PRODUCTIVITY – COST – AND PLANNING OF BUILDING & CONSTRUCTION

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Approval of Director of Graduate School of Applied Sciences

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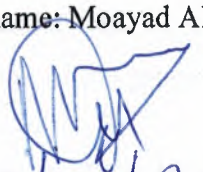
Signature: 

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ABSTRACT

The related Tender documentation of the project consisting of Five Identical Stories Residential Building in Amman, Jordan for which this thesis is built on, obtained from the relevant Engineering Bureau.

10 Contractors submitted 10 different offers about the Rates and Durations.

This Tender (Bill of quantity of works) is from the starting (Excavation) until the end (the completion of the project of Five Identical Stories Residential Building.)

After studying the 10 different offers of the 10 contractors, it is noted that contractor #7 Eng. Waheed Abu Hamza offered the shortest total duration (9-10 months) [1] to execute and finish the entire project's works. His offer is the shortest amongst the other 10 contractors in terms of the total duration.

Contractor #10 Mr. Sharif Tawfik offered the lowest total amount of $814,943.20 [2006] [10] to execute and finish the entire project's works. His offer is the lowest amongst the other 10 contractors in terms of the total amount.

Contractor #8 Eng. Nader Habayba offered the longest total duration (16 month) [6] to execute and finish the entire project's works. His offer is the longest amongst the other 10 Contractors in terms of the total duration.

Contractor #1 Eng. Hisham Altaamari offered the highest total amount $1,040,714.13 [2006] [1] to execute and finish the entire project's works. His offer is the highest amongst the other 10 Contractors in terms of the total amount.

The importance of this study is to find out the offer of a Contractor who has the shortest total duration & the Contractor who has lowest total amount to execute and finish the entire project's works. One of them will be chosen to execute and finish the entire project's works and delivery to the owner. This study will be helpful for future contractors who wish to make successful, fulfilling and up to date projects in terms of Productivity, Cost, and Planning of Building & Construction.

This thesis is dedicated to all my family members, my parents, my wives & children who afforded all these expenses and supported me in all events

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Thanks you all for your special efforts.

I hope this thesis proves worthy of your trust and hope that it can be useful for other students to get the information they may need from it.

CONTENTS

ABBREVIATIONS

ASTM	American Society for Testing and Materials Standards
Blinding	Ordinary concrete used under reinforced concrete to foundations. etc.
BS	British Standard
Concrete	Concrete is Mix of construction materials (cement + sand + gravel) + water
Cont'd	Continued
Crushed aggregate	Crushed gravels with gradual size
Drg.	Drawing(s)
e.g.	(Example gratia) meaning "for example"
etc.	Meaning "etcetera"
Filling	Back filling by choice any construction materials like base course or excavation product for filling inside building after finish the foundations
HVAC	Heating, Ventilation and Air
Karak	City in south of Jordan
LS	Lump Sum
Max.	Maximum
Min.	Minimum
MS	Measured Separately
Plain concrete	Ordinary concrete without use steel bars
Qty.	Quantity
R.A.K	Ras Alkhaima U.A.E
Reinforced concrete	Concrete with steel bars
Reinforcing bars	Reinforcing bars of steel
Ribbed slab	Slab (roof or ceiling) With ribs (ribs is mix of cement + sand + small gravel +water)
Spec.	Specification

LIST OF SYMBOLS

cm	Centimeter
dia.or ϕ	Diameter
JD	Jordan Dinar
kg	Kilogram
m	Linear metre
m^2	Square meter
m^3	Cubic metre
mm	Millimeter
nr/ no	Number
N/mm^2	Newton/Square millimeter
25 N/mm^2	Compressive strength of reinforced concrete after 28days
$	U.S Dollar

LIST OF TABLES

CHAPTER 1
INTRODUCTION

This master thesis covers the "Productivity, Cost, and Planning" areas of buildings and constructions.

The objective of this study is to find out the offer of the Contractor who has the shortest total duration and the contractor who has the lowest total amount to execute and finish the entire project's works.

In which, one of them will be chosen to execute and finish the entire project's works and delivery to the owner.

The thesis focuses on studying the tenders in the year 2006 (Bill of Quantity of Civil & Architectural Works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The construction planning lists the types of works and from these listed activities of works; the productivity will be obtained and analyzed by means of collecting data thereof (Offers of costs and durations for each activity in the tender (Bill of Quantity of Works)) from 10 various contractors.

From these 10 various contractor's productivities, 10 various durations will come out for each activity.

These 10 various durations from the construction planning. Duration of a contractor is obtained by adding all the durations of the activities, of the tender for the project.

The workers' wages for the activities described in the tender (Bill of Quantity of Works in the Project) to be included in the thesis.

The site and head office overheads of the typical reinforced concrete residential building of five identical stories to be included in the thesis, too.

After finding all the abovementioned, the question then becomes:

Which contractor is offering the shortest total duration to execute and finish the typical reinforced concrete residential building of five identical stories project?

Which contractor is offering the lowest total cost to execute and finish the typical reinforced concrete residential building of five identical stories project?

In addition, this thesis studies comparisons and differences between the duration and cost-wise offers of the 10 various contractors.

Who is offering the shortest duration?

Who is offering the lowest cost wise?

Who is offering the longest duration?

And who is offering the highest cost wise?

After studying the offers of the 10 various contractors:

It is acknowledged that: contractor #7 Eng. "Waheed Abu Hamza" is offering the shortest duration (9-10 Months) [1] to execute and finish the entire project's works of the typical reinforced concrete residential building of five identical stories;

It is acknowledged that: contractor #10 Mr. "Sharif Tawfik" is offering the lowest total amount $ 814,943.20 [2006] [10] to execute and finish the entire project's works of the typical reinforced concrete residential building of five identical stories;

It is acknowledged that: contractor #8 Eng. "Nader Habayba" is offering the highest total duration (16 months) [6] to execute and finish the entire project's works of the typical reinforced concrete residential building of five identical stories; and

It is acknowledged that: contractor #1 Eng. "Hisham Altaamari" is offering the highest total amount $ 1,040,714.13 [2006] [1] to execute and finish the entire project's works of the five- story residential building.

Chapter 2 tackles the Tender's Data (Bill of Quantity of works from the commencement of the Excavation Works till the completion of the project (completion of finishing and external works)) to execute the typical reinforced concrete residential building of five identical stories project (civil and architectural works) at rates and within duration of each activity in the project's Bill of Quantity for the 10 various contractors.

Contractor #1 Eng. "Hisham Altaamari", contractor #2 Eng. "Elia Mesalam", contractor #3 Eng. "Munther Alkharoof", contractor #4 Eng. Mazen haddad, contractor #5 Eng. "Baker Alnabulsi", contractor #6 Eng. "Yousif Hussein Saleh", contractor #7 Eng. "Waheed Abu Hamza", contractor #8 Eng. "Nader Habayba", contractor #9 Eng. "Ahmed Alumari",and contractor #10 Mr. "Sharif Tawfik".

Each contractor presented his own offer for prices and durations for each of the tender's activities (Bill of Quantity of works from the excavation works till the completion of finishing and external works) to execute and finish the typical reinforced concrete residential building of five identical stories project.

The tender (Bill of Quantity of Civil & Architectural Works) consists of Bill No.1 (Excavation & Earth Works), Bill No.2 (Concrete Works), Bill No.3 (Block Works), Bill No.4 (Roofing and Insulation Systems) and Bill No.5 (Masonry Works).

Concerning the finishing works, Bill No.1, Bill No. 4, Bill No. 5, and Bill No. 6 are dealing with Internal & External Finishes, Painting & Decoration, Fittings & Equipments, and Planting consecutively.

Table 1.1: Cost and Duration Comparison table of the bidding contractors.

Serial Number	Name of Bidder	Total Cost ($)	Total Duration (Month)
1-	Eng. Hisham Altaamari	$ 1,040,714.13 [1]	12 Months [3]
2-	Eng. Elia Mesalam	$ 1,040,225.30 [2]	14 Months [4]
3-	Eng. Munther Alkharoof	$ 1,036,627.19 [3]	14-16 Months [4]
4-	Eng. Mazen haddad	$ 1,014,537.07 [4]	15 Months [5]
5-	Eng. Baker Alnabulsi	$ 1,001,380.97 [5]	14 Months [4]
6-	Eng. Yousif Hussein Saleh	$ 1,000,033.90 [6]	15 Months [5]
7-	Eng. Waheed Abu Hamza	$ 997,500.13 [7]	9-10 Months [1]
8-	Eng. Nader Habayba	$ 995,550.40 [8]	16 Months [6]
9-	Eng. Ahmed Alumari	$ 869,793.41 [9]	10 Months [2]
10-	Mr. Sherif Tawfik	$ 814,943.20 [10]	12 Months [3]

Chapter 3 tackles Productivity & Cost. What is the productivity? Productivity is the execution of certain work within a specified period of time. Here in Chapter 3, the differences between the 10 offers of the 10 various contractors are discussed; Contractor #1, contractor #2, contractor #3, contractor #4, contractor #5, contractor #6, contractor #7, contractor #8, contractor #9, and contractor #10.

There are 10 various productivities for each of the 10 various contractors' activities in Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

Concerning the finishing works, Bill No.1, Bill No. 4, Bill No. 5, and Bill No. 6 are dealing with Internal and External Finishing, Painting & Decoration, Fittings & Equipments, and Planting consecutively.

There are 10 various durations for each activity for the above bills for the 10 various contractors. The total durations for the 10 various contractors to execute and finish the project's entire works of the typical reinforced concrete residential building of five identical stories is shown in table 1.1 above.

As for the rates, there are 10 various rates and amounts for each of the 10 various contractors' activities for Bill No.1, Bill No.2, Bill No.3, Bill No.4 , and Bill No.5.

Concerning the finishing works, Bill No.1, Bill No. 4, Bill No. 5 and Bill No. 6 are dealing with Internal and External Finishes, Painting & Decoration, Fittings & Equipments, and Planting consecutively.

The rate of each activity includes (The materials cost + workers wages + administration costs (site and head office overheads) including (office rent + staff salaries for example "engineers, foremen, secretary.... etc." + transportation + telephone cost + stationeries including (papers, pens, pencils, computer.... etc.) + profit percentage (15% - 20%, minimum 7%) + 16% sales tax to be deducted to the Government of Jordan + wood consumption for various types of reinforced concrete and concrete works....etc.

The amount of each activity is multiplied by the rate and the quantity of the works for each activity in the tender (Bill of Quantity of Civil & Architectural Works) such as, Bill No.1 (Excavation & Earth Works), Bill No.2 (Concrete Works), Bill No.3 (Block Works), Bill No.4 (Roofing & Insulation Systems), and Bill No.5 (Masonry Works).

Concerning the finishing works, Bill No.1, Bill No. 4, Bill No. 5 and Bill No. 6 are dealing with Internal & External Finishes, Painting & Decoration, Fittings & Equipments, and Planting consecutively.

A comparison and evaluation were made between all the 10 contractors' productivities and costs.

Chapter 4 tackles the Construction Planning. In this study, there are 10 work programs made by Microsoft project 2000 planning. The steps of each activity work were discussed; from Bill No.1 Excavation & Earth Works, Excavation to Foundations Levels and Excavation for External Works, until the completion of the project by offering the duration building on the contractor's work experience for each tender activity (Bill of Quantity of Works); and from the project commencement date until the delivery date of the five story residential building project to the owner of the building. Holiday are not calculated working days because they are non-working days for normal projects.

The work programs include the activity name (Task Name), duration, and the start and completion date.

The benefits of the thesis are summarized in Chapter 5, the Conclusion, as shown below:

Which contractor is offering the shortest total duration to execute and finish the identical five-story residential building project? ;

Which contractor is offering the lowest total cost for execute the identical five- story residential building project? ; And

The contractor's offer the shortest total duration to execute and finish the constructing of a typical reinforced concrete residential building of five identical stories project depends on the contractor himself, work experience, staff and staff salaries (including engineers, foremen and workers...etc. salaries), and the staff productivity, which varies between the 10 various contactors.

The contractor's offer the lowest total cost to execute and finish the constructing of a typical reinforced concrete residential building of five identical stories project also depends on the contractor's work experience, the materials suggested rate, the staff salaries (including the engineers, foremen and workers...etc. salaries), and the contractor's offer for the administration costs (site and head office overheads) including office rent and staff salaries; such as engineers, foremen, secretary....etc. ; transportation; telephone costs: stationeries including papers, pens, pencils, computers....etc.; profit percentage (15% - 20%, minimum 7%); 16% sales tax in accordance with the Hashemite Kingdom of Jordan (HKJ) Government Tax Law; and wood used in all types of reinforced concrete and concrete works....etc.

References will be provided at the end of the thesis. Such references are composed of the tender (bill of quantity of civil and architectural works) to execute and finish the constructing of a typical reinforced concrete residential building of five identical stories project. This tender was obtained from "Eng. Ammar Khammash for Architects" Engineering Bureau, in Amman, Jordan, where 10 various offers concerning the cost wise and duration submitted were received from the 10 various contractors.

CHAPTER 2

DATA

Chapter 2 of this thesis is concerned with Data. There is a tender of year 2006 [(Bill of Quantity of works from the commencement of the Excavation Works till the completion of the project (completion of finishing and external works)] to execute the typical reinforced concrete residential building of five identical stories project (civil and architectural works) at Rates and within Duration of each activity in the project's Bill of Quantity for the 10 various contractors.

In addition, there are 10 different offers by Rates (costs) and Durations for the 10 various contractors; Contractor #1, contractor #2, contractor #3, contractor #4, contractor #5, contractor #6, contractor #7, contractor #8, contractor #9, and contractor #10.

2.1 The offer of Contractor #1 Eng. Hisham Altaamari

The offer of contractor #1, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works; Bill No.1 "Internal and External Finishes", Bill No.4 "Painting and Decoration", Bill No.5 "Fittings and Equipments", and Bill No.6 "Planting."

The offer of the Contractor #1 can be found on page 114.

2.2 The offer of Contractor #2 Eng. Elia Mesalam

The offer of contractor #2, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1 "Excavation & Earth Works", Bill No.2 "Concrete", Bill No.3 "Block Works", Bill No.4 "Roofing and Insulation Systems", and Bill No.5 "Masonry Works."

And the finishing works; Bill No.1 "Internal and External Finishes", Bill No.4 "Painting and Decoration", Bill No.5 "Fittings and Equipments", and Bill No.6 "Planting".

The offer of Contractor #2, can be found on page 130.

2.3 The offer of Contractor #3 Eng. Munther Alkharoof

The offer of contractor #3, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works, Bill No.1 "Internal and External Finishes", Bill no.4 "Painting and Decoration", Bill No.5 "Fittings and Equipments", Bill No.6 "Planting".

The offer of Contractor #3, can be found on Page 143.

2.4 The offer of Contractor #4 Eng. Mazen Haddad

The offer of contractor #4, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works, Bill No.1, Bill no.4, Bill No.5, and Bill No.6.

The offer of Contractor #4, can be found on Page 156.

2.5 The offer of Contractor #5 Eng. Baker Alnabulsi

The offer of contractor #5, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works, Bill No.1, Bill no.4, Bill No.5, and Bill No.6.

The offer of Contractor #5, can be found on Page 169.

2.6 The offer of Contractor #6 Eng. Yousif Hussein Saleh

The offer of contractor #6, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works, Bill No.1, Bill no.4, Bill No.5, and "Bill No.6.

The offer of Contractor #6, can be found on Page 182.

2.3 The offer of Contractor #3 Eng. Munther Alkharoof

The offer of contractor #3, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works, Bill No.1 "Internal and External Finishes", Bill no.4 "Painting and Decoration", Bill No.5 "Fittings and Equipments", Bill No.6 "Planting".

The offer of Contractor #3, can be found on Page 143.

2.4 The offer of Contractor #4 Eng. Mazen Haddad

The offer of contractor #4, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works, Bill No.1, Bill no.4, Bill No.5, and Bill No.6.

The offer of Contractor #4, can be found on Page 156.

2.5 The offer of Contractor #5 Eng. Baker Alnabulsi

The offer of contractor #5, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works, Bill No.1, Bill no.4, Bill No.5, and Bill No.6.

The offer of Contractor #5, can be found on Page 169.

2.6 The offer of Contractor #6 Eng. Yousif Hussein Saleh

The offer of contractor #6, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works, Bill No.1, Bill no.4, Bill No.5, and "Bill No.6.

The offer of Contractor #6, can be found on Page 182.

2.7 The offer of Contractor #7 Eng. Waheed Abu Hamza

The offer of contractor #7, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works, Bill No.1, Bill no.4, Bill No.5, and Bill No.6.

The offer of Contractor #7, can be found on Page 196.

2.8 The offer of Contractor #8 Eng. Nader Habayba

The offer of contractor #8, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works, Bill No.1 "Internal and External Finishes", Bill no.4 "Painting and Decoration", Bill No.5 "Fittings and Equipments", and Bill No.6.

The offer of Contractor #8, can be found on Page 211.

2.9 The offer of Contractor #9 Eng. Ahmed Alumari

The offer of contractor #9, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the finishing works, Bill No.1, Bill no.4, Bill No.5, and Bill No.6.

The offer of Contractor #9, can be found on Page 226.

2.10 The offer of Contractor #10 Mr. Sharif Tawfik

The offer of contractor #10, is about the rates (costs) and durations for each work of the tender activities (bill of quantity of civil & architectural works) for the constructing of a typical reinforced concrete residential building of five identical stories.

The tender consists of Bill No.1, Bill No.2, Bill No.3, Bill No.4, and Bill No.5.

And the Finishing works, Bill No.1 "Internal and External Finishes", Bill no.4 "Painting and Decoration", Bill No.5 "Fittings and Equipments", and Bill No.6 "Planting".

The offer of Contractor #10, can be found on Page 241.

CHAPTER 3

PRODUCTIVITY & COST

3.1 COMPARISON BETWEEN THE OFFERS OF CONTRACTOR #1, ENG. HISHAM ALTAAMARI AND CONTRACTOR #10, MR. SHARIF TAWFIK BY THE COST WISE

3.1.1- Excavation and Earth works

• The filling material is transported from remote area and the rate of item of filling (back filling by selecting any construction materials such as base course or aggregate (single size like sand or gravel) inside and outside building after finishing the foundations works), is dependable on the distance and rate of delivery. Upon studying the site of any project, the contractors believed that the imported filling quantity is always insufficient (i.e., the contractor will fill the foundations from excavations). They proposed low rate for the item of filling and crushed aggregate base course to decrease the total amount (cost) of the tender (bill of quantity of civil & architectural works) to be awarded the tender.

• Increasing the rate of excavation is a smart thinking. For example, contractor #1, offered a rate of $ 4.23 [18] for filling inside building and a rate of $ 4.23 [19] for filling outside building (Bill No.1 Excavation & Earth Works), while contractor #10, offered a rate of $ 2.82 [17] and [18] respectively for filling inside and outside the building (Bill No.1 Excavation & Earth Works).

3.1.2- Concrete

• From bill No.2 "concrete", the item of reinforced concrete 25 N/mm^2, for example, contractor #10 offered the same rate $ 91.55 [18] and [20] respectively per each m^3 of the foundations and tie beams too. For columns and column necks, the rate is $ 98.59 [22] ….etc, while contractor #1, offered a rate of $ 105.63 [18] per each m^3 of the foundations. For the tie beams, he offered a rate of $ 119.72 [20], and a rate of $ 140.85 [22] for the columns and column necks.

• For the reinforced concrete 20 N/mm^2 for behind stone elevations, contractor #10, offered a rate of $ 77.46 [38] per each m^3, while contractor #1, offered a rate of $ 105.63 [38] per each m^3.

• For 310 mm thick ribbed slabs, contractor #10, offered a rate of $ 98.59 [49] per each m^3, while the contractor #1, offered a rate of $ 112.68 [49] per each m^3.

• For the building staircases, contractor #10, offered a rate of $ 98.59 [57] for the inside staircases and a rate of $ 91.55 [59] for the outside staircase per each m^3, while contractor #1, offered a rate of $ 140.85 [57] for the inside staircases and a rate of $ 140.85 [59] for the outside staircases per each m^3 of reinforced concrete (Grade 25 N/mm^2).

• For deformed high yield steel bar reinforcement of 420 N/mm^2 for various diameters, contractor #10, offered a rate of $ 845.07 [65], and a rate of $ 915.49 [69] for 8 mm diameter, while contractor #1, offered a rate of $ 915.49 [65] for deformed high yield steel for various diameters and a rate of $ 943.66 [69] for 8 mm.

• The total amount (cost) for bill No.2 (concrete), for contractor #10, is $ 272,762 [75], while it is $ 292,444.25 [75] for contractor #1.

3.1.3- Block works

• The total amount (cost) for bill No.3 (block works), for contractor #10, is $ 36,636.77 [47], while it is $ 35,232.41 [47] for contractor #1. Here, the total amount (cost) for contractor #10 is slightly higher than the total amount (cost) of contractor #1, by $ 1,404.36.

3.1.4- Roofing and Insulation systems

• From bill No.4 (roofing and insulation systems) the rate for item A- Foam Concrete, to roofs, per each m^2 is $ 6.34 [10] for contractor #10, whiles it is $ 12.68 [10] for contractor #1.

• The total amount (cost) for bill No.4 (roofing and insulation systems) for contractor #10 is $ 32,481.43 [69], while it is $ 39,819.88 [69] for contractor #1.

3.1.5- Masonry works

• From bill No.5 (masonry works) the rate of item A- (local (Ajloun)) stone first class, per each m^2 is $ 18.31 for case (1) [16], case (2) [18], case (3) [19], and case (4) [20], for contractor #10 , while the rate of the same item for case (1) [16], and case (2) [18], is $ 56.34, $ 63.38 for case (3) [19], and $ 84.51 for case (4) [20] for contractor #1.

• The rate of item B (stone coping) per each meter is $ 22.54 [21] for contractor #10, while it is $ 28.17 [21] per each meter for contractor #1.

• The rate of item C (approved first quality (Karak) marble gray color); per each meter is $ 9.86 [24] for contractor #10, while it is $ 63.38 [24] for contractor #1.

• The rate of item D (Ajloun local cornice stone); per each meter is $ 12.68 [45] for contractor #10, while it is $ 98.59 [45] for contractor #1.

3.1.6- Internal and External finishes

• The total amount (cost) for bill No.1 from the finishes works for contractor #10 is $ 259,741.10 [86], while it is $ 263,501.80 [85] for contractor #1. The total amount (cost) for bill No.1 from the finishes works for contractor #1 is higher than the total amount (cost) of contractor #10 by $ 3,760.70.

3.1.7- Painting and Decoration

• The total amount (cost) for bill No.4, painting and decoration works for contractor #10 is $ 20,955.53 [75], while it is $ 20,695.30 [75] for contractor #1. The total cost for bill No.4 painting and decoration works for contractor #1 is less than the total amount (cost) for contractor #10 by $ 260.23.

3.1.8- Fittings and Equipments

• The total amount (cost) for bill No.5 from fittings and equipments works for contractor #10 is $ 14,732.48 [74], while it is $ 14,690.0 [74] for contractor #1. The total amount (cost) for bill No.5 from fittings and equipments works for contractor #1 is less than the total amount (cost) of contractor #10 by $ 42.48.

3.1.9- Planting

• The total amount (cost) for bill No.6, planting works for contractor #10 is $ 19,674.84 [28], while it is $ 3,934.46 [28] for contractor #1 . The total amount (cost) for bill No.6 planting works for contractor #1 is less than the total amount (cost) of contractor #10 by $ 15,740.38.

Table 3.1.1: Cost per item Analysis of contractor #1 Eng. Hisham Altaamari and contractor #10 Mr. Sharif Tawfik

Serial Number	Description	Contractor Eng. Hisham Altaamari	Contractor Mr. Sharif Tawfik
1-	Excavation and earthworks	$ 51,965.59	$ 64,381.87
2-	Concrete	$ 292,444.25	$ 272,762.00
3-	Block works	$ 35,232.41	$ 36,636.77
4-	Roofing and insulation systems	$ 39,819.88	$ 32,481.43
5-	Masonry works	$ 318,430.44	$ 93,577.18
6-	Internal & external finishes	$ 263,501.80	$ 259,741.10
7-	Painting and decoration	$ 20,695.30	$ 20,955.53
8-	Fittings and equipments	$ 14,690.00	$ 14,732.48
9-	Planting	$ 3,934.46	$ 19,674.84
	Project total cost (civil + architecture) works	$ 1,040,714.13	$ 814,943.20

3.1.10- Summary

• From the total amount (cost) for the contractor #1 & the total amount (cost) for the contractor #10, it can see that the major difference is in Bill No.5 (masonry works), where the total amount (cost) of the masonry works for the contractor #1 is ($ 318,430.44), while it is ($ 93,577.18) for contractor #10. This means that the difference between them is high, and the total amount (cost) of the masonry works for contractor #1 is higher than contractor #10 by ($ 318,430.44 - $ 93,577.18) = $ 224,853.26.

