989	8,185,306	90,485,087	(6,650,098)	(33,250)	(565,237)	(7,215,335)
23	December	9,517,307	285,519	9,231,788	93,066,777	8,185,306	98,670,393	(5,603,616)	(28,018)	(593,255)	(6,196,871)
24	Jan-99	9,517,307	285,519	9,231,788	102,298,565	8,185,306	106,855,699	(4,557,134)	(22,786)	(616,041)	(5,173,175)
25	February	9,517,307	285,519	9,231,788	111,530,353	9,289,306	116,145,005	(4,614,652)	(23,073)	(639,114)	(5,253,766)
26	March	10,903,931	327,118	10,576,813	122,107,166	9,029,945	125,174,950	(3,067,784)	(15,339)	(654,453)	(3,722,237)
27	April	10,490,158	314,705	10,175,453	132,282,619	9,029,945	134,204,895	(1,922,276)	(9,611)	(664,064)	(2,586,340)
28	May	10,490,158	314,705	10,175,453	142,458,072	8,357,707	142,562,602	(104,530)	(523)	(664,587)	(769,117)
29	June	9,468,666	284,060	9,184,606	151,642,678	7,738,227	150,300,829	1,341,849	6,709	(657,878)	683,971
30	July	8,514,003	255,420	8,258,583	159,901,261	7,335,581	157,636,410	2,264,851	11,324	(646,554)	1,618,298
31	August	9,166,521	274,996	8,891,525	168,792,787	6,941,064	164,577,474	4,215,313	21,077	(625,477)	3,589,836
32	September	7,413,880	222,416	7,191,464	175,984,250	7,419,064	171,996,538	3,987,712	19,939	(605,538)	3,382,174
33	October	8,025,994	240,780	7,785,214	183,769,464	6,509,064	178,505,602	5,263,862	26,319	(579,219)	4,684,643
34	November	6,883,034	206,491	6,676,543	190,446,007			11,940,405	59,702	(519,517)	11,420,888
35	December			5,890,083	196,336,090			17,830,488	89,152	(430,365)	17,400,123
36											
		196,336,090	5,890,083	196,336,090		178,505,602			(430,365)		

Figure 2



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