• When asked the 10 various contractors about how they offered their rates for all activities of works in the tender (bill of quantity of civil & architectural works), and all of them agreed that the rate for each work activity or item in the tender includes (The materials cost + workers wages + administration costs (site and head office overheads) including (office rent + staff salaries for example "engineers, foremen, secretary.... etc." + transportation + telephone cost + stationeries including (papers, pens, pencils, computer.... etc.) + profit percentage (15% - 20%, minimum 7%) + 16% sales tax to be deducted to the Government of

Jordan + wood consumption for various types of reinforced concrete and concrete works….etc.

• For example, the rate of the masonry works, item -A local Ajloun stone fixed to faces of concrete for all elevations first class, case (1) mechanical push hammered face finish for contractor #1 is ($ 56.34), this rate includes the cost of stone and mortar of cement and sand + cost of workers + cost of overheads (staff salaries like engineers, foremen, secretary,…etc.) + transportation including inside and outside the project, for the contractor and the staff too + telephone costs + stationeries including (papers, pens, pencils, computer….etc.) + profit percentage (15% - 20%, minimum 7%) + and 16% sales tax to be deducted to the Government of Jordan.

3.2 COMPARISON BETWEEN THE OFFERS OF CONTRACTOR #1, ENG. HISHAM ALTAAMARI AND CONTRACTOR #10, MR. SHARIF TAWFIK BY THE DURATION

3.2.1- Excavation to foundations levels

• From the tender and offers of contractor #1 and contractor #10 about the duration, for activity of the excavation to foundations levels, contractor #1 offered 20 days to execute and finish 3,825 m^3 of excavation to foundations levels, i.e., 3,825 m^3 / 20 days = 191.25 m^3 in 1 day.

• Contractor #10 offered 10 days to execute and finish 3,825 m^3 of excavation to foundations levels, i.e., 3,825 m^3 / 10 days = 382.5 m^3 in 1 day, each day is 8 working hours. If the excavator sometimes wants to work overtime, the average overtime is 2 hours + 8 hours (standard time) = 10 hours. For contractor #, the excavator finishes the work 191.25 m^3 / 10 hours $\approx$ 19 m^3 in 1 hour, or 191.25 m^3 / 8 hours (standard time) = 23.9 m^3 $\approx$ 24 m^3 in one hour, 19 m^3 or 24 m^3 no more difference between them.

• For contractor #10, the excavator finishes the work 382.5 m^3 / 10 hours = 38.25 m^3 of excavation to foundations levels in one hour, or 382.5 m^3 / 8 hours = 47.81 m^3 $\approx$ 48 m^3 of excavation to foundations levels in one hour.

• It can be noted here that the excavator will execute 24 m^3 of excavation to foundations levels in 1 hour for contractor #1, while 48 m^3 in 1 hour for contractor #10, i.e., contractor #1 may use one excavator, while contractor #10 may use two. Each excavator executes 24 m^3 of excavation to foundations levels in 1 hour = 48 m^3 of excavation to foundations levels in 1 hour by two excavators.

• Productivity is the execution of certain work within a specified period of time; it can be noted here that contractor #1 offered low rate (cost) for excavation to foundations levels with high duration (time) to finish the work, while contractor #10 offered a higher rate (cost) for excavation to foundations levels with low duration (time) to finish the same work.

3.2.2- Excavation for external works

• Contractor #1 suggested 6 days to execute and finish 683 m^3 of excavation for external works, means 683 m^3 / 6 days = 113.83 $\approx$ 114 m^3 of excavation for external works in 1 day, i.e., 114 m^3 / 8 hours (standard work time in 1 day) = 14.25 $\approx$ 14 m^3 of excavation for external works in 1 hour.

• Contractor #10 suggested 7 days to execute and finish 683 m^3 of excavation for external works, i.e., 683 m^3 / 7 days = 97.57 ≈ 98 m^3 of excavation for external works in 1 day, means that 98 m^3 / 8 hours (standard time in 1 day) = 12.25 ≈ 12 m^3 of excavation for external works in 1 hour. It can be noted here small difference (2 m^3) between the two contractors, contractor #1, and contractor #10, means that if the duration is short, the executed work of excavation for external works is big, 14 m^3 in 1 hour and 12 m^3 in 1 hour too, 14 m^3 of excavation for external works in 1 hour at a rate of ($ 11.27) per each m^3 for contractor #1, while contractor #10 suggested 12 m^3 in 1 hour at a rate of ($ 8.45) per each m^3 of excavation for external works.

3.2.3- Approved filling inside building

• From filling (back filling by selection of any construction material like base course or aggregate (single size like sand or gravel) inside and outside building after finishing the foundations), laid and compacted, approved filling inside building, contractor #1 suggested 7 days to execute and finish 540 m^3 of approved filling inside building by shovel, means 540 m^3 / 7 days = 77.14 ≈ 77 m^3 of approved filling inside building by shovel in 1 day, 77 m^3 / 8 hours (standard time in 1 day) = 9.625 m^3 ≈ 10 m^3 of approved filling inside building by shovel in one hour, for contractor #1.

• While contractor #10 suggested 10 days to execute and finish the 540 m^3 of approved filling inside building by shovel, means 540 m^3 / 10 days = 54 m^3 of approved filling inside building by shovel in 1 day, 54 m^3 / 8 hours (standard time in 1 day) = 6.75 m^3 ≈ 7 m^3 of approved filling inside building by shovel in one hour, for contractor #10. It can be noted here small difference between the two contractors.

• Here too, contractor #1 offered a rate of ($ 4.23) per each m^3 of approved filling inside building, means 77 m^3 of approved filling inside building in 1 day* $ 4.23 = $ 352.71 in 1 day, i.e., 540 m^3 * $ 4.23 = $ 2,284.20 the total amount (cost) for approved filling inside building for contractor #1, means that contractor #1 gains $ 2,284.20 in 7 days duration, noting that the whole quantity in this item (540 m^3) might not be used in the work site.

• Contractor #10 offered a rate of ($ 2.82) per each m^3 of approved filling inside building, means 54 m^3 of approved filling inside building in 1 day * $ 2.82 = $ 152.28 in 1 day i.e., 540 m^3 * $ 2.82 = $ 1,522.8 the total amount (cost) for approved filling inside building for contractor #10, means that contractor #10 gains $ 1,522.80 in 10 days duration, noting that the whole quantity in this item (540 m^3) might not be used in the work site.

• The difference between the two contractors is $ 761.4. As mentioned earlier, productivity is the execution of a specific work in a certain period of time. If contractor #1 finishes the work of filling inside the building in 7 days with an amount of $ 2,284.20, that means he gains 3 days in this activity of work, and if contractor #10 finishes the work in 10 days with an amount of $ 1,522.80, it means that he is 3 days late in this activity of work compared to contractor #1.

3.2.4- Approved filling outside building

• From filling, laid and compacted, for fill approved filling outside building, contractor #1 suggested 9 days to finish the 736 m^3 of approved filling outside building, means 736 m^3 / 9 days ≈ 82 m^3 in 1 day, 82 m^3 / 8 hours (standard time) = 10.25 ≈ 10 m^3 in 1 hour for fill the approved filling outside the building.

• Contractor #10 suggested 10 days to finish the 736 m^3 of approved filling outside building, means 736 m^3 / 10 days = 73.6 ≈ 74 m^3 in 1 day, 74 m^3 / 8 hours (standard time) = 9.25 ≈ 9 m^3 in 1 hour to fill the approved filling outside building. A small difference can be seen between both contractors.

• For the crushed aggregate base course, there is an agreement on the rate (cost), the quantity of one m^2 of crushed aggregate base course ($ 2.82), and the duration (5 days) to finish the work of crushed aggregate base course for both contractors, contractor #1 and contractor #10.

• From the above cited information, contractor #1 suggested 47 days to finish Bill No.1 (Excavation and Earth works) with an amount of (total cost) ($ 51,965.59).

• While contractor #10 suggested 42 days to finish Bill No.1 (Excavation and Earth works) with an amount of (total cost) ($ 64,381.87).

• From the same above cited information, it can be noted that the (42 days) duration suggested by contractor #10 to finish Bill No.1 (Excavation and Earth works), is shorter than the (47 days) duration suggested by the second contractor #1.

• It can be noted from the same information that amount of (total cost) ($ 64,381.87) for Bill No.1 (Excavation and Earth works) suggested by contractor #10 is higher than the amount of (total cost) (($ 51,965.59) for the Bill No.1 (Excavation and Earth works), suggested by the second contractor #1.

• Here, the difference in duration between both contractors; contractor #1 and contractor #10 is (47 days – 42 days = 5 days), and the difference in amount is ($ 64,381.87 – $ 51,965.59) = $ 12,416.28

3.2.5- Plain concrete 18 N/mm^2 for blinding; 100 mm thick under foundations and tie beams

• From Bill No.2 (concrete), there is a small difference between the two contractors, contractor #1 and contractor #10.

• For example, for the plain concrete 18 N/mm^2 for blinding 100 mm thick under foundations and tie beams, contractor #1 suggested 4 days to finish 393 m^2 of work, means 393 m^2 / 4 days = 98.25 ≈ 98 m^2 in 1 day.

• While contractor #10 suggested 3 days to finish the same work, means 393 m^2 / 3 days = 131 m^2 in 1 day.

• It can see here that each day duration to finish 98 m^2 of blinding under foundations and tie beams suggested by contractor #1 is shorter than the 1 day duration suggested by contractor #10 to finish 131 m^2.

3.2.6- Plain concrete 18 N/mm^2 for blinding; 50 mm thick under slabs on grade

• From item B of bill No.2 (concrete), contractor #1 suggested 3 days to finish 430 m^2 of blinding, 50 mm thick under slabs on grade, means 430 m^2 / 3 days = 143.33 ≈ 143 m^2 in day i.e., .

• While contractor #10 suggested 2 days to finish 430 m^2 of blinding, 50 mm thick under slabs on grade, means 430 m^2 / 2 days = 215 m^2 in day i.e., .

• A big difference is noted here between both contractors, 143 m^2 of blinding, 50 mm thick under slabs on grade in day i.e., for contractor #1 and 215 m^2 of blinding, 50 mm thick under slabs on grade in day i.e., for contractor #10, (215 m^2 – 143 m^2 = 72 m^2) the difference between the two contractors, means that the executed work for contractor #10 (215 m^2) in 1 day is more than the executed work (143 m^2) in 1 day for contractor #1.

3.2.7- Plain concrete 18 N/mm^2 for blinding; 100 mm thick under external walls

• From item C of Bill No.2 (concrete), contractor #1 suggested 4 days to finish 217 m^2 of plain concrete of blinding, 100 mm thick under external walls, means 217 m^2 / 4 days = 54.25 ≈ 54 m^2 in day i.e., .

• While contractor #10 suggested 2 days to finish 217 m^2 of plain concrete of blinding, 100 mm thick under external walls, means 217 m^2 / 2 days = 108.5 m^2 in day i.e.,, means that contractor #10 suggested to execute the same work (217 m^2 of plain concrete for blinding, 100 mm thick under external walls) in half duration of contractor #1, noting that contractor #1 offered a lower rate with longer duration.

• While contractor #10 offered a high rate with low duration, we can conclude from this difference that the high rate for this item with low duration is better than low rate with high duration, meaning that to execute and finish any work and gaining too much money in short time is better than gaining little money in high duration. This item is better for contractor #10 than for contractor #1.

3.2.8- Reinforced concrete 25 N/mm^2 for foundations, tie beams, column and column necks, slab on grade 100 mm thick to building, slab on grade 100 mm thick to external pavements, external basement walls, water tank walls, external foundations, and external walls

• From the description of the reinforced concrete 25 N/mm^2 from bill No.2 (concrete), the item D- Foundations, E- Tie beams.....etc. – item N – external walls, contractor #1 suggested 10 days to finish the quantity of 141 m^3 of reinforced concrete for foundations, i.e., 141 m^3 / 10 days = 14.1 ≈ 14 m^3 in day i.e., , 21 m^3 of reinforced concrete for tie beams in 4 days, i.e., 21 m^3 / 4 days = 5.25 ≈ 5m^3 in day i.e., , 81 m^3 of reinforced concrete for columns and column necks in 8 days, i.e., 81 m^3 / 8 days = 10.125 ≈ 10 m^3 in day i.e., , 45 m^3 of reinforced concrete for slab on grade, 100 mm thick to building in 6 days, i.e., 45 m^3 / 6 days = 7.5 m^3 in day i.e., , 35 m^3 of reinforced concrete for slab on grade, 100 mm thick for external pavements in 6 days, i.e., 35 m^3 / 6 days = 5.8 ≈ 6 m^3 in day i.e., , 206 m^3 of reinforced concrete of external basement walls in 15 days, i.e., 206 m^3 / 15 days = 13.73 ≈ 14 m^3 in day i.e., , 52 m^3 of reinforced concrete for water tank walls in 6 days, i.e., 52 m^3 / 6 days = 8.66 ≈ 9 m^3 in day i.e., , 48 m^3 of reinforced concrete for external foundations in 5 days, i.e., 48 m^3 / 5 days = 9.6 ≈ 10 m^3 in day i.e., , 97 m^3 of reinforced concrete for external walls in 7 days, i.e., 97 m^3 / 7 days = 13.85 ≈ 14 m^3 in day i.e., , for contractor #1.

• While contractor #10 suggested 141 m^3 of reinforced concrete to execute the foundations in 7 days, i.e., 141 m^3 / 7days = 20.14 ≈ 20 m^3 in day i.e., , 21 m^3 of reinforced concrete for tie beams in 7 days, i.e., 21 m^3 / 7 days = 3 m^3 in day i.e., , 81 m^3 of reinforced concrete to execute the columns and column necks in 8 days, i.e., 81 m^3 / 8 days = 10.125 ≈

10 m^3 in day i.e., , 45 m^3 of reinforced concrete to execute the slab on grade, 100 mm thick to building in 5 days, i.e., 45 m^3 / 5 days = 9 m^3 in day i.e., , 35 m^3 of reinforced concrete to execute the slab on grade, 100mm thick to external pavements in 4 days, i.e., 35m^3 / 4days =8.75 ≈ 9 m^3 in day i.e., , 206 m^3 of reinforced concrete to execute the external basement walls in 15 days, i.e., 206 m^3 / 15days = 13.73 ≈ 14 m^3 in day i.e., , 52 m^3 of reinforced concrete to execute the water tank walls in 5 days, i.e., 52 m^3 / 5days = 10.4 ≈ 10 m^3 in day i.e., , 48 m^3 of reinforced concrete to execute the external foundations in 7 days, 48 m^3 / 7days = 6.85 m^3 in day i.e., , 97 m^3 of reinforced concrete to execute the external walls in 15 days, i.e., 97 m^3 / 15 day = 6.46 ≈ 6 m^3 in day i.e., .

• From the above cited information of the two contractors, contractor #1 and contractor #10 for the description of the reinforced concrete 25 N/mm^2 from bill No.2 (concrete), it can be noted that the (67 days) duration suggested by contractor #1 to execute the items D, E, G, H, J, K, L, M, and N is shorter than the (73 days) duration suggested by contractor #10 to execute the same items D, E, G, H, J, K, L, M, and N of reinforced concrete 25 N/mm^2 from bill No.2 (concrete).

• From the information of the rates for the above items D, E, G, H, J, K, L, M, and N, for the description of the reinforced concrete 25 N/mm^2 from bill No.2 (concrete), the total amount (cost) of $ 82,141.72 offered by contractor #1 is higher than the amount of $ 70,267.42 which is offered by contractor #10 to execute the same work. Than means that the higher amount gaining of ($ 82,141.72) offered by contractor #1 with 67 days low duration is better than the low amount gaining of ($ 70,267.42) offered by contractor #10 with longer duration of 73 days. The difference in duration is 73 days – 67 days = 6 days, and the difference in the total amount (cost) is $ 82,141.72 - $ 70,267.42 = $ 11,874.30.

3.2.9- Reinforced concrete 20 N/mm^2 behind stone elevations

• From the description of the reinforced concrete 20 N/mm^2 from bill No.2 (concrete), the item A- behind stone elevations, contractor #1 suggested 100 days to execute and finish the quantity of 187 m^3 of reinforced concrete behind stone elevations, while contractor #10 suggested 20 days to execute and finish the same quantity of 187 m^3 of reinforced concrete behind stone elevations.

• It can be noted from the above information that the (100 days) duration suggested by contractor #1 is longer than the (20 days) duration suggested by contractor #10, but it would like to say that there are five stories in this building, and (20 days) duration is not enough to

finish this work because if it want to cast reinforced concrete behind stone elevations, it must build 3 lines of stones only and wait to cast it, and to build another 3 lines after....etc.

- This type of work takes more time to finish. It can be noted that the duration of 100 days is more logic and workable until before the end of the project which is suggested by contractor #1, but it may say that the duration of 20 days suggested by contractor #10 is workable if it cast 105 mr of behind stone elevations lines with 0.12 m thick of concrete with 0.75 m high allowed of stone lines, i.e., 105 mr * 0.12 m thick * 0.75 m high = 9.45 m^3 in day i.e., , 9.45 m^3 * 20 days = 189 m^3 of reinforced concrete behind stone elevations, and this is little more than the required quantity (187 m^3).

3.2.10- Reinforced concrete cast in situ (Grade 25 N/mm^2) for ribbed slabs, 310 mm thick

- From the description of the reinforced concrete cast in situ (Grade 25 N/mm^2) from bill No.2 (concrete), item A- Ribbed slabs, 310 mm thick, contractor #1 suggested 100 days to execute and finish the quantity of 458 m^3 of reinforced concrete cast in situ (Grade 25 N/mm^2) for ribbed slabs 310 mm thick, while contractor #10 suggested 35 days to execute and finish the same quantity of 458 m^3 of reinforced concrete cast in situ (Grade 25 N/mm^2) for ribbed slabs 310 mm thick.
- It can be noted from the above information that the duration of 100 days suggested by contractor #1 is longer than the duration of 35 days suggested by contractor #10.These durations are to execute and finish five stories slabs.
- It can be concluded that the duration of 100 days is more logic and workable until before the end of the project which is suggested by contractor #1, but it may say that the duration of 35 days suggested by contractor #10 is workable if it cast reinforced concrete story by story, i.e., 7 days per each story, 7 days for formwork & steel works per each story slab + the cast duration.

3.2.11- Reinforced concrete cast in situ (Grade 25 N/mm^2) for staircases (steps and flights) inside the building, and staircases (steps and flights) outside the building

- From the description of the reinforced concrete cast in situ (Grade 25 N/mm^2) from bill No.2 (concrete), item B- staircases (steps and flights) in side & C- staircases (steps and flights) out side, contractor #1 suggested 100 days & 20 days to execute and finish the

quantity of 13 m^3 & 11 m^3 of reinforced concrete cast in situ (Grade 25 N/mm^2) for item B & C successively.

• While contractor #10 suggested 20 days & 15 days to execute and finish the same quantity of the reinforced concrete cast in situ (Grade 25 N/mm^2) for item B & C successively. These durations of 100 days & 20 days suggested by contractor #1 for item B and C successively are longer than the durations of 20 days and 15 days suggested by contractor #10 for item B & C successively.

3.2.12- Deformed high yield steel bar reinforcement of 420 N/mm^2 for various diameters generally, and smooth mild steel bar reinforcement of 280 N/mm^2 for ϕ 8 mm diameter

• From the deformed high yield steel bar reinforcement of 420 N/mm^2 item A- various diameters, generally & smooth mild steel bar reinforcement of 280 N/mm^2 item A- ϕ8 mm diameter, contractor #1 suggested 90 days & 90 days to execute and finish the quantity of 110 ton & 28 ton for item A- various diameters & item A- ϕ8 mm diameter successively.

• While contractor #10 suggested 30 days & 30 days executing and finishing the same quantity of 110 ton & 28 ton for item A- various diameters & item A- ϕ8 mm diameter successively.

• It can be concluded from the above information that the durations of 90 days & 90 days suggested by contractor #1 are longer than the durations of 30 days & 30 days suggested by contractor #10, means that the steel works for foundations & five stories slabs and another steel works in the project take 90 days as suggested by contractor #1, and 30 days as suggested by contractor #10.

3.2.13- Block works, hollow concrete blocks for walls; 100 mm thick, for walls; 150 mm thick, for walls; 200 mm thick

• From the Bill No.3 block works, Hollow concrete blocks, item A- walls 100 mm thick, walls 150 mm thick, walls 200 mm thick, contractor #1 suggested to execute the 732 m^2 of walls 100 mm thick in 60 days, 264 m^2 of walls 150 mm thick in 30 days, and 153 m^2 of walls 200 mm thick in 20 days, while contractor #1 suggested to execute the 732 m^2 of walls 100 mm thick 30 days, 264 m^2 of walls 150 mm thick in 12 days, and 153 m^2 of walls 200 mm thick in 30 days.

• It can be noted from the above information that the duration of 60 days suggested by contractor #1 to execute 732 m^2 of walls 100 mm thick, is longer than the duration of 30 days

suggested by contractor #10, means that (732 m^2 / 60 days) = 12.2 m^2/day for contractor #1, and (732 m^2 / 30 days) = 24.4 m^2/day for contractor #10, which means that the productivity of contractor #10 builder man is twice the productivity with contractor #1.

- It can be also see that contractor #1 suggested 30 days to execute 264 m^2 of walls 150 mm thick, means 264 m^2 / 30 days = 8.8 m^2/day, while contractor #10 suggested 12 days to execute the same work, which means that the productivity of contractor #10 builder man is two times and half the productivity of contractor #1 builder man.

- If it want to determine which productivity is better, it can say that the 22 m^2 of execute work is ordinary for builder man in day i.e.,, but the productivity 8.8 $m^2 \approx 9$ m^2 is small work for builder man in day i.e.,, but he possibly changes the work after few hours to do another job such as building walls 200 mm thick.

- It can be also note that contractor #1 suggested 20 days to execute 153 m^2 of walls 200 mm thick, means that 153 m^2 / 20 days = 7.65 m^2/day, while contractor #10 suggested 30 days to execute the same work, means that 153 m^2 / 30 days = 5.1 m^2/day, means that the productivity 7.65 m^2/day of contractor #1 builder man is higher than the productivity 5.1 m^2/day of contractor #10 builder man.

3.2.14- Block works, hollow concrete rib block size 400/360 mm * 200 mm * 240 mm high

- From bill No.3 block works, item D- hollow concrete rib block size 400/360 mm * 200 mm * 240 mm high, contractor #1 suggested 25 days to execute the 16,266 hollow concrete rib block size 400/360 mm * 200 mm * 240 mm high, for five stories slabs, while contractor #10 suggested 10 days to execute the 16,266 hollow concrete rib block size 400/360 mm * 200 mm * 240 mm high, for five stories slabs, means 16,266 hollow concrete rib block / 5 stories slabs = 3,253.2 ≈ 3253 hollow concrete rib blocks per each slab in 5 days (25 days the total duration / 5 story slabs = 5 days/one story slab), means that to execute 3,253 hollow concrete rib blocks in 5 days of one story slab for contractor #1.

- While for contractor #10 suggested 2 days to execute 3,253 hollow concrete rib blocks (10 days the total duration / 5 stories slabs = 2 days/one story slab), means that the 5 days duration suggested by contractor #1 to execute the 3,253 hollow concrete rib blocks per each story slab, is two times and half the duration of 2 days suggested by contractor #10 for the same work. It can be noted that if increase the workers in the site to execute the same work

above; it may execute the work in a shorter time, while it will be spend more time to finish the same work and may be late if not increasing the workers.

3.2.15- Block works, hollow concrete 100 mm thick behind the insulation for external walls of basement, and hollow concrete 100 mm thick behind the stone walls

• From the same bill No.3 block works, item E- concrete block 100 mm thick behind the insulation for external walls of basement, F- concrete block 100 mm thick behind the stone walls, contractor #1 suggested 15 days to execute the 529 m^2 of concrete block 100 mm thick behind the insulation, and 19 days to execute the 951 m^2 of concrete block 100 mm thick behind the stone walls too, while contractor #10 suggested 30 days to execute the 529 m^2 of concrete block 100 mm thick behind the insulation, and 35 days to execute the 951 m^2 of concrete block 100 mm thick behind the stone walls too.

• It can be noted from the above information that contractor #1 will execute the 529 m^2 of concrete block 100 mm thick behind the insulation / 15 days = 35.26 ≈ 35 m^2/day, and 951 m^2 of concrete block 100 mm thick behind the stone walls / 19 days = 50 m^2/day, while contractor #10 will execute the 529 m^2 of concrete block 100 mm thick behind the insulation / 30 days = 17.63 ≈ 18 m^2/day, and 951 m^2 of concrete block 100 mm thick behind the stone walls / 35 days = 27.17 ≈ 27 m^2/day.

• If it want or would like to make a comparison between the two contractors, it will be noted that contractor #1 suggested 1 day to execute 35 m^2 of concrete block 100 mm thick behind the insulation is normal productivity, while contractor #10 suggested little productivity (18 m^2/day) of concrete block 100 mm thick behind the insulation.

• And the suggested productivity of contractor #1 50 m^2/day of concrete block 100 mm thick behind the stone walls is more than the productivity 27 m^2/day of concrete block 100 mm thick behind the stone walls for contractor #10.

• It can be noted here that the builder man can build any quantity of concrete blocks 100 mm thick behind the insulation and at any height, while the same builder man is not free when he wants to build behind the stone walls. The builder man can't build a height of more than 4 lines behind the stone walls with height no more than 84 cm include mortar of cement and sand 1 cm thick for every 1 (4 lines of blocks * 21 cm "20 cm height of block + 1 cm of mortar" = 84 cm), means too 50 m^2/day for contractor #1 / 0.84 m the allowed height which is built behind stone walls = 59.52 ≈ 60 mr build of concrete block 100 mm thick behind the stone walls in day i.e.,, while for contractor #10 27 m^2/day / 0.84 m the allowed height to

build behind stone walls = 32 mr is smaller than the 60 mr which is suggested by contractor #1 .

- Means that the executed work 60 mr for contractor #1 is approximately double the work executed by contractor #10, which means that if contractor #10, employs one builder man to execute 32 mr of work in 1 day (8 hours standard time) with height 0.84 m, contractor #1 will employ two builder men to execute 60 mr of work in 1 day (8 hours standard time) with height 0.84 m.

3.2.16- Roofing and insulation systems, foam concrete minimum 50 mm thick, to roofs

- From bill No.4, roofing and insulation systems, the description foam concrete, minimum 50 mm thick, item A- to roofs, contractor #1 suggested 6 days to finish the 430 m^2 of foam concrete, minimum 50 mm thick, means 430 m^2 / 6 days = 71.6 ≈ 72 m^2 /day of foam concrete, minimum 50 mm thick, to roofs.
- While contractor #10 suggested 10 days to execute the 430 m^2 of foam concrete, minimum 50 mm thick, means that 430 m^2 / 10 days = 43 m^2/day of foam concrete, minimum 50 mm thick, to roofs.
- It can be noted from the above information that the productivity of contractor #1, 72 m^2/day is more than the productivity 43 m^2/day of contractor #10.
- And contractor #1 will finish the work in a shorter time than contractor #10 to finish the same work.

3.2.17- Cement sand screed, minimum 30 mm thick, to roofs

- From the description of the cement sand screed, minimum 30 mm thick, item B- to roofs, contractor #1 suggested 3 days to execute the 430 m^2 of cement sand screed, minimum 30 mm thick to roofs, means that 430 m^2 / 3 days = 143.33 ≈143 m^2/day.
- While contractor #10 suggested 10 days to execute the 430 m^2 of cement sand screed, minimum 30 mm thick to roofs, means 430 m^2 / 10 days = 43 m^2 /day.
- It can be noted from the above information that the productivity of 143 m^2 for contractor #1 in 1 day is more than the productivity 43 m^2 for contractor #10 in day i.e., .
- Means that the productivity of 143 m^2 in 1 day for contractor #1 is more than the productivity of 43 m^2 in 1 day for contractor #10 , 143 m^2 – 43 m^2 = 100 m^2 the difference between the two contractors, contractor #1 and contractor #10.

3.2.18- 4 mm thick torch applied modified bituminous water-proofing membrane; to roofs

•From the description 4 mm thick torch applied, item G- to roofs, contractor #1 suggested 4 days to execute 430 m^2 of 4mm thick torch applied, to roofs, means 430 m^2 / 4 days = 107.5 m^2 in day i.e., .

•While contractor #10 suggested 12 days to execute the 430 m^2 of 4 mm thick torch applied, to roofs, means 430 m^2 / 12 days = 35.83 ≈ 36m^2 in day i.e., .

•It can be noted from the above information that the productivity of the workers 107.5 m^2 in 1 day of 4 mm thick torch applied, to roofs, for contractor #1 is three times the productivity of the workers 36 m^2 in 1 day of 4 mm thick torch applied, to roofs, for contractor #10.

•Means that if contractor #10 employs one worker or one group of workers to execute the work of 4 mm thick torch applied, to roofs, contractor #1 will employ 3 groups of workers to finish the same work.

3.2.19- 4 mm thick torch applied modified bituminous polymer water-proofing membrane; for slabs on grade

• From the description 4 mm thick torch applied modified bituminous polymer water–proofing membrane, item A- for slabs on grade, contractor #1 suggested 4 days to execute 410 m^2 of 4 mm thick torch applied modified bituminous polymer water–proofing membrane, means 410 m^2 / 4 days = 102.5 m^2 in day i.e., .

• While contractor #10 suggested 17 days to execute the 410 m^2 of the same work, means 410 m^2 / 17 days = 24.11 ≈ 24 m^2 in day i.e., .

• Means that the productivity of the workers 102.5 m^2 in 1 day of 4 mm thick torch applied modified bituminous polymer water–proofing membrane for contractor #1 is four times the productivity of the workers 24 m^2 in 1 day of 4 mm thick torch applied modified bituminous polymer water–proofing membrane for contractor #10.

• Means that if contractor #10 employs one group of workers in 1 day for 17 days to execute the work 4 mm thick torch applied modified bituminous polymer water–proofing membrane, for slabs on grade, contractor #1 will employ 4 groups of workers to execute the same work.

3.2.20- 4 mm thick torch applied modified bituminous polymer water-proofing membrane; to basement walls

• From the description 4 mm thick torch applied modified bituminous polymer water–proofing membrane, item B- to basement walls, contractor #1 suggested 6 days to execute 529 m^2 of 4 mm thick torch applied modified bituminous polymer water–proofing membrane, to basement walls, means 529 m^2 / 6 days = 88.16 ≈ 88 m^2 in day i.e., .

• While contractor #10 suggested 25 days to execute 529 m^2 of the 4 mm thick torch applied modified bituminous polymer water–proofing membrane, to basement walls, means 529 m^2 / 25 days = 21.16 ≈ 21 m^2 in day i.e., .

• It can be noted from the above information that the productivity of 88 m^2 in 1 day for contractor #1 is four times the productivity of 21 m^2 in 1 day for contractor #10.

• Means that if contractor #10 employs one group of workers in 1 day for 25 days, contractor #1 will employ four groups of workers in 1 day for 6 days to execute the same work.

3.2.21- PVC water stops for water tank walls

• From bill No.4 roofing and insulation systems, the description PVC water stops, for water tank walls, contractor #1 suggested 1 day executing 56 mr of PVC water stop, for water tank walls, means 56 mr / 1day = 56 mr in day i.e., .

• While contractor #10 suggested 6 days to execute 56 mr of PVC water stop, for water tank walls, means 56 mr / 6 days = 9.33 ≈ 9 mr in day i.e., .

• Means the productivity 56 mr in 1 day of PVC water stop for water tank walls for contractor #1 is six times the productivity 9 mr in 1 day of PVC water stop, for water tank walls, for contractor #10.

• Means that too if contractor #1 employs six groups of workers in 1 day to execute the 56 mr of the of PVC water stop, for water tank walls, contractor #10 will employ one group of workers in 1 day for 6 days to execute the same work.

3.2.22- Damp proofing membrane comprising of two perpendicular coats of emulsified asphalt reinforced with non asbestos fibers cold applied; to basement walls

• From bill No.4, roofing and insulation systems, the description damp proofing membrane, item F- to basement walls, contractor #1 suggested 13 days to execute the 2,650

m^2 of damp proofing membrane, to basement walls, means 2,650 m^2 / 13 days = 203.84 ≈ 204 m^2 of damp proofing membrane, to basement walls in day i.e., .

• While contractor #10 suggested 25 days to execute the 2,650 m^2 of damp proofing membrane, to basement walls, means 2,650 m^2 / 25 days = 106 m^2 of damp proofing membrane, to basement walls in day i.e., .

• It can be noted from the above information that the productivity of 88 m^2 in 1 day for contractor #1 is four times the productivity of 21 m^2 in 1 day for contractor #10.

• Means that if contractor #10 employs one group of workers in 1 day for 25 days, contractor #1 will employ four groups of workers in 1 day for 6 days to execute the same work.

• It can be noted from the above information that the productivity of 204 m^2 of damp proofing membrane, to basement walls in 1 day for contractor #1 is double times the productivity of 106 m^2 of the same work in 1 day for contractor #10. Means that if contractor #10 employ one group of workers in 1 day for 25 days to execute the damp proofing membrane, to basement walls, contractor #1 will employ two groups of workers in 1 day for 13 days to execute the same work.

3.2.23- Masonry works, local (Ajloun) stone fixed to faces of concrete for all elevations; case (1) mechanical push hammered face finish, case (2) light chiseled, case (3) rough chiseled, case (4) face finish:-

• From bill No.5 masonry works, the description local (Ajloun) stone, item A- case (1) mechanical push, case (2) light chiseled, case (3) rough chiseled, case (4) face finish, contractor #1 suggested 100 days to execute the 1,151 m^2 of local (Ajloun) stone case (1), 100 days to execute the 1,151 m^2 of local (Ajloun) stone case (2), 100 days to execute the 1,151 m^2 of local (Ajloun) stone case (3), and 120 days to execute the 1,151 m^2 of local (Ajloun) stone case (4), means 1,151 m^2 / 100 days = 11.51 m^2 in 1 day for case (1), 11.51 m^2 in 1 day for case (2), 11.51 m^2 in 1 day for case (3), and 1,151 m^2 / 120 days = 9.59 m^2 in 1 day for case (4).

• While contractor #10 suggested 60 days to execute the 1,151 m^2 of local (Ajloun) stone case (1), 60 days to execute the 1,151 m^2 of local (Ajloun) stone case (2), 60 days to execute the 1,151 m^2 of local (Ajloun) stone case (3), and 65 days to execute the 1,151 m^2 of local (Ajloun) stone case (4), means 1,151 m^2 / 60 days = 19.18 m^2 in 1 day for case (1),

19.18 m^2 in 1 day for case (2), 19.18 m^2 in 1 day for case (3), and 1,151 m^2 / 65 days = 17.70 m^2 in 1 day for case (4).

- It can be noted from the above information that the productivity of 11.51 m^2 in 1 day for contractor #1 for case (1), case (2), case (3), and 9.59 m^2 in 1 day for case (4), is less than the productivity of 19.18 m^2 in 1 day for contractor #10 for case (1), case (2), case (3), and 17.70 m^2 in 1 day for case (4).

3.2.24- Masonry works, stone coping (local Ajloun)

- From bill No.5 masonry works, item B- stone coping (local Ajloun), contractor #1 suggested 20 days to execute and finish the 356 mr of stone coping (local Ajloun), i.e., 356 mr / 20 days = 17.8 mr/day.
- While contractor #10 suggested 7 days to execute and finish the same work, i.e., 356 mr / 7 days = 50.85 mr/day.
- Means that the productivity (50.85 mr/day) of contractor #10 is approximately three times the productivity (17.8 mr/day) of contractor #1.
- That means if contractor #1 employs one group of workers for 20 days, contractor #10 employs three groups of workers for 7 days.

3.2.25- Masonry works approved first quality (Karak) marble gray color

- From bill No.5 Masonry works, item C- approved first quality (Karak) marble gray color, contractor #1 suggested 30 days to execute 95 m^2 of approved first quality (Karak) marble gray color, means 95 m^2 / 30 days = 3.16 $\approx$ 3 m^2/day.
- While contractor #10 suggested 6 days to execute the same work, i.e., 95 m^2 / 6 days = 15.83 $\approx$ 16 m^2/day. Means that the productivity 16 m^2 /day of approved first quality (Karak) marble gray color of contractor #10 is five times the productivity 3 m^2/day of approved first quality (Karak) marble gray color to contractor #1.
- Means that too if contractor #10 employs five groups of workers in 1 day to execute 95 m^2 of approved first quality (Karak) marble gray color; contractor #1 will employ one group of workers in 1 day to execute the same work.

3.2.26- Finishes works, Internal and external finishes, floor finishes, precast terrazzo tiles, natural color, to floors, size 400 mm * 100 mm * 30 mm thick for guards' rooms

• From bill No.1 (finishes works), internal & external finishes, the description floor finishes, precast terrazzo tiles, natural color, to floors, size 400 mm * 100 mm * 30 mm thick for guards room, contractor #1 suggested 4 days to execute the 52 m^2 of precast terrazzo tiles, natural color, to floors, size 400 mm * 100 mm * 30 mm thick, means 52 m^2 / 4 days = 13 m^2/day.

• While contractor #10 suggested 10 days to execute the same work, i.e., 52 m^2 / 10 days = 5.2 m^2/day.

• Means that the productivity 13 m^2 /day of contractor #1 are more than two times and half the productivity 5.2 m^2/day of contractor #10.

3.2.27- Finishes works, Internal and external finishes, approved first quality Jerusalem stone marble tiles, to floors of saloons, living, TV and master bedrooms …etc.

• From bill No.1 (internal & external finishes), the description approved first quality Jerusalem stone marble tiles, item A- to floors of saloons, living, TV and master bedrooms …etc. contractor #1 suggested 30 days to execute the 574 m^2 of approved first quality Jerusalem stone marble tiles, item A- to floors of saloons, living, TV and master bedrooms …etc. i.e., 574 m^2 / 30 days = 19.13 ≈ 19 m^2/day.

• While contractor #10 suggested 15 days to execute the same work i.e., 574 m^2 / 15 days = 38.26 ≈ 38 m^2/day.

• It can be noted from the above information that the productivity of (38 m^2/day) of workers of contractor #10 is twice the productivity of (19 m^2/day) of workers of contractor #1.

3.2.28- Finishes works, Internal and external finishes, to skirting size 600 mm * 100 mm * 6 mm thick

• Contractor #1 suggested 6 days to execute the 360 mr of skirting size 600 mm * 100 mm * 6 mm thick, i.e., 360 mr / 6 days = 60 mr/day.

• While contractor #10 suggested 12 days to execute the same work, i.e., 360 mr / 12 days = 30 mr/day.

• It can be noted from the above information that the productivity of workers 60 mr/day of contractor #1 is twice the productivity of workers 30 mr/day of contractor #10.

• Means that if contractor #1 employs one group of workers to execute the work of skirting size 600 mm * 100 mm * 6 mm thick, contractor #10 will employ two groups of workers to execute the same work.

3.2.29- Finishes works, Internal and external finishes, (standby item) ditto but Italian marble, to floors of saloons, living, TV ...etc. & to skirting size 600 mm * 100 mm * 6 mm thick

• From bill No.1 internal & external finishes, the description (standby item) ditto but Italian marble, item A- to floors of saloons, living, TV,.....etc. & item B- to skirting size 600 mm * 100 mm * 6 mm thick, the productivity of contractor #1 & contractor #10 is the same as in the previous case; items A & B (Jerusalem stone to floors and to skirting).

3.2.30- Finishes works, Internal and external finishes, ditto but Omani or stone like ceramic tiles to floors 400 mm * 400 mm * 20 mm thick

• From description ditto but Omani or stone like ceramic tiles, item A- to floors 400 mm * 400 mm * 20 mm thick, contractor #1 suggested 30 days to execute the 365 m^2 of ditto but Omani or stone like ceramic tiles, to floors 400 mm * 400 mm * 20mm thick, means 365 m^2 / 30 days = 12.16 m^2/day.

• While contractor #10 suggested 12 days to execute the same work, i.e., 365 m^2 / 12 days = 30.41 m^2/day.

• It can be noted from the above information that the productivity of workers 30.41 m^2 /day of contractor #10 is two times and half the productivity of workers 12.16 m^2/day of contractor #1.

• Means if contractor #1 employs one group of workers in 1 day for period 30 days to execute the 365 m^2 of ditto but Omani or stone like ceramic tiles, to floors 400 mm * 400 mm * 20 mm thick, contractor #10 will employ two and half groups of workers in 1 day for a period of 12 days to execute the same work.

3.2.31- Finishes works, Internal and external finishes, ditto but Omani or stone like ceramic tiles to skirting size 300 mm * 100 mm * 6mm thick

• From the description ditto but Omani or stone like ceramic tiles, item B- to skirting size 300 mm * 100 mm * 6 mm thick, contractor #1 suggested 6 days to execute 247 mr of

ditto but Omani or stone like ceramic tiles, to skirting size 300 mm * 100 mm * 6 mm thick, i.e., 247 mr / 6 days = 41.16 mr/day.

• While contractor #10 suggested 10 days to execute the same work, i.e., 247 mr / 10 days = 24.7 mr/day.

• It can be noted from the above information that the productivity of workers 41.16 mr/day of contractor #1 is one time and half the productivity of workers 24.7 mr/day of contractor #10.

• Means if contractor #1 employs one group of workers in 1 day to execute the 247 mr of ditto but Omani or stone like ceramic tiles, to skirting size 300 mm * 100 mm * 6 mm thick, contractor #10 will employ two and half groups of workers in 1 day to execute the same work.

3.2.32- Finishes works, Internal and external finishes, Spanish ceramic colored floor tiles; natural color; to kitchens floors size 400 mm * 400 mm * 9 mm thick

• From Bill No.1 internal & external finishes, the description Spanish ceramic colored floor tiles; natural color; to kitchens floors size 400 mm * 400 mm * 9 mm thick, contractor #1 suggested 17 days to execute the 137 m^2 of Spanish ceramic colored floor tiles; natural color; to kitchens floors size 400 mm * 400 mm * 9 mm thick, i.e., 137 m^2 / 17 days = 8.05 m^2/day.

• While contractor #10 suggested 15 days to execute the same work, i.e., 137 m^2 / 15 days = 9.13 m^2/day.

• It can be noted from the above information that the productivity of workers 8.05 m^2 /day of contractor #1 are approximately the same productivity of workers 9.13 m^2/day of contractor #10.

3.2.33- Finishes works, Internal and external finishes, ditto but Emirates R.A.K ceramic colored floor tiles, to floors size 300 mm * 300 mm * 9 mm thick

• From Bill No.1 internal & external finishes, the description ditto but Emirates R.A.K ceramic colored floor tiles, the item A- to floors size 300 mm * 300 mm * 9 mm thick, contractor #1 suggested 3 days to execute the 36 m^2 of ditto but Emirates R.A.K ceramic colored floor tiles, the item A- to floors size 300 mm * 300 mm * 9 mm thick, for maids rooms, i.e., 36 m^2 / 3 days = 12 m^2/day.

• While contractor #10 suggested 7 days to execute the same work 36 m^2 of ditto but Emirates R.A.K ceramic colored floor tiles, the item A- to floors size 300 mm * 300 mm * 9 mm thick, for maids rooms, i.e., 36 m^2 / 7 days = 5.14 m^2/day.

• It can be noted from the above information that the productivity of workers 12 m^2/day of contractor #1 is two times more than the productivity of workers 5.14 m^2/day of contractor #10.

3.2.34- Finishes works, Internal and external finishes, ditto but Emirates R.A.K ceramic colored floor tiles, to skirting, size 300 mm * 100 mm * 6 mm thick for maids' rooms

• From ditto but Emirates R.A.K ceramic colored floor tiles, the item B- to skirting, size 300 mm * 100 mm * 6 mm thick for maids' rooms, contractor #1 suggested 1 day to execute the 43 mr of ditto but Emirates R.A.K ceramic colored floor tiles, the item B- to skirting, size 300 mm * 100 mm * 6 mm thick for maids' rooms, i.e., 43 mr / 1 day = 43 mr/day.

• While contractor #10 suggested 7 days to execute the 43 mr of ditto but Emirates R.A.K ceramic colored floor tiles, the item B- to skirting, size 300 mm * 100 mm * 6 mm thick for maids' rooms, i.e., 43 mr / 7 days = 6.14 mr/day.

• It can be noted from the above information that the productivity of workers 43 mr/day of contractor #1 is seven times more than the productivity of workers 6.14 mr/day of contractor #10.

3.2.35- Finishes works, Internal and external finishes, ditto but local ceramic colored floor tiles for boiler and maids bathrooms 200 mm * 200 mm * 9 mm thick

• From item C- ditto but local ceramic colored floor tiles for boiler and maids bathrooms 200 mm * 200 mm * 9 mm thick, contractor #1 suggested 6 days to execute the 86 m^2 of ditto but local ceramic colored floor tiles for boiler and maids bathrooms 200 mm * 200 mm * 9 mm thick, i.e., 86 m^2 / 6 days = 14.33 m^2/day.

• While contractor #10 suggested 10 days to execute the 86 m^2 of ditto but local ceramic colored floor tiles for boiler and maids bathrooms 200 mm * 200 mm * 9 mm thick, i.e., 86 m^2 / 10 days = 8.6 m^2/day.

• It can be noted from the above information that the productivity of workers 14.33 m^2/day of contractor #1 is one time and half more than the productivity of workers 8.6 m^2/day of contractor #10.

3.2.36- Finishes works, Internal and external finishes, one piece Jerusalem stone to steps, natural color; to treads and risers

• From the description one piece Jerusalem stone to steps, natural color; the item A- to treads and risers; contractor #1 suggested 30 days to execute the 168 mr of one piece Jerusalem stone to steps, natural color; the item A- to treads and risers, i.e., 168 mr / 30 days = 5.6 mr/day.

• While contractor #10 suggested 5 days to execute the 168 mr of one piece Jerusalem stone to steps, natural color; the item A- to treads and risers, means 168 mr / 5 days = 33.6 mr/day.

• It can be noted from the above information that the productivity of workers 33.6 mr/day of contractor #10 is six times more than the productivity of workers 5.6 mr/day of contractor #1.

• Means that if contractor #1 employs one group of workers in day i.e., contractor #10 will employ six groups of workers in day i.e.

• But it can be noted that the duration suggested by contractor #10 is shorter to execute 168 mr of one piece of Jerusalem stone to steps, natural color; item A- to treads and risers in 5 days, and this work is not simple and needs quality and to be checked.

3.2.37- Finishes works, Internal and external finishes, one piece Jerusalem stone to steps, natural color; skirting to flights 6mm thick

• From the description one piece Jerusalem stone to steps, natural color; item B- skirting to flights 6mm thick; contractor #1 suggested 10 days to execute the 108 mr of one piece Jerusalem stone to steps, natural color; the item B- skirting to flights 6 mm thick; i.e., 108 mr / 10 days = 10.8 mr/day.

• While contractor #10 suggested 4 days to execute the same work; i.e., 108 mr / 4 days = 27 mr/day.

• It can be noted from the above information that the productivity of workers 27 mr/day of contractor #10 is two times and half more than the productivity of workers 10.8 mr/day of contractor #1.

• It can be noted from the above information that if contractor #1 employs one group of workers in 1 day to execute the one piece Jerusalem stone to steps, natural color; item B- skirting to flights 6 mm thick; contractor #10 will employ two and half groups of workers in 1 day to execute the same work.

3.2.38- Finishes works, Internal and external finishes, precast interlock concrete cement floor tiles, to walk way at parking and ramps size 400 mm * 400 mm * 40 mm

• From the description precast interlock concrete cement floor tiles, item A- to walk way at parking and ramps size 400 mm * 400 mm * 40 mm; contractor #1 suggested 10 days to execute the 333 m^2 of precast interlock concrete cement floor tiles, item A- to walk way at parking and ramps size 400 mm * 400 mm * 40 mm; i.e., 333 m^2 / 10 days = 33.3 m^2/day.

• While contractor #10 suggested 12 days to execute the same work; i.e., 333 m^2 / 12 days = 27.75 m^2/day.

• It can be noted from the above information that the productivity of workers 33.3 m^2 /day of contractor #1 is little more than the productivity of workers 27.75 m^2/day of contractor #10.

3.2.39- Finishes works, Internal and external finishes, precast interlock concrete cement floor tiles, standby item ditto but basalt stone

• From the description precast interlock concrete cement floor tiles, item B- standby item ditto but basalt stone; contractor #1 suggested 10 days to execute the 333 m^2 of precast interlock concrete cement floor tiles, item B- standby item ditto but basalt stone; i.e., 333 m^2 / 10 days = 33.3 m^2/day.

• While contractor #10 suggested 11 days to execute the same work; i.e., 333 m^2 / 11 days = 30.27 m^2/day.

• It can be noted from the above information that the productivity of workers 33.3 m^2/day of contractor #1 is little more than the productivity of workers 30.27 m^2/day of contractor #10.

3.2.40- Finishes works, Internal and external finishes, precast interlock concrete cement floor tiles, for external paving

• From the description precast concrete cement floor tiles, for external paving; contractor #1 suggested 5 days to execute the 163 m^2 of precast concrete cement floor tiles, for external paving; i.e., 163 m^2 / 5 days = 32.6 m^2/day.

• While contractor #10 suggested 8 days to execute the same work; i.e., 163 m^2 / 8 days = 20.375 m^2/day.

• It can be noted from the above information that the productivity of workers 32.6 m^2/day of contractor #1 is one time and half more than the productivity of workers 20.375 m^2/day of contractor #10.

3.2.41- Finishes works, Internal and external finishes, wall finishes, three coats cement and sand (1: 4) plastering; smooth finish as specified, to walls, internally

• From the description wall finishes, three coats of cement and sand (1: 4) plastering; smooth finish as specified: item A- to walls, internally; contractor #1 suggested 80 days to execute the 7,783 m^2 of three coats of cement and sand (1: 4) plastering; smooth finish as specified: item A- to walls, internally; i.e., 7,783 m^2 / 80 days = 97.28 m^2/day.

• While contractor #10 suggested 96 days to execute the same work; i.e., 7,783 m^2 / 96 days = 81.07 m^2/day.

• It can be noted from the above information that the productivity of workers 97.28 m^2/day of contractor #1 is more than the productivity of workers 81.07 m^2/day of contractor #10.

3.2.42- Finishes works, Internal and external finishes, wall finishes, three coats cement and sand (1:4) plastering; smooth finish as specified, to walls, internally behind ceramic walls

• From the description wall finishes, three coats of cement and sand (1: 4) plastering; smooth finish as specified: item B- to walls, internally behind ceramic walls; contractor #1 suggested 10 days to execute the 1,010 m^2 of three coats of cement and sand (1: 4) plastering; smooth finish as specified: item B- to walls, internally behind ceramic walls; i.e., 1,010 m^2 / 10 days = 101 m^2/day.

• While contractor #10 suggested 30 days to execute the same work; i.e., 1,010 m^2 / 30 days = 33.66 m^2/day.

• It can be noted from the above information that the productivity of workers 101 m^2 /day of contractor #1 are three times more than the productivity of workers 33.66 m^2/day of contractor #10.

3.2.43- Finishes works, Internal and external finishes, wall finishes, three coats cement and sand (1: 4) plastering; smooth finish as specified, to walls, internally for water tanks walls

- From the description wall finishes, three coats of cement and sand (1: 4) plastering; smooth finish as specified: item C- to walls, internally for water tanks walls; contractor #1 suggested 6 days to execute the 240 m^2 of three coats cement and sand (1: 4) plastering; smooth finish as specified: item C- to walls, internally for water tanks walls; i.e., 240 m^2 / 6 days = 40 m^2/day.
- While contractor #10 suggested 9 days to execute the same work; i.e., 240 m^2 / 9 days = 26.66 m^2/day.
- It can be noted from the above information that the productivity of workers 40 m^2/day of contractor #1 is one time and half more than the productivity of workers 26.66 m^2/day of contractor #10.

3.2.44- Finishes works, Internal and external finishes, wall finishes, three coats cement and sand (1: 4) plastering; smooth finish as specified, to walls, externally

- From the description wall finishes, three coats of cement and sand (1: 4) plastering; smooth finish as specified: item D- to walls, externally; contractor #1 suggested 5 days to execute the 270 m^2 of three coats cement and sand (1: 4) plastering; smooth finish as specified: the item D- to walls, externally; i.e., 270 m^2 / 5 days = 54 m^2/day.
- While contractor #10 suggested 10 days to execute the same work; i.e., 270 m^2 / 10 days = 27 m^2/day.
- It can be noted from the above information that the productivity of workers 54 m^2/day of contractor #1 is two times more than the productivity of workers 27 m^2/day of contractor #10.

3.2.45- Finishes works, Internal and external finishes, ceiling finishes, three coats cement and sand (1: 4) plastering; smooth finish as specified

- From the description ceiling finishes, three coats of cement and sand (1: 4) plastering; smooth finish as specified, contractor #1 suggested 30 days to execute the 1,828 m^2 of ceiling finishes, three coats of cement and sand (1: 4) plastering; smooth finish as specified: i.e., 1,828 m^2 / 30 days = 60.93 m^2/day.

• While contractor #10 suggested 35 days to execute the same work; i.e., 1,828 m^2 / 35 days = 52.22 m^2/day.

• It can be noted from the above information that the productivity of workers 60.93 m^2/day of contractor #1 is little more than the productivity of workers 52.22 m^2/day of contractor #10.

3.2.46- Finishes works, Internal and external finishes, suspended ceilings, 12 mm thick gypsum board suspended ceiling panels finished……etc.

• From the description suspended ceilings, 12 mm thick gypsum board suspended ceiling panels finished……etc.; contractor #1 suggested 4 days to execute the 47 m^2 of suspended ceilings, 12 mm thick gypsum board suspended ceiling panels finished……etc.; i.e., 47 m^2 / 4 days = 11.75 m^2/day.

• While contractor #10 suggested 5 days to execute the same work; i.e., 47 m^2 / 5 days = 9.4 m^2/day.

• It can be noted from the above information that the productivity of workers 11.75 m^2/day of contractor #1 is little more than the productivity of workers 9.4 m^2/day of contractor #10.

3.2.47- Painting and decoration, the description internally, Emulsion PVA – based paint, matt finish for interior, quality in one priming coat and three finishing coats….etc. (DELUXE or approved equivalent) instructions complete, to walls

• From the bill No.4 Painting and decoration, the description internally, Emulsion PVA – based paint, matt finish for interior, quality in one priming coat and three finishing coats….etc. (DELUXE or approved equivalent) instructions complete, to walls; contractor #1 suggested 65 days to execute the 4,783 m^2 of Painting and decoration, the description internally, Emulsion PVA – based paint, matt finish for interior, quality in one priming coat and three finishing coats….etc. (DELUXE or approved equivalent) instructions complete, to walls; i.e., 4,783 m^2 / 65 days = 73.58 m^2/day.

• While contractor #10 suggested 30 days to execute the same work; i.e., 4,783 m^2 / 30 days = 159.43 m^2/day.

• It can be noted from the above information that the productivity of workers 159.43 m^2/day of contractor #10 is two times more than the productivity of workers 73.58 m^2/day of contractor #1.

3.2.48- Painting and decoration, Resin base waterproofing acrylic textured decorative coating.....etc. including all necessary preparation work and under coats, complete, to exterior walls

- From bill No.4 Painting and decoration, the description, Resin base waterproofing acrylic textured decorative coating.....etc. including all necessary preparation work and under coats, complete, to exterior walls; contractor #1 suggested 22 days to execute the 265 m^2 of Resin base waterproofing acrylic textured decorative coating.....etc. including all necessary preparation work and under coats, complete, to exterior walls; i.e., 265 m^2 / 22 days = 12.04 m^2/day.
- While contractor #10 suggested 15 days to execute the same work; i.e., 265 m^2 / 15 days = 17.66 m^2/day.
- It can be noted from the above information that the productivity of workers 17.66 m^2/day of contractor #10 is approximately one time and half times more than the productivity of workers 12.04 m^2/day of contractor #1.

3.2.49- Painting and decoration, Resin base waterproofing acrylic textured decorative coating.....etc. including all necessary preparation work and under coats, complete, to walls at roof

- From bill No.4 Painting and decoration, the description, Resin base waterproofing acrylic textured decorative coating.....etc. including all necessary preparation work and undercoats, complete to walls at roof; contractor #1 suggested 19 days to execute the 196 m^2 of Resin base waterproofing acrylic textured decorative coating.....etc. including all necessary preparation work and under coats, complete to walls at roof; i.e., 196 m^2 / 19 days = 10.31 m^2/day.
- While contractor #10 suggested 10 days to execute the same work; i.e., 196 m^2 / 10 days = 19.6 m^2/day.
- It can be noted from the above information that the productivity of workers 19.6 m^2/day of contractor #10 is approximately two times more than the productivity of workers 10.31 m^2/day of contractor #1.

3.2.50- Fittings and equipments, Corner guards, supply and fix rubber corner guards for columns at parking areas……etc. 100 mm * 100 mm, 1,200 mm height

• From bill No.5 Fittings and equipments, Corner guards, supply and fix rubber corner guards for columns at parking areas……etc. 100 mm * 100 mm, 1,200 mm height; contractor #1 suggested 197 days to execute the 4 no. (number) of Corner guards, supply and fix rubber corner guards for columns at parking areas……etc. 100 mm * 100 mm, 1,200 mm height; i.e., it want 1.75 ≈ 2 days to execute the 1 no. (number) of Corner guards, supply and fix rubber corner guards for columns at parking areas……etc. 100 mm * 100 mm, 1,200 mm height.

• While contractor #10 suggested 7 days to execute the 4 no. (number) of Corner guards, supply and fix rubber corner guards for columns at parking areas……etc. 100 mm * 100 mm, 1,200 mm height; i.e., we want 1.75 ≈ 2 days to execute the 1 no. (number) of Corner guards, supply and fix rubber corner guards for columns at parking areas……etc. 100 mm * 100 mm, 1,200 mm height.

• It can be noted from the above information that the duration which is used 2 days to execute the 1 no. (number) of Corner guards, supply and fix rubber corner guards for columns at parking areas……etc. 100 mm * 100 mm, 1,200 mm height of contractor #1 is the same duration of 2 days to execute the 1 no. (number) of Corner guards, supply and fix rubber corner guards for columns at parking areas……etc. 100 mm * 100 mm, 1,200 mm height of contractor #10.

3.2.51- Fittings and equipments, Mirrors, 6 mm thick mirrors with 20 mm stainless steel frame including 8 mm thick plywood backing…..etc. size 1,050 mm * 2,600 mm high, size 1,600 mm * 1,300 mm high, and size 800 mm * 1,300 mm high

• From bill No.5 Fittings and equipments, the description, Mirrors, 6mm thick mirrors with 20 mm stainless steel frame including 8 mm thick plywood backing…..etc., the item A- size 1,050 mm * 2,600 mm high, item B- size 1,600 mm * 1,300 mm high, item C- size 800 mm * 1,300 mm high; contractor #1 suggested 4 days to execute the 2 no. (number) of Mirrors, 6 mm thick mirrors with 20 mm stainless steel frame including 8 mm thick plywood backing…..etc., item A- size 1,050 mm * 2,600 mm high; 5 days to execute the 3 no. (number) of Mirrors, 6 mm thick mirrors with 20 mm stainless steel frame including 8 mm thick plywood backing…..etc., item B- size 1,600 mm * 1,300 mm high; 11 days to execute the 19 no. (number) of Mirrors, 6 mm thick mirrors with 20 mm stainless steel frame including 8 mm thick plywood backing…..etc., item C- size 800 mm * 1,300 mm high; i.e.,

item A- size 1,050 mm * 2,600 mm high execute 1 no. (number) in 2 days; i.e., item B- size 1,600 mm * 1,300 mm high execute 1 no. (number) in 2 days approximately; means the item C- size 800 mm * 1,300 mm high execute 2 no. (number) in 1 day approximately.

- While contractor #10 suggested 3 days to execute the 2 no. (number) of Mirrors, 6 mm thick mirrors with 20 mm stainless steel frame including 8 mm thick plywood backing…..etc., item A- size 1,050 mm * 2,600 mm high; 4 days to execute the 3 no. (number) of Mirrors, 6 mm thick mirrors with 20 mm stainless steel frame including 8 mm thick plywood backing…..etc., item B- size 1,600 mm * 1,300 mm high; 8 days to execute the 19 no. (number) of Mirrors, 6 mm thick mirrors with 20 mm stainless steel frame including 8 mm thick plywood backing…..etc., item C- size 800 mm * 1,300 mm high; i.e., item A- size 1,050 mm * 2,600 mm high execute 1 no. (Number) in 1.5 days; i.e., item B- size 1,600 mm * 1,300 mm high execute 1 no. (Number) in 1 day approximately; i.e., item C-size 800 mm * 1,300 mm high execute 2 no. (number) in 1 day approximately
- It can be noted from the above information that the duration for items A, B, and C suggested by contractor #1 is approximately the same duration suggested by contractor #10.

3.2.52- Fittings and equipments, vanity counter, local KARAK marble counter top 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing,……etc., size 1,700 mm * 600 mm wide, size 2,800 * 600 mm wide, size 2,000 mm * 600 mm wide, size 1,800 mm * 600 mm wide, size 2,000 mm * 600 mm wide, size 2,200 mm * 600 mm wide, size 1,900 mm * 600 mm wide, and size 2,600 mm * 600 mm wide

- From bill No.5 (Fittings and equipments), the description, vanity counter, local KARAK marble counter top 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing …etc., item A-size 1,700 mm * 600 mm wide, item B-size 2,800 mm * 600 mm wide, item C-size 2,000 mm * 600 mm wide, item D-size 1,800 * 600 mm wide, item E- size 2,000 mm * 600 mm wide, item F- size 2,200 mm * 600 mm wide, item G- size 1,900 mm * 600 mm wide, and item H-size 2,600 mm * 600 mm wide; the durations suggested by contractor #1 for all the items are 2 days, 1 day, 1 day, 1 day, 2 days, 2 days, 3 days, and 1 day, which are as the same as the durations suggested by contractor #10.

3.2.53- Planting, Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones

- From bill No.6 Planting, the description, Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones; contractor #1 suggested 22 days to execute 254 m^3 of Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones; i.e., 254 m^3 / 22 days = 11.54 m^3/day.
- While contractor #10 suggested 15 days to execute the same work; i.e., 254 m^3 / 15 days = 16.93 m^3/day.
- It can be noted from the above information that the productivity of workers 16.93 m^3/day of contractor #10 is more than the productivity of worker 11.54 m^3/day of contractor #1.

3.3 COMPARISON BETWEEN THE 10 OFFERS OF CONTRACTORS ABOUT THE COST WISE AND DURATION

3.3.1- Bill No.1- Excavation and Earth works, Item A- Excavation to foundations levels

Table 3.3.1: Cost and Duration comparison table of the bidding contractors.

Serial Number	Name of contractor	Total cost ($)	Total duration (month)
1-	Eng. Hisham Altaamari	$1,040,714.13 [1]	12 months [3]
2-	Eng. Elia Mesalam	$1,040,225.30 [2]	14 months [4]
3-	Eng. Munther Alkharoof	$1,036,627.19 [3]	14-16 months [4]
4-	Eng. Mazen haddad	$1,014,537.07 [4]	15 months [5]
5-	Eng. Baker Alnabulsi	$1,001,380.97 [5]	14 months [4]
6-	Eng. Yousif Hussein Saleh	$1,000,033.90 [6]	15 months [5]
7-	Eng. Waheed Abu Hamza	$997,500.13 [7]	9-10months [1]
8-	Eng. Nader Habayba	$995,550.40 [8]	16 months [6]
9-	Eng. Ahmed Alumari	$869,793.41 [9]	10 months [2]
10-	Mr. Sharif Tawfik	$814,943.20 [10]	12 months [3]

- It can be noted from the table above that the lowest total cost to finish the project was the cost of contractor # 10 (lowest total cost is $ 814,943.20)
- From the table above, the lowest total duration to finish the project was the duration of contractor #7 (lowest total duration is 9 month).
- Contractor #1 suggested 20 days to execute and finish the 3,825 m^3 of excavation to foundations levels, i.e., 3,825 m^3 / 20 days = 191.25 m^3/day (1 day means 8 working hours (standard time)), at a rate of 9.86 $/$m^3$, and the amount to execute 3,825 m^3 of excavation to foundations levels is $ 37,714.50
- Contractor #2 suggested 12 days to execute and finish the 3,825 m^3 of excavation to foundations levels, i.e., 3,825 m^3 / 12 days = 318.75 m^3/day (1 day means 8 working hours (standard time)), at a rate of 8.45 $/$m^3$, and the amount to execute 3,825 m^3 of excavation to foundations levels is $ 32,321.25
- Contractor #3 suggested 10 days to execute and finish the 3,825 m^3 of excavation to foundations levels, i.e., 3,825 m^3 / 10 days = 382.5 m^3/day (1 day means 8 working hours

(standard time)), at a rate of 7.04 $/m^3$, and the amount to execute 3,825 m^3 of excavation to foundations levels is $ 26,928

- Contractor #4 suggested 8 days to execute and finish the 3,825 m^3 of excavation to foundations levels, i.e., 3,825 m^3 / 8 days = 478.125 m^3/day (1 day means 8 working hours (standard time)), at a rate of 7.0 $/m^3$, and the amount to execute 3,825 m^3 of excavation to foundations levels is $ 26,775

- Contractor #5 suggested 9 days to execute and finish the 3,825 m^3 of excavation to foundations levels, i.e., 3,825 m^3 / 9 days = 425 m^3/day (1 day means 8 working hours (standard time)), at a rate of 7.04 $/m^3$, and the amount to execute 3,825 m^3 of excavation to foundations levels is $ 26,928

- Contractor #6 suggested 8 days to execute and finish the 3,825 m^3 of excavation to foundations levels, i.e., 3,825 m^3 / 8 days = 478.125 m^3/day (1 day means 8 working hours (standard time)), at a rate of 7.04 $/m^3$, and the amount to execute 3,825 m^3 of excavation to foundations levels is $ 26,928

- Contractor #7 suggested 12 days to execute and finish the 3,825 m^3 of excavation to foundations levels, means 3,825 m^3 / 12 days = 318.75 m^3/day (1 day means 8 working hours (standard time)), at a rate of 6.34 $/m^3$, and the amount to execute 3,825 m^3 of excavation to foundations levels is $ 24,250.50

- Contractor #8 suggested 9 days to execute and finish the 3,825 m^3 of excavation to foundations levels, i.e., 3,825 m^3 / 9 days = 425 m^3/day (1 day means 8 working hours (standard time)), at a rate of 16.90 $/m^3$, and the amount to execute 3,825 m^3 of excavation to foundations levels is $ 64,642.50

- Contractor #9 suggested 21 days to execute and finish the 3,825 m^3 of excavation to foundations levels, i.e., 3,825 m^3 / 21 days = 182.14 m^3/day (1 day means 8 working hours (standard time)), at a rate of 9.86 $/m^3$, and the amount to execute 3,825 m^3 of excavation to foundations levels is $ 37,714.50

- Contractor #10 suggested 10 days to execute and finish the 3,825 m^3 of excavation to foundations levels, i.e., 3,825 m^3 / 10 days = 382.5 m^3/day (1 day means 8 working hours (standard time)), at a rate of 14.08 $/m^3$, and the amount to execute 3,825 m^3 of excavation to foundations levels is $ 53,856

Table 3.3.2: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	contractor #1	191.250 m^3/day.
2-	contractor #2	318.750 m^3/day.
3-	contractor #3	478.125 m^3/day.
4-	contractor #4	478.125 m^3/day.
5-	contractor #5	425.000 m^3/day.
6-	contractor #6	478.125 m^3/day.
7-	contractor #7	318.750 m^3/day.
8-	contractor #8	425.000 m^3/day.
9-	contractor #9	182.140 m^3/day.
10-	contractor #10	382.500 m^3/day.

- It can be noted from the above information that the productivity of the 10 contractors is as below:
  - ✓ The highest productivity is 478.125 m^3/day.
  - ✓ The lowest productivity is 182.140 m^3/day.

Table 3.3.3: The serial productivity of the 10 contractors from top to bottom is as below:-

Number of contractor	Productivity	Duration
#4, #6	478.125 m^3/day	8 days
#5, #8	425.000 m^3/day	9 days
#3, #10	382.500 m^3/day	10 days
#2, #7	318.750 m^3/day	12 days
#1	191.250 m^3/day	20 days
#9	182.140 m^3/day	21 days

• When the duration is short, it can be noted that the productivity is high because the contractor wants to execute a specific work in short time. For example, contractor #4 and contractor #6 suggested 8 days executing the 3,825 m^3 of excavation to foundations levels.

• It can be noted that the productivity of (478.125 m^3/day) of contractor #4 and contractor #6 is more than the productivity of contractors (#1, #2, #3, #5, #7, #8, #9, and #10).

• The productivity of (425 m^3/day) of contractor #5 and contractor #8 is more than the productivity of contractors (#1, #2, #3, #7, #9, and #10).

• The productivity of (382.5 m^3/day) of contractor #3 and contractor #10 is more than the productivity of contractors (#1, #2, #7, and #9).

• The productivity of (318.75 m^3/day) of contractor #2 and contractor #7 is more than the productivity of contractors (#1 and #9).

• The productivity of (191.25 m^3/day) of contractor #1 is more than the productivity of contractor (#9).

• The lowest productivity of (182.14 m^3/day) is the productivity of contractor #9 who suggested the longest duration to execute the 3,825 m^3 of excavation to foundation levels.

• It can be noted from the above information that the amounts of the 10 contractors are as below:

▪ The highest amount....$ 64,642.50, contractor #8.

▪ The lowest amount.....$ 24,250.50, contractor#7.

▪ The serial amount of excavation to foundations level for the 10 contractors from top to bottom is as below:

✓ $ 64,642.50 contractor #8.

✓ $ 53,856 contractor #10.

✓ $ 37,714.50 contractors #1 and #9.

✓ $ 32,321.25 contractor #2.

✓ $ 26,928 contractors #3, #5 and #6.

✓ $ 26,775 contractor #4.

✓ $ 24,250.50 contractor #7.

• It can be noted from the above information that the highest amount ($ 64,642.50) is the amount suggested by contractor #8 is higher than the amounts of all contractors (#1, #2, #3, #4, #5, #6, #7, #9, and #10) while the lowest amount ($ 24,250.50) is the amount suggested by contractor #7.

• When asked all contractors about how they suggested the rates for all things and activities in the tender, they agreed and answered that the rate for any activity includes (The materials cost + workers wages + administration costs (site and head office overheads) including (office rent + staff salaries for example "engineers, foremen, secretary.... etc.) + transportation + telephone cost + stationeries including (papers, pens, pencils, computer.... etc.) + profit percentage (15% - 20%, minimum 7%) + 16% sales tax to be deducted to the Government of Jordan + wood consumption for various types of reinforced concrete and concrete works....etc.

Table 3.3.4: Wages defined by contractors

Man Power

Name of man power	Wages $/day
Carpenter	21
Steel man	21
Builder man	21
Plaster man	28
Cast labor	15
Tiles man (mosaic tiles)	21
Tiles man (ceramic tiles (walls + floors))	25-28
Painter	21
<u>Site overheads</u>	
Project manager	1,500 $ / month
Site Engineer	1,000 $ / month
Foreman	550 $ / month
Buffet worker (make tea, coffee and clean the office in the project)	200 $ / month
Quantity surveyors	
Driver with car (pick up car)	700 $ / month
<u>Head office overheads</u>	700 $ / month
Accountant	
Buffet worker (make tea, coffee, and clean the office)	600 $ / month
Secretary	200 $ / month
Administrative	400 $ / month
	450 $ / month

• For example, the highest rate of $ 16.90 per each m^3 of excavation to foundations levels suggested by contractor #8 includes the excavation cost of one m^3 and taking the excavations outside the project (near the project if the product of excavation is good for filling in the project after finishing the foundations). Otherwise, the product of excavation must be taken outside the project or outside the city if not good for filling purposes. In addition, the cost included workers wages + administration costs (site and head office overheads) including (office rent + staff salaries for example "engineers, foremen, secretary.... etc.) +

transportation inside and outside the project + telephone costs + stationeries including (papers, pens, pencils, computer....etc.) + profit percentage (15% - 20%, minimum 7%) + 16% sales tax to be deducted to the Government of Jordan.

- It can be noted that the productivity for highest rate of contractor #8 is 425 m^3/day, i.e., the amount suggested by contractor #8 per each day is 425 m^3/day * 16.90 \$/m^3 = \$ 7,182.5 in 1 day (8 working hours (standard time)) of excavation and may be the excavator work for overtime, i.e., 10 hours, the amount for 8 hours of excavation by excavator is \$ 7,182.5 / 8 hours = 897.81 \$/hour or \$ 7,182.5 / 10 hours = 718.25 \$/hour, this 897.81 \$/hour or 718.25 \$/hour includes the excavation cost of one m^3 and taking the excavations outside the project (near the project if the product of excavation is good for filling in the project after finishing the foundations). Otherwise, the product of excavation must be taken outside the project or outside the city if not good for filling purposes. In addition, the cost included workers wages + administration costs (site and head office overheads) including (office rent + staff salaries for example "engineers, foremen, secretary.... etc.) + transportation inside and outside the project + telephone costs + stationeries including (papers, pens, pencils, computer....etc.) + profit percentage (15% - 20%, minimum 7%) + 16% sales tax to be deducted to the Government of Jordan.

- But here for contractor #8, it can be noted that the rate of \$ 16.90 per each m^3 of excavation to foundations levels is high, but this is up to contractor himself.

- The total amount (\$ 64,642.50) offered by contractor #8 is the highest amount of all contractors (#1, #2, #3, #4, #5, #6, #7, #9, and #10).

- Contractor #10 who offered a rate of \$ 14.08 per each m^3 of excavation to foundations levels, is less than the rate of (\$ 16.90 per each m^3) offered by contractor #8, and the total amount (\$ 53,856) offered by contractor #10 is less than the total amount (\$ 64,642.50) offered by contractor #8.

- The rate of \$ 9.86 per each m^3 of excavation to foundations levels offered by contractors #1 and #9 is less than the rate of \$ 14.08 per each m^3 of excavation to foundations levels offered by contractor #10, and the rate of \$ 16.90 per each m^3 of excavation to foundations levels offered by contractor #8, and the total amount of contractors #1 and #9 (\$ 37,714.50) is less than the total amount of (\$ 53,856) offered by contractor #10, and the amount of (\$ 64,642.50) offered by contractor #8.

- Contractor #2 who offered a rate of 8.45 \$/m^3 of excavation to foundations levels is less than the rate of \$ 9.86 per each m^3 of excavation to foundations levels offered by

contractors #1 and #9, and the rate of $ 14.08 per each m^3 offered by contractor #10 and the rate of $ 16.90 per each m^3 of excavation to foundations levels offered by contractor #8.

- The total amount of ($ 32,321.25) offered by contractor #2 is less than the amounts of ($ 37,714.50), ($ 53,856) and ($ 64,642.50) offered by contractors #1, #9, #10, and #8 consecutively.

- The rate of 7.04 $/m^3$ of excavation to foundations levels offered by contractors #3, #5 and #6 is less than the rates of (8.45 $/m^3$), (9.86 $/m^3$), (14.08 $/m^3$) and (16.90 $/m^3$) offered by contractor #2; #1, #9, #10, and #8 consecutively.

- The total amount of ($ 26,928) offered by contractors #3, #5 and #6 of excavation to foundations levels is less than the total amount of ($ 32,321.25) offered by contractor #2; and the amount of ($ 37,714.50) offered by contractors #1 and #9; and the amount of ($ 53,856) offered by contractor #10; and contractor #8 ($ 64,642.50).

- The rate of 7.0 $/m^3$ of excavation to foundations levels offered by contractor #4 is less than the rate of contractors #3, #5 and #6 who offered a rate of (7.04 $/m^3$) of excavation to foundations levels, #2 (8.45 $/m^3$), #1 and #9 (9.86 $/m^3$), #10 (14.08 $/m^3$), and #8 (16.90 $/m^3$)

- The total amount of ($ 26,775) of excavation to foundations levels offered by contractor #4 is less than the total amount of contractors #3, #5 and #6 ($ 26,928), #2 ($ 32,321.25), #1 and #9 ($ 37,714.50), contractor #10 ($ 53,856), and contractor #8 ($ 64,642.50).

- The amount of ($ 24,250.50) offered by contractor #7 who suggested a rate of 6.34 $/m^3$ of excavation to foundations levels is the lowest rate as it is less than the rates of contractors #4 (7.0 $/m^3$), #3, #5 and #6 (7.04 $/m^3$), #2 (8.45 $/m^3$), #1 and #9 (9.86 $/m^3$), #10 (14.08 $/m^3$), and #8 (16.90 $/m^3$).

- The total amount of $ 24,250.50 offered by contractor #7 is the lowest total amount among the total amounts offered by all contractors, #4 ($ 26,775) of excavation to foundations levels, #3, #5 and #6 ($ 26,928), #2 ($ 32,321.25), #1 and #9 ($ 37,714.50), contractor #10 ($ 53,856), and contractor #8 ($ 64,642.50).

3.3.2- Bill No.1- Excavation and Earth works, Item B- Excavation for external works

- Contractor #1 suggested 6 days to execute and finish the 683 m^3 of excavation for external works, i.e., 683 m^3 / 6 days = 113.83 m^3/day (1 day i.e., 8 working hours (standard time)), at a rate of 11.27 \$/m^3, and the amount to execute 683 m^3 of excavation for external works is \$ 7,697.41

- Contractor #2 suggested 7 days to execute and finish the 683 m^3 of excavation for external works, i.e., 683 m^3 / 7 days = 97.57 m^3/day, at a rate of 7.04 \$/m^3, and the amount to execute 683 m^3 of excavation for external works is \$ 4,808.32

- Contractor #3 suggested 3 days to execute and finish the 683 m^3 of excavation for external works, i.e., 683 m^3 / 3 days = 227.66 m^3/day, at a rate of 7.04 \$/m^3, and the amount to execute 683 m^3 of excavation for external works is \$ 4,808.32

- Contractor #4 suggested 5 days to execute and finish the 683 m^3 of excavation for external works, i.e., 683 m^3 / 5 days = 136.6 m^3/day, at a rate of 10.0 \$/m^3, and the amount to execute 683 m^3 of excavation for external works is \$ 6,830

- Contractor #5 suggested 7 days to execute and finish the 683 m^3 of excavation for external works, i.e., 683 m^3 / 7 days = 97.57 m^3/day, at a rate of 5.63 \$/m^3, and the amount to execute 683 m^3 of excavation for external works is \$ 3,845.29

- Contractor #6 suggested 5 days to execute and finish the 683 m^3 of excavation for external works, i.e., 683 m^3 / 5 days = 136.6 m^3/day, at a rate of 9.86 \$/m^3, and the amount to execute 683 m^3 of excavation for external works is \$ 6,734.38

- Contractor #7 suggested 7 days to execute and finish the 683 m^3 of excavation for external works, i.e., 683 m^3 / 7 days = 97.57 m^3/day, at a rate of 5.63 \$/ m^3, and the amount to execute 683 m^3 of excavation for external works is \$ 3,845.29

- Contractor #8 suggested 3 days to execute and finish the 683 m^3 of excavation for external works, i.e., 683 m^3 / 3 days = 227.66 m^3/day, at a rate of 15.49 \$/m^3, and the amount to execute 683 m^3 of excavation for external works is \$ 10,579.67

- Contractor #9 suggested 10 days to execute and finish the 683 m^3 of excavation for external works, i.e., 683 m^3 / 10 days = 68.3 m^3/day, at a rate of 7.05 \$/m^3, and the amount to execute 683 m^3 of excavation for external works is \$ 4,815.15

- Contractor #10 suggested 7 days to execute and finish the 683 m^3 of excavation for external works, i.e., 683 m^3 / 7 days = 97.57 m^3/day, at a rate of 8.45 \$/m^3, and the amount to execute 683 m^3 of excavation for external works is \$ 5,771.35

Table 3.3.5: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	contractor #1	113.83 m^3/day.
2-	contractor #2	97.57 m^3/day.
3-	contractor #3	227.66 m^3/day.
4-	contractor #4	136.60 m^3/day.
5-	contractor #5	97.57 m^3/day.
6-	contractor #6	136.60 m^3/day.
7-	contractor #7	97.57 m^3/day.
8-	contractor #8	227.66 m^3/day.
9-	contractor #9	68.30 m^3/day.
10-	contractor #10	97.57 m^3/day.

- It can be noted from the above information that the productivity of the 10 contractors is as below:
  - ✓ The highest productivity is 227.66 m^3/day.
  - ✓ The lowest productivity is 68.30 m^3/day.

Table 3.3.6: The serial productivity of the 10 contractors from top to bottom is as below:-

Number of contractor	Productivity	Duration
#3, #8	227.66 m^3/day	3 days
#4, #6	136.60 m^3/day	5 days
#1	113.83 m^3/day	6 days
#2, #5, #7, #10	97.57 m^3/day	7 days
#9	68.30 m^3/day	10 days

• When the duration is short, it can be noticed that the productivity is high because the contractor wants to execute a specific work in a short time. For example, contractor #3 and contractor #8 suggested 3 days executing the 683 m^3 of excavation for external works.

• It can be noted that the productivity of (227.66 m^3/day) of contractor #3 and contractor #8 is more than the productivity of all other contractors (#1, #2, #4, #5, #6, #7, #9, and #10).

• The productivity of (136.6 m^3/day) of contractor #4 and contractor #6 is more than the productivity of contractors (#1, #2, #5, #7, #9, and #10).

• The productivity of (113.83 m^3/day) of contractor #1 is more than the productivity of contractors (#2, #5, #7, #9, and #10).

• The productivity of (97.57 m^3/day) of contractor #2, contractor #5, contractor #7 and contractor #10 is more than the productivity of contractor (#9).

• The lowest productivity of (68.3 m^3/day) is the productivity of contractor #9 who suggested the longest duration to execute the 683 m^3 of excavation for external works.

• From the above information on the 10 contractors as regards the cost, it can be noted that the amount for the 10 contractors is as below:-

▪ The highest amount .....$ 10,579.67.....Contractor #8.

▪ The lowest amount.....$ 3,845.29.....Contractor #5 and contractor #7.

▪ The serial amount of excavation for external works for the 10 contractors from top to bottom is as below:-

- ✓ $ 10,579.67 contractor #8.
- ✓ $ 7,697.41 contractor #1.
- ✓ $ 6,830 contractor #4.
- ✓ $ 6,734.38 contractor #6.
- ✓ $ 5,771.35 contractor #10.
- ✓ $ 4,815.15 contractor #9.
- ✓ $ 4,808.32 contractor #2 and contractor #3.
- ✓ $ 3,845.29 contractor #5 and contractor #7.

• From the above information, it can be noted that the highest amount ($ 10,579.67) offered by contractor #8 is higher than all other contractors (#1, #2, #3, #4, #5, #6, #7, #9, #10), while the lowest amount ($ 3,845.29) is offered by contractor #5 and contractor #7.

3.3.3- Bill No.1- Excavation and earth works, filling, laid and compacted in, item A- Approved filling inside building

• Contractor #1 suggested 7 days to execute and finish the 540 m^3 of approved filling inside building, i.e., 540 m^3 / 7 days = 77.14 m^3/day (1 day i.e., 8 working hours (standard time)), at a rate of 4.23 $/$m^3$, and the amount to execute 540 m^3 of approved filling inside building is $ 2,284.2

• Contractor #2 suggested 6 days to execute and finish the 540 m^3 of approved filling inside building, i.e., 540 m^3 / 6 days = 90 m^3/day, at a rate of 7.75 $/$m^3$, and the amount to execute 540 m^3 of approved filling inside building is $ 4,185

• Contractor #3 suggested 5 days to execute and finish the 540 m^3 of approved filling inside building, i.e., 540 m^3 / 5 days = 108 m^3/day, at a rate of 9.86 $/$m^3$, and the amount to execute 540 m^3 of approved filling inside building is $ 5,324.40

• Contractor #4 suggested 7 days to execute and finish the 540 m^3 of approved filling inside building, i.e., 540 m^3 / 7 days = 77.14 m^3/day, at a rate of 11.27 $/$m^3$, and the amount to execute 540 m^3 of approved filling inside building is $ 6,085.80

• Contractor #5 suggested 10 days to execute and finish the 540 m^3 of approved filling inside building, i.e., 540 m^3 / 10 days = 54 m^3/day, at a rate of 14.08 $/$m^3$, and the amount to execute 540 m^3 of approved filling inside building is $ 7,603.20

• Contractor #6 suggested 7 days to execute and finish the 540 m^3 of approved filling inside building, i.e., 540 m^3 / 7 days = 77.14 m^3/day, at a rate of 11.27 $/$m^3$, and the amount to execute 540 m^3 of approved filling inside building is $ 6,085.80

• Contractor #7 suggested 12 days to execute and finish the 540 m^3 of approved filling inside building, i.e., 540 m^3 / 12 days = 45 m^3/day, at a rate of 11.27 $/$m^3$, and the amount to execute 540 m^3 of approved filling inside building is $ 6,085.80

• Contractor #8 suggested 6 days to execute and finish the 540 m^3 of approved filling inside building, i.e., 540 m^3 / 6 days = 90 m^3/day, at a rate of 2.81 $/$m^3$, and the amount to execute 540 m^3 of approved filling inside building is $ 1,517.40

• Contractor #9 suggested 10 days to execute and finish the 540 m^3 of approved filling inside building, i.e., 540 m^3 / 10 days = 54 m^3/day, at a rate of 7.05 $/$m^3$, and the amount to execute 540 m^3 of approved filling inside building is $ 3,807

• Contractor #10 suggested 10 days to execute and finish the 540 m^3 of approved filling inside building, i.e., 540 m^3 / 10 days = 54 m^3/day, at a rate of 2.82 $/$m^3$, and the amount to execute 540 m^3 of approved filling inside building is $ 1,522.80

• Productivity means execution of a certain work within a specified period of time;

Table 3.3.7: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	Contractor #1	77.14 m^3/day.
2-	Contractor #2	90.00 m^3/day.
3-	Contractor #3	108.00 m^3/day.
4-	Contractor #4	77.14 m^3/day.
5-	Contractor #5	54.00 m^3/day.
6-	Contractor #6	77.14 m^3/day.
7-	Contractor #7	45.00 m^3/day.
8-	Contractor #8	90.00 m^3/day.
9-	Contractor #9	54.00 m^3/day.
10-	Contractor #10	54.00 m^3/day.

- From the above information, it can be noted that the productivity of the 10 contractors is as below:-
  - ✓ The highest productivity is 108 m^3/day.
  - ✓ The lowest productivity is 45 m^3/day.

Table 3.3.8: The serial productivity of the 10 contractors from top to bottom is as below:-

Number of contractor	Productivity	Duration
#3	108.00 m^3/day	5 days
#2, #8	90.00 m^3/day	6 days
#1, #4, #6	77.14 m^3/day	7 days
#5, #9,#10	54.00 m^3/day	10 days
#7	45.00 m^3/day	12 days

- It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in a short time. For example, contractor #3 suggested 5 days to execute 540 m^3 of approved filling inside building.
- It can be noted that the productivity of (108 m^3/day) of contractor #3 is higher than the productivity of the all contractors (#1, #2, #4, #5, #6, #7, #8, #9, and #10).
- The productivity of (90 m^3/day) of contractor #2 and contractor #8 is more than the productivity of contractors (#1, #4, #5, #6, #7, #9, and #10).

• The productivity of (77.14 m^3/day) of contractor #1, contractor #4 and contractor #6 is more than the productivity of contractors (#5, #7, #9, and #10).

• The productivity of (54 m^3/day) of contractor #5, contractor#9, and contractor #10 is more than the productivity of contractor (#7).

• And the lowest productivity of (45 m^3/day) is the productivity of contractor #7 who suggested the longest duration (12 days) to execute the 540 m^3 of approved filling inside building.

• From the above information on the 10 contractors as regards the cost, it can be noted that the amount for the 10 contractors is as below:-

▪ The highest amount .....$ 7,603.20...Contractor #5.

▪ The lowest amount..... $ 1,517.40... Contractor #8

▪ The serial amount of approved filling inside building for the 10 contractors from top to bottom is as below:-

- ✓ $ 7,603.20 contractor #5.
- ✓ $ 6,085.80 contractor #4, contractor #6 and contractor #7.
- ✓ $ 5,324.40 contractor #3.
- ✓ $ 4,185 contractor #2.
- ✓ $ 3,807 contractor #9.
- ✓ $ 2,284.20 contractor #1.
- ✓ $ 1,522.80 contractor #10.
- ✓ $ 1,517.40 contractor #8.

• It can be noted from the above information that the highest amount ($ 7,603.20) offered by contractor #5 is more than the amount of each of the other contractors (#1, #2, #3, #4, #6, #7, #8, #9, and #10),, while the lowest amount ($ 1,517.40) is offered by contractor #8.

3.3.4- Bill No.1- Excavation and earth works, filling, laid and compacted in, item B-Approved filling outside building

• Contractor #1 suggested 9 days to execute and finish the 736 m^3 of approved filling outside building, i.e., 736 m^3 / 9 days = 81.77 m^3/day (1 day i.e., 8 working hours (standard time)), at a rate of 4.23 $/$m^3$, and the amount to execute 736 m^3 of approved filling outside building is $ 3,113.28

- Contractor #2 suggested 8 days to execute and finish the 736 m^3 of approved filling outside building, i.e., 736 m^3 / 8 days = 92 m^3/day, at a rate of 7.04 $/$m^3$, and the amount to execute 736 m^3 of approved filling outside building is $ 5,181.44

- Contractor #3 suggested 7 days to execute and finish the 736 m^3 of approved filling outside building, i.e., 736 m^3 / 7 days = 105.14 m^3/day, at a rate of 9.86 $/$m^3$, and the amount to execute 736 m^3 of approved filling outside building is $ 7,256.96

- Contractor #4 suggested 7 days to execute and finish the 736 m^3 of approved filling outside building, i.e., 736 m^3 / 7 days = 105.14 m^3/day, at a rate of 11.27 $/$m^3$, and the amount to execute 736 m^3 of approved filling outside building is $ 8,294.72

- Contractor #5 suggested 10 days to execute and finish the 736 m^3 of approved filling outside building, i.e., 736 m^3 / 10 days = 73.6 m^3/day, at a rate of 11.26 $/$m^3$, and the amount to execute 736 m^3 of approved filling outside building is $ 8,287.36

- Contractor #6 suggested 7 days to execute and finish the 736 m^3 of approved filling outside building, i.e., 736 m^3 / 7 days = 105.14 m^3/day, at a rate of 11.27 $/$m^3$, and the amount to execute 736 m^3 of approved filling outside building is $ 8,294.72

- Contractor #7 suggested 15 days to execute and finish the 736 m^3 of approved filling outside building, i.e., 736 m^3 / 15 days = 49.06 m^3/day, at a rate of 11.27 $/$m^3$, and the amount to execute 736 m^3 of approved filling outside building is $ 8,294.72

- Contractor #8 suggested 8 days to finish the 736 m^3 of approved filling outside building, i.e., 736 m^3 / 8 days = 92 m^3/day, at a rate of 2.81 $/$m^3$, and the amount to execute 736 m^3 of approved filling outside building is $ 2,068.16

- Contractor #9 suggested 12 days to execute and finish the 736 m^3 of approved filling outside building, i.e., 736 m^3 / 12 days = 61.33 m^3 / day, at a rate of 7.05 $/$m^3$, and the amount to execute 736 m^3 of approved filling outside building is $ 5,188.80

- Contractor #10 suggested 10 days to execute and finish the 736 m^3 of approved filling outside building, i.e., 736 m^3 / 10 days = 73.6 m^3/day, at a rate of 2.82 $/$m^3$, and the amount to execute 736 m^3 of approved filling outside building is $ 2,075.52

Table 3.3.9: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	contractor #1	81.77 m^3/day.
2-	contractor #2	92.00 m^3/day.
3-	contractor #3	105.14 m^3/day.
4-	contractor #4	105.14 m^3/day.
5-	contractor #5	73.60 m^3/day.
6-	contractor #6	105.14 m^3/day.
7-	contractor #7	49.06 m^3/day.
8-	contractor #8	92.00 m^3/day.
9-	contractor #9	61.33 m^3/day.
10-	contractor #10	73.60 m^3/day.

- It can be noted from the above information that the productivity of the 10 contractors is as below:-
  - ✓ The highest productivity is 105.14 m^3/day.
  - ✓ The lowest productivity is 49.06 m^3/day.

Table 3.3.10: The serial productivity of the 10 contractors from the top to bottom is as below:-

Number of contractor	Productivity	Duration
#3, #4, #6	105.14 m^3/day	7 days
#2, #8	92.00 m^3/day	8 days
#1	81.77 m^3/day	9 days
#5, #10	73.60 m^3/day	12 days
#9	61.33 m^3/day	12 days
#7	49.06 m^3/day	15 days

• It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in a short time. For example, , contractor #3, contractor #4 and contractor #6 suggested 7 days to execute 736 m^3 of approved filling outside building.

• It can be noted that the productivity of (105.14 m^3/day) of contractor #3, contractor #4 and contractor #6 is more than the productivity of all contractors (#1, #2, #5, #7, #8, #9, and #10).

• The productivity of (92 m^3/day) of contractor #2 and contractor #8 is more than the productivity of contractors (#1, #5, #7, #9, and #10).

• The productivity of (81.77 m^3/day) of contractor #1 is more than the productivity of contractors (#5, #7, #9, and #10).

• The productivity of (73.6 m^3/day) of contractor #5, and contractor #10 is more than the productivity of contractors (#7, #9).

• The productivity of (61.33 m^3/day) of contractor #9 is more than the productivity of contractor (#7).

• The lowest productivity is the productivity of contractor #7 who suggested the longest duration (15 days) to execute the 736 m^3 of approved filling outside building.

• From the above information on the 10 contractors as regards the cost, it can be noted that the amount for the 10 contractors is as below:-

▪ The highest amount $ 8,294.72 of contractor #4, contractor #6 and contractor #7.

▪ The lowest amount $ 1,517.4 of contractor #8.

▪ The serial amount of approved filling outside building for the 10 contractors from the top to bottom is as below:-

✓ $ 8,294.72 Contractor #4, Contractor #6 and contractor #7.

✓ $ 8,287.36 Contractor #5.

✓ $ 7,256.96 Contractor #3.

✓ $ 5,188.80 Contractor #9.

✓ $ 5,181.44 Contractor #2.

✓ $ 3,113.28 Contractor #1.

✓ $ 2,075.52 Contractor #10.

✓ $ 2,068.16 Contractor #8.

• It can be noted from the above information that the highest amount $ 8,294.72 is the amount offered by contractor #4, contractor #6 and contractor #7 is more than the amount offered by each of all contractors (#1, #2, #3, #5, #8, #9, and #10),, while the lowest amount $ 1,517.40 is offered by contractor #8.

3.3.5- Bill No.2- Concrete, Plain concrete 18 N/mm^2 at 28 days cube.....etc., item A- Blinding; 100 mm thick under foundations and tie beams

• Contractor #1 suggested 4 days to execute and finish the 393 m^2 of blinding; 100mm thick under foundations and tie beams, i.e., 393 m^2 / 4 days = 98.25 m^2/day (1 day i.e., 8 working hours (standard time)), at a rate of 9.86 \$/m^2, and the amount to execute 393 m^2 of blinding; 100 mm thick under foundations and tie beams is \$ 3,874.98

• Contractor #2 suggested 5 days to execute and finish the 393 m^2 of blinding; 100 mm thick under foundations and tie beams, i.e., 393 m^2 / 5 days = 78.6 m^2/day, at a rate of 9.86 \$/m^2, and the amount to execute 393 m^2 of blinding; 100 mm thick under foundations and tie beams is \$ 3,874.98

• Contractor #3 suggested 5 days to execute and finish the 393 m^2 of blinding; 100 mm thick under foundations and tie beams, i.e., 393 m^2 / 5 days = 78.6 m^2/day, at a rate of 11.27 \$/m^2, and the amount to execute 393 m^2 of blinding; 100 mm thick under foundations and tie beams is \$ 4,429.11

• Contractor #4 suggested 4 days to execute and finish the 393 m^2 of blinding; 100 mm thick under foundations and tie beams, i.e., 393 m^2 / 4 days = 98.25 m^2/day, at a rate of 7.75 \$/m^2, and the amount to execute 393 m^2 of blinding; 100 mm thick under foundations and tie beams is \$ 3,045.75

• Contractor #5 suggested 5 days to execute and finish the 393 m^2 of blinding; 100 mm thick under foundations and tie beams, i.e., 393 m^2 / 5 days = 78.6 m^2/day, at a rate of 7.74 \$/m^2, and the amount to execute 393 m^2 of blinding; 100 mm thick under foundations and tie beams is \$ 3,041.82

• Contractor #6 suggested 4 days to execute and finish the 393 m^2 of blinding; 100 mm thick under foundations and tie beams, i.e., 393 m^2 / 4 days = 98.25 m^2/day, at a rate of 7.75 \$/m^2, and the amount to execute 393 m^2 of blinding; 100 mm thick under foundations and tie beams is \$ 3,045.75

• Contractor #7 suggested 20 days to execute and finish the 393 m^2 of blinding; 100 mm thick under foundations and tie beams, i.e., 393 m^2 / 20 days = 19.65 m^2/day, at a rate of 119.72 \$/m^2, and the amount to execute 393 m^2 of blinding; 100 mm thick under foundations and tie beams is \$ 47,049.96

• Contractor #8 suggested 6 days to execute and finish the 393 m^2 of blinding; 100 mm thick under foundations and tie beams, i.e., 393 m^2 / 6 days = 65.5 m^2/day, at a rate of 7.04

$/m^2, and the amount to execute 393 m^2 of blinding; 100 mm thick under foundations and tie beams is $ 2,766.72

- Contractor #9 suggested 5 days to execute and finish the 393 m^2 of blinding; 100 mm thick under foundations and tie beams, i.e., 393 m^2 / 5 days = 78.6 m^2/day, at a rate of 11.27 $/m^2, and the amount to execute 393 m^2 of blinding; 100 mm thick under foundations and tie beams is $ 4,429.11

- Contractor #10 suggested 3 days to execute and finish the 393 m^2 of blinding; 100 mm thick under foundations and tie beams, i.e., 393 m^2 / 3 days = 131 m^2/day, at a rate of 21.13 $/m^2, and the amount to execute 393 m^2 of blinding; 100 mm thick under foundations and tie beams is $ 8,304.09

Table 3.3.11: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	Contractor #1	98.25 m^2/day
2-	Contractor #2	78.60 m^2/day.
3-	Contractor #3	78.60 m^2/day.
4-	Contractor #4	98.25 m^2/day.
5-	Contractor #5	78.60 m^2/day.
6-	Contractor #6	98.25 m^2/day
7-	Contractor #7	19.65 m^2/day.
8-	Contractor #8	65.50 m^2/day
9-	Contractor #9	78.60m^2/day
10-	Contractor #10	131.00 m^2/day

- It can be noted from the above information that the productivity of the 10 contractors is as below:-

✓ The highest productivity is 131 m^2/day.

✓ The lowest productivity is 19.65 m^2/day

Table 3.3.12: The serial productivity of the 10 contractors from the top to bottom is as below:-

Number of contractor	Productivity	Duration
#10	131.00 m^2/day	3 days
#1, #4, #6	98.25 m^2/day	4 days
#2, #3, #5, #9	78.60 m^2/day	5 days
#8	65.50 m^2/day	6 days
#7	19.65 m^2/day	20 days

- It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in the short time. For example, contractor #10 suggested 3 days to execute 393 m^2 of blinding; 100mm thick under foundations and tie beams.
- It can be noted that the productivity of (131 m^2/day) of contractor #10 is more than the productivity of all contractors (#1, #2, #3, #4, #5,#6, #7, #8, and #9).
- The productivity of (98.25 m^2/day) of contractor #1, #4 and contractor #6 is more than the productivity of contractors (#2, #3, #5, #7, #8, and #9).
- The productivity of (78.6 m^2/day) of contractor #2, contractor #3, contractor #5 and contractor #9 is more than the productivity of contractors (#7, and #8).
- The productivity of (65.5 m^2/day) of contractor #8 is more than the productivity of contractor (#7).
- The productivity of (61.33 m^2/day) of contractor #9 is more than the productivity of contractors (#7).
- The lowest productivity is the productivity of contractor #7 who suggested the longest duration (20 days) to execute the 393 m^2 of blinding; 100 mm thick under foundations and tie beams.
- From the above information on the 10 contractors as regards the cost, it can be noted that the amount of the 10 contractors is as below:-
  - The highest amount $ 47,049.96 of contractor #7.
  - The lowest amount $ 2,766.72 of contractor #8.

▪ The serial amount to execute the 393 m^2 of blinding; 100 mm thick under foundations and tie beams of the 10 contractors from top to bottom is as below:-

- ✓ $ 47,049.96 Contractor #7.
- ✓ $ 8,304.09 Contractor #10.
- ✓ $ 4,429.11 Contractor #3 and Contractor #9.
- ✓ $ 3,874.98 Contractor #1 and Contractor #2.
- ✓ $ 3,045.75 Contractor #4 and Contractor #6.
- ✓ $ 3,041.82 Contractor #5.
- ✓ $ 2,766.72 Contractor #8.

• It can be noted from the above information that the highest amount $ 47,049.96 offered by contractor #7 is more than the amount of each of the other contractors (#1, #2, #3, #4, #5, #6, #8, #9, and #10), while the lowest amount $ 2,766.72 offered by contractor #8.

3.3.6- Bill No.2- Concrete, Reinforced concrete 25 N/mm^2 at 28 days cubes compressive strength with ordinary Portland cement including all necessary formwork, complete, item D- Foundations

• Contractor #1 suggested 10 days to execute and finish the 141 m^3 of reinforced concrete 25 N/mm^2 to foundations, i.e., 141 m^3 / 10 days = 14.1 m^3/day (1 day i.e., 8 working hours (standard time)), at a rate of 105.63 $/$m^3$, and the amount to execute 141 m^3 of reinforced concrete 25 N/mm^2 to foundations is $ 14,893.83

• Contractor #2 suggested 8 days to execute and finish the 141 m^3 of reinforced concrete 25 N/mm^2 to foundations, i.e., 141 m^3 / 8 days = 17.625 m^3/day, at a rate of 132.39 $/$m^3$, and the amount to execute 141 m^3 of reinforced concrete 25 N/mm^2 to foundations is $ 18,666.99

• Contractor #3 suggested 15 days to execute and finish the 141 m^3 of reinforced concrete 25 N/mm^2 to foundations, i.e., 141 m^3 / 15 days = 9.4 m^3/day, at a rate of 105.63 $/$m^3$, and the amount to execute 141 m^3 of reinforced concrete 25 N/mm^2 to foundations is $ 14,893.83

• Contractor #4 suggested 8 days to execute and finish the 141 m^3 of reinforced concrete 25 N/mm^2 to foundations, i.e., 141 m^3 / 8 days = 17.625 m^3/day, at a rate of 112.68 $/$m^3$, and the amount to execute 141 m^3 of reinforced concrete 25 N/mm^2 to foundations is $ 15,887.88

• Contractor #5 suggested 10 days to execute and finish the 141 m^3 of reinforced concrete 25 N/mm^2 to foundations, i.e., 141 m^3 / 10 days = 14.1 m^3/day, at a rate of 98.59

$/m^3$, and the amount to execute 141 m^3 of reinforced concrete 25 N/mm^2 to foundations is $ 13,901.19

- Contractor #6 suggested 8 days to execute and finish the 141 m^3 of reinforced concrete 25 N/mm^2 to foundations, i.e., 141 m^3 / 8 days = 17.625 m^3/day, at a rate of 112.68 $/m^3$, and the amount to execute 141 m^3 of reinforced concrete 25 N/mm^2 to foundations is $ 15,887.88
- Contractor #7 suggested 7 days to execute and finish the 141 m^3 of reinforced concrete 25 N/mm^2 to foundations, i.e., 141 m^3 / 7 days = 20.14 m^3/day, at a rate of 112.68 $/m^3$, and the amount to execute 141 m^3 of reinforced concrete 25 N/mm^2 to foundations is $ 15,887.88
- Contractor #8 suggested 13 days to execute and finish the 141 m^3 of reinforced concrete 25 N/mm^2 to foundations, i.e., 141 m^3 / 13 days = 10.84 m^3/day, at a rate of 98.59 $/m^3$, and the amount to execute 141 m^3 of reinforced concrete 25 N/mm^2 to foundations is $ 13,901.19
- Contractor #9 suggested 15 days to execute and finish the 141 m^3 of reinforced concrete 25 N/mm^2 to foundations, i.e., 141 m^3 / 15 days = 9.4 m^3/day, at a rate of 105.64 $/m^3$, and the amount to execute 141 m^3 of reinforced concrete 25 N/mm^2 to foundations is $ 14,895.24
- Contractor #10 suggested 7 days to execute and finish the 141 m^3 of reinforced concrete 25 N/mm^2 to foundations,, i.e., 141 m^3 / 7 days = 20.14 m^3/day, at a rate of 91.55 $/m^3$, and the amount to execute 141 m^3 of reinforced concrete 25 N/mm^2 to foundations is $ 12,908.55

Table 3.3.13: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	Contractor #1	14.100 m^3/day.
2-	Contractor #2	17.625 m^3/day
3-	Contractor #3	9.400 m^3/day.
4-	Contractor #4	17.625 m^3/day
5-	Contractor #5	14.100 m^3/day.
6-	Contractor #6	17.625 m^3/day.
7-	Contractor #7	20.140 m^3/day.
8-	Contractor #8	10.840 m^3/day.
9-	Contractor #9	9.400 m^3/day.
10-	Contractor #10	20.140 m^3/day.

- It can be noted from the above information that the productivity of the 10 contractors is as below:-

✓ The highest productivity is 20.14 m^3/day

✓ The lowest productivity is 10.84 m^3/day

Table 3.3.14: The serial productivity of the 10 contractors from the top to bottom is as below:-

Number of contractor	Productivity	Duration
#7, #10	20.140 m^3/day	7 days
#2, #4, #6	17.625 m^3/day	8 days
#1, #5	14.100 m^3/day	10 days
#8	10.840 m^3/day	13 days
#3, #9	9.400 m^3/day	15 days

- It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in a short time. For example, contractor #7 and contractor #10 suggested 7 days executing 141 m^3 of reinforced concrete 25 N/mm^2 to foundations.
- It can be noted that the productivity of (20.14 m^3/day) of contractor #7 and contractor #10 is more than the productivity of the all contractors (#1, #2, #3, #4, #5, #6, #8, and #9).
- The productivity of (17.625 m^3/day) of contractor #2, #4 and contractor #6 more than the productivity of contractors (#1, #3, #5, #8, and #9).
- The productivity of (14.1 m^3/day) of contractor #1 and contractor #5 is more than the productivity of contractors (#3, #8, and #9).
- The productivity of (10.84 m^3/day) of contractor #8 is more than the productivity of contractor (#3, and #9).
- The lowest productivity of (9.4 m^3/day) of contractor #3 and contractor #9 who suggested the longest duration (15 days) to execute 141m^3 of reinforced concrete 25 N/mm^2 to foundations.
- From the above information on the 10 contractors as regards the cost, it can be noted that the amount of the 10 contractors is as below:-
  - The highest amount $ 18,666.99 of contractor #2.
  - The lowest amount $ 12,908.55 of contractor #10.

- The serial amount to execute the 141 m3 of reinforced concrete 25 N/mm^2 to foundations of the 10 contractors from top to bottom is as below:-

✓ $ 18,666.99 Contractor #2.

✓ $ 15,887.88 Contractor #4, contractor #6 and contractor #7.

✓ $ 14,895.24 Contractor #9.

✓ $ 14,893.83 Contractor #1 and contractor #3.

✓ $ 13,901.19 Contractor #5 and contractor #8.

✓ $ 12,908.55 Contractor #10.

• It can be noted from the above information that the highest amount $ 18,666.99 offered by contractor #2 is more than the amount of each of the other contractors (#1, #3, #4, #5, #6, #7, #8, #9, and #10), while the lowest amount $ 12,908.55 offered by contractor #10.

3.3.7- Bill No.2- Concrete, Reinforced concrete cast in situ (Grade 25), item A- Ribbed slabs, 310 mm thick.

• Contractor #1 suggested 100 days to execute and finish the 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick, i.e., 458 m^3 / 100 days = 4.58 m^3/day (1 day i.e., 8 working hours (standard time)), at a rate of 112.68 $/m^3, and the amount to execute 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick is $ 51,607.44

• Contractor #2 suggested 145 days to execute and finish the 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick, i.e., 458 m^3 / 145 days = 3.16 m^3/day, at a rate of 126.76 $/m^3, and the amount to execute 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick is $ 58,056.08

• Contractor #3 suggested 60 days to execute and finish the 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick, i.e., 458 m^3 / 60 days = 7.63 m^3/day, at a rate of 105.63 $/m^3, and the amount to execute 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick is $ 48,378.54

• Contractor #4 suggested 130 days to execute and finish the 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick, i.e., 458 m^3 / 130 days = 3.52 m^3/day, at a rate of 119.72 $/m^3, and the amount to execute 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick is $ 54,831.76

• Contractor #5 suggested 140 days to execute and finish the 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick, i.e., 458 m^3 / 140 days = 3.27 m^3/day, at a

rate of 105.63 $/m^3, and the amount to execute 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick is $ 48,378.54

- Contractor #6 suggested 130 days to execute and finish the 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick, i.e., 458 m^3 / 130 days = 3.52 m^3/day, at a rate of 119.72 $/m^3, and the amount to execute 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick is $ 54,831.76.

- Contractor #7 suggested 10 days to execute and finish the 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick, i.e., 458 m^3 / 10 days = 45.8 m^3/day, at a rate of 119.72 $/m^3, and the amount to execute 458m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick is $ 54,831.76

- Contractor #8 suggested 70 days to execute and finish the 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick, i.e., 458 m^3 / 70 days = 6.54 m^3/day, at a rate of 91.54 $/m^3, and the amount to execute 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick is $ 41,925.32

- Contractor #9 suggested 70 days to execute and finish the 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick, i.e., 458 m^3 / 70 days = 6.54 m^3/day, at a rate of 112.68 $/m^3, and the amount to execute 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick is $ 51,607.44

- Contractor #10 suggested 35 days to execute and finish the 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick, i.e., 458 m^3 / 35 days = 13.08 m^3/day, at a rate of 98.59 $/m^3, and the amount to execute 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick is $ 45,154.22

Table 3.3.15: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	contractor #1	4.58 m^3/day.
2-	contractor #2	3.16 m^3/day
3-	contractor #3	7.63 m^3/day.
4-	contractor #4	3.52 m^3/day
5-	contractor #5	3.27 m^3/day.
6-	contractor #6	3.52 m^3/day.
7-	contractor #7	45.80 m^3/day.
8-	contractor #8	6.54 m^3/day.
9-	contractor #9	6.54 m^3/day.
10-	contractor #10	13.08m ^{3}/day.

- It can be noted from the above information that the productivity of the 10 contractors is as below:-
  - ✓ The highest productivity is 45.8 m^3/day.
  - ✓ The lowest productivity is 3.16 m^3/day.

Table 3.3.16: The serial productivity of the 10 contractors from top to bottom is as below:-

Number of contractor	Productivity	Duration
#7	45.80 m^3/day	10 days
#10	13.08 m^3/day	35 days
#3	7.63 m^3/day	60 days
#8, #9	6.54 m^3/day	70 days
#1	4.58 m^3/day	100 days
#4, #6	3.52 m^3/day	130 days
#5	3.27 m^3/day	140 days
#2	3.16 m^3/day	145 days

• It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in a short time. For example, contractor #7 suggested 10 days to execute 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310mm thick.

• It can be noted that the productivity of (45.8 m^3/day) of contractor #7 is more than the productivity of the all contractors (#1, #2, #3, #4, #5, #6, #8, #9, and #10).

• The productivity of (13.08 m^3/day) of contractor #10 is more than the productivity of contractors (#1, #2, #3, #4, #5, #6, #8, and #9).

• The productivity of (7.63 m^3/day) of contractor #3 is more than the productivity of contractors (#1, #2, #4, #5, #6, #8, and #9).

• The productivity of (6.54 m^3/day) of contractor #8 and contractor #9 is more than the productivity of contractors (#1, #2, #4, #5, and #6).

• The productivity of (4.58 m^3/day) of contractor #1 is more than the productivity of contractors (#2, #4, #5, and #6).

• The productivity of (3.52 m^3/day) of contractor #4 and contractor #6 is more than the productivity of contractors (#2, and#5).

• The productivity of (3.27 m^3/day) of contractor #5 is more than the productivity of contractors (#2).

• The lowest productivity of (3.16 m^3/day) is the productivity of contractor #2 who suggested the longest duration (145 days) to execute 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick.

• From the above information on the 10 contractors as regards the cost, it can be noted that the amount of the 10 contractors is as below:-

- The highest amount $ 58,056.08 of contractor #2.
- The lowest amount $ 41,925.32 of contractor #8.
- The serial amount to execute the 458 m^3 of reinforced concrete (Grade 25) for ribbed slabs 310 mm thick of the 10 contractors from top to bottom is as below:-

✓ $ 58,056.08 Contractor #2.

✓ $ 54,831.76 Contractor #4, contractor #6 and contractor #7.

✓ $ 51,607.44 Contractor #1 Contractor and #9.

✓ $ 48,378.54 Contractor #3 and Contractor #5.

✓ $ 45,154.22 Contractor #10.

✓ $ 41,925.32 Contractor #8.

• It can be noted from the above information that the highest amount $ 58,056.08 offered by contractor #2 is more than the amount of each of the other contractors (#1, #3, #4, #5, #6, #7, #8, #9, and #10), while the lowest amount $ 41,925.32 offered by contractor #8.

3.3.8- Bill No.3- Block works, Hollow concrete blocks bedded and jointed in cement sand mortar (1:3) to item A – Walls; 100 mm thick

- Contractor #1 suggested 60 days to execute and finish the 732 m^2 of hollow concrete blocks for Walls; 100 mm thick, i.e., 732 m^2 / 60 days = 12.2 m^2 / day (1 day i.e., 8 hours of work (standard time)), at a rate of 8.45 $/$m^2$, and the amount to execute 732 m^2 of hollow concrete blocks for Walls; 100 mm thick is $ 6,185.40

- Contractor #2 suggested 8 days to execute and finish the 732 m^2 of hollow concrete blocks for Walls; 100mm thick, i.e., 732 m^2 / 8 days = 91.5 m^2/day, at a rate of 12.68 $/$m^2$, and the amount to execute 732 m^2 of hollow concrete blocks for Walls; 100 mm thick is $ 9,281.76

- Contractor #3 suggested 20 days to execute and finish the 732 m^2 of hollow concrete blocks for Walls; 100 mm thick, i.e., 732 m^2 / 20 days = 36.6 m^2/day, at a rate of 8.45 $/$m^2$, and the amount to execute 732 m^2 of hollow concrete blocks for Walls; 100mm thick is $ 6,185.40

- Contractor #4 suggested 150 days to execute and finish the 732 m^2 of hollow concrete blocks for Walls; 100 mm thick, i.e., 732 m^2 / 150 days = 4.88 m^2/day, at a rate of 7.05 $/$m^2$, and the amount to execute 732 m^2 of hollow concrete blocks for Walls; 100 mm thick is $ 5,160.60

- Contractor #5 suggested 160 days to execute and finish the 732 m^2 of hollow concrete blocks for Walls; 100 mm thick, i.e., 732 m^2 / 160 days = 4.575 m^2/day, at a rate of 8.45 $/$m^2$, and the amount to execute 732 m^2 of hollow concrete blocks for Walls; 100 mm thick is $ 6,185.40

- Contractor #6 suggested 20 days to execute and finish the 732 m^2 of hollow concrete blocks for Walls; 100 mm thick, i.e., 732 m^2 / 20 days = 36.6 m^2/day, at a rate of 8.45 $/$m^2$, and the amount to execute 732 m^2 of hollow concrete blocks for Walls; 100 mm thick is $ 6,185.40

- Contractor #7 suggested 15 days to execute and finish the 732 m^2 of hollow concrete blocks for Walls; 100 mm thick i.e., 732 m^2 / 15 days = 48.8 m^2/day, at a rate of 10.57 $/$m^2$, and the amount to execute 732 m^2 of hollow concrete blocks for Walls; 100 mm thick is $ 7,737.24

- Contractor #8 suggested 17 days to execute and finish the 732 m^2 of hollow concrete blocks for Walls; 100 mm thick, i.e., 732 m^2 / 17 days = 43.06 m^2/day, at a rate of 7.04 $/$m^2$,

and the amount to execute 732 m^2 of hollow concrete blocks for Walls; 100mm thick is $ 5,153.28

• Contractor #9 suggested 7 days to execute and finish the 732 m^2 of hollow concrete blocks for Walls; 100 mm thick, i.e., 732 m^2 / 7 days = 104.57 m^2/day, at a rate of 7.05 $/$m^2$, and the amount to execute 732 m^2 of hollow concrete blocks for Walls; 100 mm thick is $ 5,160.60

• Contractor #10 suggested 30 days to execute and finish the 732 m^2 of hollow concrete blocks for Walls; 100 mm thick, i.e., 732 m^2 / 30 days = 24.4 m^2/day, at a rate of 9.86 $/$m^2$, and the amount to execute 732 m^2 of hollow concrete blocks for Walls; 100 mm thick is $ 7,217.52

Table 3.3.17: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	contractor #1	12.200 m^2/day.
2-	contractor #2	91.500 m^2/day.
3-	contractor #3	36.600 m^2/day.
4-	contractor #4	4.880 m^2/day.
5-	contractor #5	4.575 m^2/day.
6-	contractor #6	36.600 m^2/day.
7-	contractor #7	48.800 m^2/day.
8-	contractor #8	43.060 m^2/day.
9-	contractor #9	104.570 m^2/day.
10-	contractor #10	24.400 m^2/day.

o It can be noted from the above information that the productivity of the 10 contractors is as below:-

- ✓ The highest productivity is 104.570 m^2/day.
- ✓ The lowest productivity is 4.575 m^2/day.

Table 3.3.18: The serial productivity of the 10 contractors from top to bottom is as below:-

Number of contractor	Productivity	Duration
#9	104.570 m^2/day	7 days
#2	91.500 m^2/day	8 days
#7	48.800 m^2/day	15 days
#8	43.060 m^2/day	17 days
#3, #6	36.600 m^2/day	20 days
#10	24.400 m^2/day	30 days
#1	12.200 m^2/day	60 days
#4	4.880 m^2/day	150 days
#5	4.575 m^2/day	160 days

- It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in a short time. For example, contractor #9 suggested 7 days to execute 732m^2 of hollow concrete blocks for Walls; 100mm thick.
- It can be noted that the productivity of (104.57 m^2/day) of contractor #9 is more than the productivity of the all contractors (#1, #2, #3, #4, #5, #6, #7, #8, and #10).
- The productivity of (91.5 m^2/day) of contractor #2 is more than the productivity of contractors (#1, #3, #4, #5, #6, #7, #8, and #10).
- The productivity of (48.8 m^2/day) of contractor #7 is more than the productivity of contractors (#1, #3, #4, #5, #6, #8, and #10).
- The productivity of (43.06 m^2/day) of contractor #8 is more than the productivity of contractors (#1, #3, #4, #5, #6, and #10).
- The productivity of (36.6 m^2/day) of contractor #3 and contractor #6 is more than the productivity of contractors (#1, #4, #5, and #10).
- The productivity of (24.4 m^2/day) of contractor #10 is more than the productivity of contractors (#1, #4, and #5).
- The productivity of (12.2 m^2/day) of contractor #1 is more than the productivity of contractors (#4, and #5).
- The productivity of (4.88 m^2/day) of contractor #4 is more than the productivity of contractor (#5).
- The lowest productivity of (4.575 m^2/day) of contractor #5 who suggested the longest duration (160 days) to execute 732 m^2 of hollow concrete blocks for Walls; 100 mm thick.

• From the above information on the 10 contractors as regards the cost, it can be noted that the amount of the 10 contractors is as below:-

- The highest amount $ 9,281.76 of contractor #2.
- The lowest amount $ 5,153.28 of contractor #8.
- The serial amount to execute the 732 m^2 of hollow concrete blocks for Walls; 100 mm thick of the 10 contractors from top to bottom is as below:-

✓ $ 9,281.76 Contractor #2.

✓ $ 7,737.24 Contractor #7.

✓ $ 7,217.52 Contractor #10.

✓ $ 6,185.40 Contractor #1, contractor #3, contractor #5 and contractor #6.

✓ $ 5,160.60 Contractor #4 and contractor #9

✓ $ 5,153.28 Contractor #8.

• It can be noted from the above information that the highest amount $ 9,281.76 offered by contractor #2 is more than the amount of each of the other contractors (#1, #3, #4, #5, #6, #7, #8, #9, and #10), while the lowest amount $ 5,153.28 offered by contractor #8.

3.3.9- Bill No.4- Roofing and insulation systems, Foam concrete, minimum 50 mm thick laid to falls and cross falls including preparing top surfaces smooth to receive water proofing membrane complete, item A – To roofs

• Contractor #1 suggested 6 days to execute and finish the 430 m^2 of foam concrete minimum 50 mm thick to roofs, i.e., 430 m^2 / 6 days = 71.66 m^2/day (1 day i.e., 8 working hours (standard time)), at a rate of 12.68 $/$m^2$, and the amount to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs is $ 5,452.40

• Contractor #2 suggested 7 days to execute and finish the 430 m^2 of foam concrete minimum 50 mm thick to roofs, i.e., 430 m^2 / 7 days = 61.43 m^2/day, at a rate of 4.93 $/$m^2$, and the amount to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs is $ 2,119.90

• Contractor #3 suggested 9 days to execute and finish the 430 m^2 of foam concrete minimum 50 mm thick to roofs, i.e., 430 m^2 / 9 days = 47.77 m^2/day, at a rate of 7.04 $/$m^2$, and the amount to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs is $ 3,027.20

• Contractor #4 suggested 7 days to execute and finish the 430 m^2 of foam concrete minimum 50 mm thick to roofs, i.e., 430 m^2 / 7 days = 61.43 m^2/day, at a rate of 9.86 $/$m^2$,

and the amount to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs is $ 4,239.80

- Contractor #5 suggested 7 days to execute and finish the 430 m^2 of foam concrete minimum 50 mm thick to roofs, i.e., 430 m^2 / 7 days = 61.43 m^2/day, at a rate of 11.26 $/$m^2$, and the amount to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs is $ 4,841.80

- Contractor #6 suggested 9 days to execute and finish the 430 m^2 of foam concrete minimum 50 mm thick to roofs, i.e., 430 m^2 / 9 days = 47.77 m^2/day, at a rate of 7.04 $/$m^2$, and the amount to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs is $ 3,027.20

- Contractor #7 suggested 7 days to execute and finish the 430 m^2 of foam concrete minimum 50 mm thick to roofs, i.e., 430 m^2 / 7 days = 61.43 m^2/day, at a rate of 9.86 $/$m^2$, and the amount to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs is $ 4,239.80

- Contractor #8 suggested 10 days to execute and finish the 430 m^2 of foam concrete minimum 50 mm thick to roofs, i.e., 430 m^2 / 10 days = 43 m^2/day, at a rate of 8.45 $/$m^2$, and the amount to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs $ 3,633.50

- Contractor #9 suggested 3 days to execute and finish the 430 m^2 of foam concrete minimum 50 mm thick to roofs, i.e., 430 m^2 / 3 days = 143.33 m^2/day, at a rate of 7.05 $/$m^2$, and the amount to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs is $ 3,031.50

- Contractor #10 suggested 10 days to execute and finish the 430 m^2 of foam concrete minimum 50 mm thick to roofs, i.e., 430 m^2 / 10 days = 43 m^2/day, at a rate of 6.34 $/$m^2$, and the amount to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs is $ 2,726.20

Table 3.3.19: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	contractor #1	71.66 m^2/day.
2-	contractor #2	61.43 m^2/day.
3-	contractor #3	47.77 m^2/day.
4-	contractor #4	61.43 m^2/day.
5-	contractor #5	61.43 m^2/day.
6-	contractor #6	47.77 m^2/day.
7-	contractor #7	61.43 m^2/day.
8-	contractor #8	43.00 m^2/day.
9-	contractor #9	143.33 m^2/day.
10-	contractor #10	43.00 m^2/day.

- It can be noted from the above information that the productivity of the 10 contractors is as below:-

✓ The highest productivity is 143.33 m^2/day.

✓ The lowest productivity is 43 m^2/day.

Table 3.3.20: The serial productivity of the 10 contractors from top to bottom is as below:-

Number of contractor	Productivity	Duration
#9	143.33 m^2/day	3 days
#1	71.66 m^2/day	6 days
#2, #4, #5, #7	61.43 m^2/day	7 days
#3, #6	47.77 m^2/day	9 days
#8, #10	43.00 m^2/day	10 days

• It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in a short time. For example, contractor #9 suggested 3 days to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs.

• It can be noted that the productivity of (143.33 m^2/day) of contractor #9 is more than the productivity of all contractors (#1, #2, #3, #4, #5, #6, #7, #8, and #10).

• The productivity of (71.66 m^2/day) of contractor #1 is more than the productivity of contractors (#2, #3, #4, #5, #6, #7, #8, and #10).

• The productivity of (61.43 m^2/day) of contractor #2, contractor #4, contractor #5 and contractor #7 is more than the productivity of contractors (#3, #6, #8, and #10).

• The productivity of (47.77 m^2/day) of contractor #3 and contractor #6 is more than the productivity of contractors (#8, and #10).

• The lowest productivity of (43 m^2/day) of contractor #8 and contractor #10 suggested the longest duration (10 days) to execute 430 m^2 of foam concrete minimum 50 mm thick to roofs.

• From the above information on the 10 contractors as regards the cost, it can be noted that the amount of the 10 contractors is as below:-

- The highest amount $ 5,452.40 of contractor #1.
- The lowest amount $ 2,119.90 of contractor #2.
- The serial amount to execute the 430 m^2 of foam concrete minimum 50 mm thick to roofs of the 10 contractors from top to bottom is as below:-

✓ $ 5,452.40 Contractor #1.
✓ $ 4,841.80 Contractor #5.
✓ $ 4,239.80 Contractor #4 and contractor #7.
✓ $ 3,633.50 Contractor #8.
✓ $ 3,031.50 Contractor #9.
✓ $ 3,027.20 Contractor #3 and contractor #6.
✓ $ 2,726.20 Contractor #10.
✓ $ 2,119.90 Contractor #2.

• It can be noted from the above information that the highest amount $ 5,452.40 offered by contractor #1 is more than the amount of each of the other contractors (#2, #3, #4, #5, #6, #7, #8, #9, and #10), while the lowest amount $ 2,119.90 offered by contractor #2.

3.3.10- Bill No.5- Masonry works, Local (AJLOUN) stone fixed to faces of concrete for all elevations first class no less than 50 mm thick and 400 mm length 250 mm height, stone color shall be approved by the engineer, corner stones, jambs, lintels, are included with the pure engineered m^2 price, the price included the formworks, and whatever needed to complete the work, Case (1) mechanical push hammered face finish

• Contractor #1 suggested 100 days to execute and finish the 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish, i.e., 1,151 m^2 / 100 days = 11.51 m^2/day, (1 day i.e., 8 working hours

(standard time)), at a rate of 56.34 $/m^2$, and the amount to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish is $ 64,847.34

- Contractor #2 suggested 150 days to execute and finish the 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish, i.e., 1,151 m^2 / 150 days = 7.67 m^2/day, at a rate of 63.38 $/m^2$, and the amount to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish is $ 72,950.38

- Contractor #3 suggested 46 days to execute and finish the 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish, i.e., 1,151 m^2 / 46 days = 25.02 m^2/day, at a rate of 49.30 $/m^2$, and the amount to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish is $ 56,744.30

- Contractor #4 suggested 150 days to execute and finish the 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish, i.e., 1,151 m^2 / 150 days = 7.67 m^2/day, at a rate of 59.16 $/m^2$, and the amount to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish is $ 68,093.16

- Contractor #5 suggested 160 days to execute and finish the 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish, i.e., 1,151 m^2 / 160 days = 7.19 m^2/day, at a rate of 49.29 $/m^2$, and the amount to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish is $ 56,732.79

- Contractor #6 suggested 150 days to execute and finish the 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish, i.e., 1,151 m^2 / 150 days = 7.67 m^2/day, at a rate of 63.38 $/m^2$, and the amount to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish is $ 72,950.38

- Contractor #7 suggested 62 days to execute and finish the 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish, i.e., 1,151 m^2 / 62 days = 18.56 m^2/day, at a rate of 45.78 $/m^2$, and the amount to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish is $ 52,692.78

• Contractor #8 suggested 50 days to execute and finish the 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish, i.e., 1,151 m^2 / 50 days = 23.02 m^2/day, at a rate of 56.33 \$/m^2, and the amount to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish is \$ 64,835.83

• Contractor #9 suggested 46 days to execute and finish the 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish, i.e., 1,151 m^2 / 46 days = 25.02 m^2/day, at a rate of 42.25 \$/m^2, and the amount to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish is \$ 48,629.75

• Contractor #10 suggested 60 days to execute and finish the 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish, i.e., 1,151 m^2 / 60 days = 19.18 m^2/day, at a rate of 18.31 \$/m^2, and the amount to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish is \$ 21,074.81

Table 3.3.21: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	contractor #1	11.51 m2/day.
2-	contractor #2	7.67 m^2/day.
3-	contractor #3	25.02 m^2/day.
4-	contractor #4	7.67 m^2/day.
5-	contractor #5	7.19 m^2/day.
6-	contractor #6	7.67 m^2/day.
7-	contractor #7	18.56 m^2/day.
8-	contractor #8	23.02 m^2/day.
9-	contractor #9	25.02 m^2/day.
10-	contractor #10	19.18 m^2/day.

- It can be noted from the above information that the productivity of the 10 contractors is as below:-

✓ The highest productivity is 25.02 m^2/day

✓ The lowest productivity is7.19 m^2/day

Table 3.3.22: The serial productivity of the 10 contractors from top to bottom is as below:-

Number of contractor	Productivity	Duration
#3, #9	25.02 m^2/day	46 days
#8	23.02 m^2/day	50 days
#10	19.18 m^2/day	60 days
#7	18.56 m^2/day	62 days
#1	11.51 m^2/day	100 days
#2, #4, #6	7.67 m^2/day	150 days
#5	7.19 m^2/day	160 days

- It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in a short time. For example, contractor #3 and contractor #9 suggested 46 days to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish.
- It can be noted that the productivity of (25.02 m^2/day) of contractor #3 and contractor #9 is more than the productivity of all contractors (#1, #2, #4, #5, #6, #7, #8, and #10).
- The productivity of (23.02 m^2/day) of contractor #8 is more than the productivity of contractors (#1, #2, #4, #5, #6, #7, and #10).
- The productivity of (19.18 m^2/day) of contractor #10 is more than the productivity of contractors (#1, #2, #4, #5, #6, and #7).
- The productivity of (18.56 m^2/day) of contractor #7 is more than the productivity of contractors (#1, #2, #4, #5, and #6).
- The productivity of (11.51 m^2/day) of contractor #1 is more than the productivity of contractors (#2, #4, #5, and #6).
- The productivity of (7.67 m^2/day) of contractor #2, contractor #4 and contractor #6 is more than the productivity of contractor (#5).
- The lowest productivity of (7.19 m^2/day) is the productivity of contractor #5 who suggested the longest duration (160 days) to execute 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish.
- From the above information on the 10 contractors as regards the cost, it can be noted that the amount of the 10 contractors is as below:-
  - The highest amount $ 72,950.38 of contractor #2 and contractor #6.
  - The lowest amount $ 21,074.81 of contractor #10.

▪ The serial amount to execute the 1,151 m^2 of local (AJLOUN) stone fixed to faces of concrete for all elevations Case (1) mechanical push hammered face finish, of the 10 contractors from top to bottom is as below:-

- ✓ $ 72,950.38 Contractor #2 and contractor #6.
- ✓ $ 68,093.16 Contractor #4.
- ✓ $ 64,847.34 Contractor #1.
- ✓ $ 64,835.83 Contractor #8.
- ✓ $ 56,744.30 Contractor #3.
- ✓ $ 56,732.79 Contractor #5.
- ✓ $ 52,692.78 Contractor #7.
- ✓ $ 48,629.75 Contractor #9.
- ✓ $ 21,074.81 Contractor #10.

• It can be noted from the above information that the highest amount $ 72,950.38 offered by contractor #2 and contractor #6 is more than the amount of each of the other contractors (#1, #3, #4, #5, #7, #8, #9, and #10), while the lowest amount $ 21,074.81 offered by contractor #10.

3.3.11- Bill No.1- Internal and External finishes, Floor finishes, Precast terrazzo tiles, natural color, bedded on sand including cement and mortar (1:3), cleaning and polishing upon completion, selection to engineer's approval, To floors, size (400*100*30) mm thick for guard's rooms

• Contractor #1 suggested 4 days to execute and finish the 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms, i.e., 52 m^2 / 4 days = 13 m^2/day (1 day i.e., 8 working hours (standard time)), at a rate of 14.08 $/$m^2$, and the amount to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms is $ 732.16

• Contractor #2 suggested 2 days to execute and finish the 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms, i.e., 52 m^2 / 2 days = 26 m^2/day, at a rate of 15.49 $/$m^2$, and the amount to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms is $ 805.48

• Contractor #3 suggested 4 days to execute and finish the 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms, i.e., 52 m^2 / 4 days = 13 m^2/day, at a

rate of 12.68 $/m^2$, and the amount to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms is $ 659.36

- Contractor #4 suggested 5 days to execute and finish the 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms, i.e., 52 m^2 / 5 days = 10.4 m^2/day, at a rate of 12.68 $/m^2$, and the amount to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms is $ 659.36

- Contractor #5 suggested 4 days to execute and finish the 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms, i.e., 52 m^2 / 4 days = 13 m^2/day, at a rate of 14.08 $/m^2$, and the amount to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms is $ 732.16

- Contractor #6 suggested 2 days to execute and finish the 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms, i.e., 52 m^2 / 2 days = 26 m^2/day, at a rate of 15.49 $/m^2$, and the amount to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms is $ 805.48

- Contractor #7 suggested 5 days to execute and finish the 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms, i.e., 52 m^2 / 5 days = 10.4 m^2/day, at a rate of 16.91 $/m^2$, and the amount to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms is $ 879.32

- Contractor #8 suggested 3 days to execute and finish the 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms, i.e., 52 m^2 / 3 days = 17.33 m^2/day, at a rate of 11.26 $/m^2$, and the amount to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms is $ 585.52

- Contractor #9 suggested 2 days to execute and finish the 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms, i.e., 52 m^2 / 2 days = 26 m^2/day, at a rate of 9.86 $/m^2$, and the amount to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms is $ 512.72

- Contractor #10 suggested 10 days to execute and finish the 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms, i.e., 52 m^2 / 10 days = 5.2 m^2/day, at a rate of 16.90 $/m^2$, and the amount to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guards rooms is $ 878.80

Table 3.3.23: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	contractor #1	13.00 m^2/day.
2-	contractor #2	26.00 m^2/day.
3-	contractor #3	13.00 m^2/day.
4-	contractor #4	10.40 m^2/day.
5-	contractor #5	13.00 m^2/day.
6-	contractor #6	26.00 m^2/day.
7-	contractor #7	10.40 m^2/day.
8-	contractor #8	17.33 m^2/day.
9-	contractor #9	26.00 m^2/day.
10-	contractor #10	5.20 m^2/day.

- It can be noted from the above information that the productivity of the 10 contractors is as below:-

✓ The highest productivity is 26 m^2/day.

✓ The lowest productivity is 5.2 m^2/day.

Table 3.3.24: The serial productivity of the 10 contractors from top to bottom is as below:-

Number of contractor	Productivity	Duration
#2, #6, #9	26.00 m^2/day	2 days
#8	17.33 m^2/day	3 days
#1, #3, #5	13.00 m^2/day	4 days
#4, #7	10.40 m^2/day	5 days
#10	5.20 m^2/day	10 days

• It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in a short time. For example, contractor #2, contractor #6 and contractor #9 suggested 2 days to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guard's rooms.

• It can be noted that the productivity of (26 m^2/day) of contractor #2, contractor #6 and contractor #9 is more than the productivity of all contractors (#1, #3, #4, #5, #7, #8, and #10).

• The productivity of (17.33 m^2/day) of contractor #8 is more than the productivity of contractors (#1, #3, #4, #5, #7, and #10).

• The productivity of (13 m^2/day) of contractor #1, contractor #3 and contractor #5 is more than the productivity of contractors (#4, #7, and #10).

• The productivity of (10.4 m^2/day) of contractor #4 and contractor #7 is more than the productivity of contractor (#10).

• The lowest productivity of (5.2 m^2/day) of contractor #10 who suggested the longest duration (10 days) to execute 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guard's rooms.

• From the above information on the 10 contractors as regards the cost, it can be noted that the amount of the 10 contractors is as below:-

▪ The highest amount $ 879.32 of contractor #7.

▪ The lowest amount $ 512.72 of contractor #9.

▪ The serial amount to execute the 52 m^2 of precast terrazzo tiles to floors size (400*100*30) mm thick for guard's rooms, of the 10 contractors from top to bottom is as below:-

✓ $ 879.32 Contractor #7.

✓ $ 878.80 Contractor #10.

✓ $ 805.48 Contractor #2.

✓ $ 805.48 Contractor #6.

✓ $ 732.16 Contractor #1 and contractor #5.

✓ $ 659.36 Contractor #3 and contractor #4.

✓ $ 585.52 Contractor #8.

✓ $ 512.72 Contractor #9.

• It can be noted from the above information that the highest amount $ 879.32 offered by contractor #7 is more than the amount of each of the other contractors (#1, #2, #3, #4, #5, #6, #8, #9, and #10), while the lowest amount is $ 512.72 offered by contractor #9.

3.3.12- Bill No. 4- Painting and decoration, Internally, Emulsion PVA- based paint, matt finish for interior, quality in one priming coat and three finishing coats, for application to walls and ceilings, using full coverage putty, including all necessary preparation works and undercoats, application to all heights as required of works, all according to manufacturer (DELUXE or approved equivalent) instructions, complete, To walls

- Contractor #1 suggested 65 days to execute and finish the 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings, i.e., 4,783 m^2 / 65 days = 73.58 m^2/day (1 day i.e., 8 working hours (standard time)), at a rate of 2.82 $/$m^2$, and the amount to execute 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings is $ 13,488.06

- Contractor #2 suggested 60 days to execute and finish the 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings, i.e., 4,783 m^2 / 60 days = 79.72 m^2/day, at a rate of 2.81 $/$m^2$, and the amount to execute 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings is $ 13,440.23

- Contractor #3 suggested 65 days to execute and finish the 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings, i.e., 4,783 m^2 / 65 days = 73.58 m^2/day, at a rate of 2.82 $/$m^2$, and the amount to execute 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings is $ 13,488.06

- Contractor #4 suggested 70 days to execute and finish the 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings, i.e., 4,783 m^2 / 70 days = 68.33 m^2/day, at a rate of 3.52 $/$m^2$, and the amount to execute 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings is $ 16,836.16

- Contractor #5 suggested 67 days to execute and finish the 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings, i.e., 4,783 m^2 / 67 days = 71.39 m^2/day, at a rate of 3.52 $/$m^2$, and the amount to execute 4,783 m^2 of internally, emulsion PVA – based

paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings is $ 16,836.16

• Contractor #6 suggested 60 days to execute and finish the 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings, i.e., 4,783 m^2 / 60 days = 79.72 m^2/day, at a rate of 2.82 $/$m^2$, and the amount to execute 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings is $ 13,488.06

• Contractor #7 suggested 40 days to execute and finish the 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings, i.e., 4,783 m^2 / 40 days = 119.575 m^2/day, at a rate of 4.23 $/$m^2$, and the amount to execute 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings is $ 20,232.09

• Contractor #8 suggested 62 days to execute and finish the 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings, i.e., 4,783 m^2 / 62 days = 77.145 m^2/day, at a rate of 3.52 $/$m^2$, and the amount to execute 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings is $ 16,836.16

• Contractor #9 suggested 75 days to execute and finish the 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings, i.e., 4,783 m^2 / 75 days = 63.77 m^2/day, at a rate of 2.11 $/$m^2$, and the amount to execute 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings is $ 10,092.13

• Contractor #10 suggested 30 days to execute and finish the 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings, i.e., 4,783 m^2 / 30 days = 159.43 m^2/day, at a rate of 3.52 $/$m^2$, and the amount to execute 4,783 m^2 of internally, emulsion PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings is $ 16,836.16

Table 3.3.25: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	contractor #1	73.580 m^2/day.
2-	contractor #2	79.720 m^2/day.
3-	contractor #3	73.580 m^2/day.
4-	contractor #4	68.330 m^2/day.
5-	contractor #5	71.390 m^2/day.
6-	contractor #6	79.720 m^2/day.
7-	contractor #7	119.575 m^2/day.
8-	contractor #8	77.145 m^2/day.
9-	contractor #9	63.770m^2/day.
10-	contractor #10	159.430 m^2/day.

- It can be noted from the above information that the productivity of the 10 contractors is as below:-

✓ The highest productivity is 159.43 m^2/day.

✓ The lowest productivity is 63.77 m^2/day.

Table 3.3.26: The serial productivity of the 10 contractors from top to bottom is as below:-

Number of contractor	Productivity	Duration
#10	159.430 m^2/day	30 days
#7	119.575 m^2/day	40 days
#2, #6	79.720 m^2/day	60 days
#8	77.145 m^2/day	62 days
#1, #3	73.580 m^2/day	65 days
#5	71.390 m^2/day	67 days
#4	68.330 m^2/day	70 days
#9	63.770 m^2/day	75 days

• It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in a short time. For example, contractor #10 suggested 30 days to execute 4,783 m^2 of internally, emulsion PVA – based paint matt finish

for interior quality in one priming coat and three finishing coats for application to walls and ceilings.

- It could be noted that the productivity of (159.43 m^2/day) of contractor #10 is more than the productivity of all contractors (#1, #2, #3, #4, #5,#6, #7, #8, and #9).
- The productivity of (119.575 m^2/day) of contractor #7 is more than the productivity of contractors (#1, #2, #3, #4, #5, #6, #8, and #9).
- The productivity of (79.72 m^2/day) of contractor #2 and contractor #6 is more than the productivity of contractors (#1, #3, #4, #5, #8, and #9).
- The productivity of (77.145 m^2/day) of contractor #8 is more than the productivity of contractor ((#1, #3, #4, #5, and #9).
- The productivity of (73.58 m^2/day) of contractor #1 and contractor #3 is more than the productivity of contractors (#4, #5, and #9).
- The productivity of (71.39 m^2/day) of contractor #5 is more than the productivity of contractors ((#4, and #9).
- The productivity of (68.33 m^2/day) of contractor #4 is more than the productivity of contractor ((#9).
- The lowest productivity of (63.77 m^2/day) of contractor #9 who suggested the longest duration (75 days) to execute 4,783 m^2 of internally, emulsions PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings.
- From the above information on the 10 contractors as regards the cost, it can be noted that the amount of the 10 contractors is as below:-
  - The highest amount $ 20,232.09 of contractor #7.
  - The lowest amount $ 10,092.13 of contractor #9.
  - The serial amount to execute the 4,783 m^2 of internally, emulsions PVA – based paint matt finish for interior quality in one priming coat and three finishing coats for application to walls and ceilings, of the 10 contractors from top to bottom is as below:-
    - ✓ $ 20,232.09 Contractor #7.
    - ✓ $ 16,836.16 Contractor #4, contractor #5, contractor #8 and contractor #10.
    - ✓ $ 13,488.06 Contractor #1 and contractor #3 and contractor #6.
    - ✓ $ 13,440.23 Contractor #2.
    - ✓ $ 10,092.13 Contractor #9.

• It can be noted from the above information that the highest amount $ 20,232.09 offered by contractor #7 is more than the amount of each of the other contractors (#1, #2, #3, #4, #5, #6, #8, #9, and #10), while the lowest amount $ 10,092.13 offered by contractor #9.

3.3.13- Bill No. 5- Fittings and Equipments, Corner Guards Supply and fix rubber corner guards for columns at parking areas, fixed with stainless steel flathead fastener flush and plastic cement adhesive according to manufacturer instructions and detailed drawing, (100*100) mm, 1,200 mm height:-

• Contractor #1 suggested 7 days to execute and finish the 4 no. (number) of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height, i.e., 4 no. / 7 days = 0.57 no. /day (1 day i.e., 8 working hours (standard time)), at a rate of 210 $/no. And the amount to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height is $ 840

• Contractor #2 suggested 4 days to execute and finish the 4 no. (number) of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height, i.e., 4 no. / 4 days = 1 no. /day, at a rate of 42.25 $/no. And the amount to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height is $ 169

• Contractor #3 suggested 5 days to finish the 4 no. (number) of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height, i.e., 4 no. / 5 days = 0.8 no. /day, at a rate of 211.27 $/no. And the amount to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height is $ 845.08

• Contractor #4 suggested 8 days to execute and finish the 4 no. (number) of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height, i.e., 4 no. / 8 days = 0.5 no. /day, at a rate of 28.17 $/no. And the amount to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height is $ 112.68

• Contractor #5 suggested 8 days to execute and finish the 4 no. (number) of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height, i.e., 4 no. / 8 days = 0.5 no. /day at a rate of 197.18 $/no. And the amount to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height is $ 788.72

• Contractor #6 suggested 6 days to execute and finish the 4 nr. (number) of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height, i.e., 4 no. / 6 days = 0.67 no. /day, at a rate of 225.35 $/no. And the amount to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height is $ 901.40

• Contractor #7 suggested 2 days to execute and finish the 4 no. (number) of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height, i.e., 4 no. / 2 days = 2 no. /day, at a rate of 56.34 $/no. And the amount to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height is $ 225.36

• Contractor #8 suggested 6 days to execute and finish the 4 no. (number) of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height, i.e., 4 no. / 6 days = 0.67 no. /day, at a rate of 225.35 $/no. And the amount to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height is $ 901.40

• Contractor #9 suggested 9 days to execute and finish the 4 no. (number) of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height, i.e., 4 no. / 9 days = 0.45 no. /day, at a rate of 42.25 $/no. And the amount to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height is $ 169

• Contractor #10 suggested 7 days to execute and finish the 4 no. (number) of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height, i.e., 4 no. / 7 days = 0.57 no. /day, at a rate of 126.76 $/no. And the amount to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height is $ 507.04

Table 3.3.27: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity no. /day .
1-	contractor #1	0.57 no./day
2-	contractor #2	1.00 no. /day
3-	contractor #3	0.80 no. /day
4-	contractor #4	0.50no. /day
5-	contractor #5	0.50 no. /day
6-	contractor #6	0.67 no. /day
7-	contractor #7	2.00 no. /day
8-	contractor #8	0.67 no. /day
9-	contractor #9	0.45 no. /day
10-	contractor #10	0.57 no. /day

- It can be noted from the above information that the productivity of the 10 contractors is as below:-

✓ The highest productivity is 2 no. /day

✓ The lowest productivity is 0.45 no. /day

Table 3.3.28: The serial productivity of the 10 contractors from top to bottom is as below:-

Number of contractor	Productivity	Duration
#7	2.00 No. /day	2 days
#2	1.00 No. /day	4 days
#3	0.80 No. /day	5 days
#6, #8	0.67 No. /day	6 days
#1, #10	0.57 No. /day	7 days
#4, #5	0.50 No. /day	8 days
#9	0.45 No. /day	9 days

• It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in a short time. For example, contractor #7 suggested 2 days to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height.

• It can be noted that the productivity of (2 no. /day) of contractor #7 is more than the productivity of all contractors (#1, #2, #3, #4, #5, #6, #8, #9, and #10).

• The productivity of (1 no. /day) of contractor #2 is more than the productivity of contractors (#1, #3, #4, #5, #6, #8, #9, and #10).

• The productivity of (0.8 no. /day) of contractor #3 is more than the productivity of contractors (#1, #4, #5, #6, #8, #9, and #10).

• The productivity of (0.67 no. /day) of contractor #6 and contractor #8 is more than the productivity of contractor (#1, #4, #5, #9, and #10).

• The productivity of (0.57 no. /day) of contractor #1 and contractor #10 is more than the productivity of contractors (#4, #5, and #9).

• The productivity of (0.5 no. /day) of contractor #4 and contractor #5 is more than the productivity of contractor (#9).

• The lowest productivity of (0.45 no. /day) of contractor #9 who suggested the longest duration (9 days) to execute 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height.

• From the above information on the 10 contractors as regards the cost, it can be noted that the amount of the 10 contractors is as below:-

▪ The highest amount $ 901.40 of contractor #6 and contractor #8.

▪ The lowest amount $ 112.68 of contractor #4.

▪ The serial amount to execute the 4 no. of supply and fix rubber corner guards for columns at parking areas size (100*100) mm, 1,200 mm height, of the 10 contractors from top to bottom is as below:-

✓ $ 901.40 Contractor #6 and contractor #8.

✓ $ 845.08 Contractor #3.

✓ $ 840 Contractor #1.

✓ $ 788.72 Contractor #5.

✓ $ 507.04 Contractor #10.

✓ $ 225.36 Contractor #7.

✓ $ 169 Contractor #2 and contractor #9.

✓ $ 112.68 Contractor #4.

• It can be noted from the above information that the highest amount $ 901.40 offered by contractor #6 and contractor #8 is more than the amount of each of the other contractors

(#1, #2, #3, #4, #5, #7, #9, and #10), while the lowest amount $ 112.68 offered by contractor #4.

3.3.14- Bill No. 6- Planting, Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones as per drawings

- Contractor #1 suggested 22 days to execute and finish the 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes, i.e., 254 m^3 / 22 days = 11.55 m^3/day (1 day i.e., 8 working hours (standard time)), at a rate of 15.49 $/$m^3$, and the amount to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes is $ 3,934.46
- Contractor #2 suggested 20 days to execute and finish the 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes, i.e., 254 m^3 / 20 days = 12.7 m^3/day, at a rate of 4.22 $/$m^3$ and the amount to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes is $ 1,071.88
- Contractor #3 suggested 23 days to execute and finish the 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes, i.e., 254 m^3 / 23 days = 11.04 m^3/day, at a rate of 11.27 $/$m^3$ and the amount to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes is $ 2,862.58
- Contractor #4 suggested 22 days to execute and finish the 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes, i.e., 254 m^3 / 22 days = 11.55 m^3/day, at a rate of 21.13 $/$m^3$ and the amount to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes is $ 5,367.02
- Contractor #5 suggested 25 days to execute and finish the 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes, i.e., 254 m^3 / 25 days = 10.16 m^3/day at a rate of 9.85 $/$m^3$ and the amount to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes is $ 2,501.90
- Contractor #6 suggested 23 days to execute and finish the 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes, i.e., 254 m^3 / 23 days = 11.04 m^3/day, at a rate of 14.08 $/$m^3$ and the amount to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes is $ 3,576.32
- Contractor #7 suggested 10 days to finish the 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes, i.e., 254 m^3 / 10 days = 25.4 m^3/day, at a rate

of 10.57 $/m^3$ and the amount to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes is $ 2,684.78

- Contractor #8 suggested 24 days to execute and finish the 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes, i.e., 254 m^3 / 24 days = 10.58 m^3/day, at a rate of 15.49 $/m^3$ and the amount to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes is $ 3,934.46

- Contractor #9 suggested 21 days to execute and finish the 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes, i.e., 254 m^3 / 21 days = 12.10 m^3/day, at a rate of 14.08 $/m^3$ and the amount to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes is $ 3,576.32

- Contractor #10 suggested 15 days to execute and finish the 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes, i.e., 254 m^3 / 15 days = 16.93 m^3/day, at a rate of 77.46 $/m^3$ and the amount to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes is $ 19,674.

Table 3.3.29: The serial productivity of the 10 contractors above is as below:-

Serial number	Contractor number	Productivity m^3/day.
1-	contractor #1	11.55 m^3/day.
2-	contractor #2	12.70 m^3/day.
3-	contractor #3	11.04 m^3/day.
4-	contractor #4	11.55 m^3/day.
5-	contractor #5	10.16 m^3/day.
6-	contractor #6	11.04 m^3/day.
7-	contractor #7	25.40 m^3/day.
8-	contractor #8	10.58 m^3/day.
9-	contractor #9	12.10 m^3/day.
10-	contractor #10	16.93 m^3/day

- It can be noted from the above information that the productivity of the 10 contractors is as below:-

✓ The highest productivity is 25.40 m^3/day.

✓ The lowest productivity is 10.16 m^3/day.

Table 3.3.30: The serial productivity of the 10 contractors from top to bottom is as below:-

Number of contractor	Productivity	Duration
#7	25.40 m^3/day	10 days
#10	16.93 m^3/day	15 days
#2	12.70 m^3/day	20 days
#9	12.10 m^3/day	21days
#1, #4	11.55 m^3/day	22 days
#3, #6	11.04 m^3/day	23 days
#8	10.58 m^3/day	24 days
#5	10.16 m^3/day	25 days

- It can be noted that when the duration is short, the productivity is high because contractor wants to execute a specific work in a short time. For example, contractor #7 suggested 10 days to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes.
- It can be noted that the productivity of (25.4 m^3/day) of contractor #7 is more than the productivity of all contractors (#1, #2, #3, #4, #5, #6, #8, #9, and #10).
- The productivity of (16.93 m^3/day) of contractor #10 is more than the productivity of contractors (#1, #2, #3, #4, #5, #6, #8, and #9).
- The productivity of (12.7 m^3/day) of contractor #2 is more than the productivity of contractors (#1, #3, #4, #5, #6, #8, and #9).
- The productivity of (12.10 m^3/day) of contractor #9 is more than the productivity of contractor (#1, #3, #4, #5, #6, and #8).
- The productivity of (11.55 m^3/day) of contractor #1 and contractor #4 is more than the productivity of contractors (#3, #5, #6, and #8).
- The productivity of (11.04 m^3/day) of contractor #3 and contractor #6 is more than the productivity of contractor (#5, and #8).
- The productivity of (10.58 m^3/day) of contractor #8 is more than the productivity of contractor (#5).
- The lowest productivity of (10.16 m^3/day) is the productivity of contractor #5 who suggested the longest duration (25 days) to execute 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes.

• From the above information on the 10 contractors as regards the cost, it can be noted that the amount of the 10 contractors is as below:-

- The highest amount $ 19,674.84 of contractor #10.
- The lowest amount $ 1,071.88 of contractor #2.
- The serial amount to execute the 254 m^3 of agricultural soil of clean selected top soil suitable for planting purposes of the 10 contractors from top to bottom is as below:-

✓ $ 19,674.84 Contractor #10.

✓ $ 5,367.02 Contractor #4.

✓ $ 3,934.46 Contractor #1 and contractor #8.

✓ $ 3,576.32 Contractor #6 and contractor #9.

✓ $ 2,862.58 Contractor #3.

✓ $ 2,684.78 Contractor #7.

✓ $ 2,501.90 Contractor #5.

✓ $ 1,071.88 Contractor #2.

• It can be noted from the above information that the highest amount $ 19,674.84 offered by contractor #10 is more than the amount of each of the other contractors (#1, #2, #3, #4, #5, #6, #7, #8, and #9), while the lowest amount $ 1,071.88 offered by contractor #2.

3.4 ESTIMATING PROJECT COSTS. CONTRACTOR'S BID ESTIMATE

Contractor's bid estimate for a successful project must bid low enough to obtain and get the work, yet high enough to make a profit.

Many people in the construction industry think of estimating as a more or less structured undertaking like engineering design. But a look at bids received for a typical project in a competitive area will sometimes show more than 50 percent difference between the low and high bidders.

For many years, numerous successful smaller contractors were able to compete effectively using the unit-cost system in which overall unit costs, including costs of labor, material, equipment, and overhead, were applied directly to actual quantity takeoffs.

However, with the sharp price changes for all components in recent years, this method is becoming increasingly rare in successful companies. Almost all successful contractors now estimate new projects with separate categories and evaluations for labor, materials, equipment usage, and subcontractors.

General contractors acting as professional construction managers must develop in house estimating capability for electrical, plumbing, piping, roofing etc.

3.5 INFLUENCE OF PROJECT TYPE AND PROCUREMENT METHOD ON REWORK COSTS IN BUILDING CONSTRUCTION PROJECTS

While it is widely recognized that additional costs due to rework can have an adverse effect on project performance, limited empirical research has been done to investigate the influencing factors.

The research presented in this paper aims to determine the influence of different project types and procurement methods on rework costs in construction projects.

Using a questionnaire survey, rework costs were obtained from 161 Australian construction projects.

The direct and indirect consequences of rework are analyzed and discussed.

It is shown that, contrary to expectation, rework costs do not differ relative to project type or procurement method. In addition, it was found rework contributed to 52% of a project's cost growth and that 26% of the variance in cost growth was attributable to changes due to direct rework.

To reduce rework costs and therefore improve project performance, it is posited that construction organizations begin to consider and measure them, so that an understanding of their magnitude can be captured, root causes identified, and effective prevention strategies implemented.

3.6 FACTORS INFLUENCING CONSTRUCTION PRODUCTIVITY.

3.6.1- External factors:-

Nature of the industry

The traditional separation of the design and construction functions has affected construction productivity through waiting for drawings, design changes and subsequent rework.

The construction client

Construction clients have sometimes been impediments to construction productivity because of their lack of, or too little, knowledge of construction procedures and hence employment of project managers, architects, engineers and quantity surveyors.

Weather

Being an outdoor industry; construction experiences various climatic conditions affecting labor productivity.

As reported by Markham [1942] the work force functions most efficiently at ambient temperatures between 60 and 76 degree F with a moderate 40-70 percentage humidity.

Hot and wet climates are far less conducive to mental and physical energy, and tropical climates do not favor muscular activity generating much body heat and discomfort.

Level of economic development

Global construction industry productivity depends greatly on the general level of economic development and buoyancy.

If the economy booms with money available to carry out development projects, construction industry productivity should increase, while productivity suffers most during recession or a downturn in economic fortunes; these factors are all intermingled with political stability in determining to a great extent the level of investment.

3.6.2- Internal factors:-

Management

In Taylor's [1961] advocating of scientific management, responsibility for employing, training and equipping workers for the job in order to achieve optimum productivity belongs to management through proper plans, control and coordination of resources.

With increased project size and complexity this responsibility has become even more important; management inadequacies can result in a waste of resources with consequent losses in productivity.

Technology

Productivity improves with the proper use of plant and tools; For example, digging with an excavator will produce more than manual digging.

A part from quantity, quality also generally improves when suitable machines are used.

New technology is constantly being introduced to the construction industry, perhaps to cope with current skills shortages.

Labor

With labor being a major influential factor in construction productivity, Maloney [1983] showed that the level of productivity is directly related to the `driving, induced and restraining forces acting upon workers`- that is, their motivation.

Although the direct influence of labor can not be note that clearly when productivity is perceived globally, as far as on-site productivity is concerned labor acts as the hub for other resources and hence is a major controlling variable in construction productivity.

The personal attributes of the worker can also affect productivity in a particular trade, craft or operation through; [1] skills, qualifications, training and experience, [2] innate ability—both physical and mental energy—and [3] the intensity of the application of both

skills and innate ability to the production process, Although construction might appear to a simple or untrained person as mere physical exertion, the skill comes only through proper training and experience.

Unions

Unions are commonly note that by management as having negative influences on workers` productivity and in certain instances can be very influential.

Unions are alleged to be against productivity growth because they perceive it as a threat to job security, and therefore often accused of working against the interest of the society.

3.7 PRODUCTIVITY IN ON-SITE CONSTRUCTION – THE STATE OF THE ART AND A PRESCRIPTION FOR IMPROVING IT. CONSTRUCTION INDUSTRY PERFORMANCE – THE STATE OF THE ART

The construction industry builds for industry, business, individuals, and governmental agencies.

all about us are plants, buildings, roads, housing, systems to supply water and dispose of wastes and many other facilities that are required to keep our modern society viable.

In the United States, construction is nearly its largest industry.

In 1986 the construction industry employed about 4.4 million people; in all its phases, expenditures were $389 billion dollars, or 9 percent of the gross national product.

Some predict that it will continue to do so because of regulation; lower expenditures for plants, buildings, housing, and other facilities by private interests; decreased government spending; and, possibly high interest rates.

In addition, foreign contractors, many of whom have strong engineering, management, and research capabilities, are increasingly challenging American firms for work overseas as well as at home.

For example, Japanese, German, and French firms are acquiring partial owner ship in U.S. construction firms and, in a few instances, establishing their own companies.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Chapter 5 of this thesis is the conclusion, meaning what are the benefits of this thesis. It can say that there are some benefits from this thesis. It is known that:

Contractor #7 Eng. Waheed Abu Hamza offered the shortest total duration (9-10 month) [1] to execute and complete the project of the typical reinforced concrete residential building of five identical stories, out of 10 contractors.

Contractor #10 Mr. Sharif Tawfik offered the lowest total amount $814,943.20 on year 2006 [10] to execute and complete the project of the typical reinforced concrete residential building of five identical stories, out of 10 contractors.

Contractor #8 Eng. Nader Habayba offered the longest total duration (16 month) [6] to execute and complete the project of the typical reinforced concrete residential building of five identical stories, out of 10 contractors.

Contractor #1 Eng. Hisham Altaamari offered the highest total amount $1,040,714.13 on year 2006 [1] to execute and complete the project of the typical reinforced concrete residential building of five identical stories, out of 10 contractors.

From the offer of contractor #7 it is understood that there are many factors he took into consideration to complete the construction in the shortest total duration (9-10 month) [1] to execute and complete the project of the typical reinforced concrete residential building of five identical stories from the starting until the delivery to the owner.

Such factors include his experience of works, the salaries and wages of his staff and workers (skilled & unskilled), including the engineers, foremen, and workers, and their productivity per day.

Productivity means execution of a certain work within a specified period of time, then to calculate the total time suggested by the contractor for each activity, and to calculate the total time suggested by the contractor to execute and finish all the project works.

It is different between the 10 different contractors.

From the offer of contractor #10 it is understood that there are many factors he took into consideration to complete the construction in the lowest total amount $814,943.20 on year 2006 [10] to execute and complete the project of the typical reinforced concrete residential building of five identical stories from the starting until the delivery to the owner.

Such factors include his experience of works, the rate suggested for each activity (bill of quantity of civil and architectural works), and how much he pays for his staff, including the

engineers, foremen, and workers (skilled & unskilled), and the administration costs suggested by him (site and head office overheads) including (office rent + staff salaries for example "engineers, foremen, secretary.... etc.) + transportation + telephone cost + stationeries including (papers, pens, pencils, computer.... etc.) + profit percentage (15% - 20%, minimum 7%) + 16% sales tax to be deducted to the Government of Jordan + wood consumption for various types of reinforced concrete and concrete works....etc.

From the offer of contractor #8 it is understood that there are many factors he took into consideration to complete the construction in the longest total duration (16month) [6] to execute and complete the project of the typical reinforced concrete residential building of five identical stories from the starting until the delivery to the owner.

Such factors include his experience of works, the salaries and wages of his staff and workers (skilled & unskilled) including the engineers, foremen, and workers, their productivity per day. .

Also, from the offer of contractor #1 it is understood that there are many factors he took into consideration to complete the construction in the highest total amount $1,040,714.13 [1] to execute and complete the project of the typical reinforced concrete residential building of five identical stories from the starting until the delivery to the owner.

Such factors include his experience of works, the rate suggested for each activity (bill of quantity of civil and architectural works), and how much he pays his staff, including the engineers, foremen, and workers (skilled & unskilled), and the administration costs suggested by him (site and head office overheads) including (office rent + staff salaries for example "engineers, foremen, secretary.... etc.) + transportation + telephone cost + stationeries including (papers, pens, pencils, computer.... etc.) + profit percentage (15% - 20%, minimum 7%) + 16% sales tax to be deducted to the Government of Jordan + wood consumption for various types of reinforced concrete and concrete works....etc.

Comparing between the 10 contractors different offers regarding the duration and cost wise, it will be noted that any contractor with high cost / short period is better than the one with the low cost / longer period.

This could be attributed to the fact that if the project is completed in a short period (time) with high cost, another project could be immediately started with, and site and head office overheads could be saved.

But with low cost / longer period, the site and head office overheads will increase gradually with the longer period.

In addition, savings could be made in the salaries of engineers, foremen, and workers (skilled & unskilled) in short period because their salaries increase with the longer period, and the profit percentage will be higher with short period not with longer period.

This fact is known for all contractors.

The high cost means spending or paying some money rather than reducing the time consumed spent to finish any project. For example, the project of the typical reinforced concrete residential building of five identical stories.

It is noted here that contractor #1 offered a total cost of $1,040,714.13 on year 2006 [1] and suggested 12 months [3] to execute and complete the project of the typical reinforced concrete residential building of five identical stories.

While the contractor #3 offered a total cost of $1,036,627.19 on year 2006 [3], and suggested (14-16months) [4] executing and finishing the project too.

Contractor #8 offered a total cost of $995,550.40 on year 2006 [8] and suggested 16 months [6] to execute and complete the project too.

A very small difference is noted here between the three contractors regarding the cost wise. The difference between the total cost of contractor #1 and contractor #3 is approximately $4,000, while the difference between all of them as regards the time is about 4 months.

Also, it is seen that the difference between the total cost of contractor #1 and contractor #8 is approximately $45,000, while the difference between all of them as regards the time is about 4 months too.

It is know the manpower which any contractor will employ in any project; the site overheads and head office overheads.

It is suggested here the 10 work program by Microsoft project 2000 planning for 10 different contractors who submitted their 10 different offers for the tender on year 2006 (bill of quantity of civil and architectural works) to execute and complete the project of the typical reinforced concrete residential building of five identical stories includes the steps of works from the commencement of the work (Excavation) till the completion of the project.

The owner of the residential building chose contractor # 10, Mr. Sharif Tawfik to construct this project of a typical reinforced concrete residential building of five identical stories.

He based his decision on cost and duration because, Contractor #10 offered the lowest total amount of money to execute and finish the entire project works, and the materials offered is also of high quality and commercially based on the tender data specification.

And the consultant for this project is "Eng. Ammar Khammash for Architects" Engineering Bureau, in Amman, Jordan.

Further in what I've studied from the 10 offers of contractors I also chose contractor #10 Mr. Sharif Tawfik because his offer is economical, and materials he used have good quality and very helpful to those who are aspiring to be contractors in the future.

In other words, larger amount of money is not needed to construct a residential building, but it can also be produced with lower costs, using same materials and quality. The salaries of the engineers, foreman etc., are also saved with short period. This proves that contractors can be successful by spending less amounts of money for the entire projects.

Finally, my personal choice is Contractor #10 as the main contractor to execute and finish the project of the typical reinforced concrete residential building of five identical stories from the starting until the deliver to the owner. I chose "Eng. Ammar Khammash for Architects" Engineering Bureau, in Amman, Jordan as a consultant for this project too.

In the future study of tender of Civil and Architectural works; I recommend the following options to be taken into consideration;

Firstly, the cost of the project must be low and shorter construction period should be considered.

Secondly, a timetable should be used and updated periodically to avoid delays as much as possible.

Thirdly, materials must be of good quality and tools plus machinery should operate at high efficiency.

Fourthly, skilled and unskilled workers must be punctual, knowledgeable, experienced and proficient at work

Lastly, for a successful and faster execution of the entire project, the owner should appoint a professional Consultant Engineering Bureau to handle the entire construction of the project from the beginning to the end.

Table 5.1: Cost and Duration offers of the contractors

Serial Number	Name of contractor	Total cost ($)	Total duration (month)
1-	Eng. Hisham Altaamari	$1,040,714.13 [1]	12 months [3]
2-	Eng. Elia Mesalam	$1,040,225.30 [2]	14 months [4]
3-	Eng. Munther Alkharoof	$1,036,627.19 [3]	14-16 months [4]
4-	Eng. Mazen Haddad	$1,014,537.07 [4]	15 months [5]
5-	Eng. Baker Alnabulsi	$1,001,380.97 [5]	14 months [4]
6-	Eng. Yousif Hussein Saleh	$1,000,033.90 [6]	15 months [5]
7-	Eng. Waheed Abu Hamza	$997,500.13 [7]	9-10 months [1]
8-	Eng. Nader Habayba	$995,550.40 [8]	16 months [6]
9-	Eng. Ahmed Alumari	$869,793.41 [9]	10 months [2]
10-	Mr. Sharif Tawfik	$814,943.20 [10]	12 months [3]

Table 5.2: Wages defined by the contractors

Man Power

Name of man power	Wages $/day
Carpenter	21
Steel man	21
Builder man	21
Plaster man	28
Cast labor	15
Tiles man (mosaic tiles)	21
Tiles man (ceramic tiles (walls + floors))	25-28
Painter	21
<u>Site overheads</u>	
Project manager	1,500 $ / month
Site Engineer	1,000 $ / month
Foreman	550 $ / month
Buffet worker (make tea, coffee and clean the office in the project)	200 $ / month
Quantity surveyors	700 $ / month
Driver with car (pick up car)	700 $ / month
<u>Head office overheads</u>	
Accountant	600 $ / month
Buffet worker (make tea, coffee, and clean the office)	200 $ / month
Secretary	400 $ / month
Administrative	450 $ / month

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	APPENDIX 1					**page #**	**114**		
	Contractor #1 Eng. Hisham Altaamari								
	BILL NO. 1								
	EXCAVATION AND EARTH WORKS								
Item	**Description**		**Qty.**	**Unit**	**Rate**		**Amount**		**Duration**
					$	**cent**	**$**	**cent**	**Day**
	EXCAVATION AND EARTH WORKS								
	Excavation starting at existing ground								
A	Excavation To foundations Levels		**3.825**	**m3**	9	86	37714	50	20
B	Excavation for external works.		**683**	**m3**	11	27	7697	41	6
	Filling, laid and compacted in layers:								
A	Approved filling inside building.		**540**	**m3**	4	23	2284	20	7
B	Approved filling outside building.		**736**	**m3**	4	23	3113	28	9
	Crushed aggregate base course,								
A	200 mm thickn inside building		**410**	**m2**	2	82	1156	20	5
	TOTAL EXCAVATION & EARTH WORKS				**Total**		**51965**	**59**	
	CARRIED TO SUMMARY								

BILL NO. 2

CONCRETE

Item	Contractor #1 Eng. Hisham Altaamari / Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
						page # 115		
	Plain concrete 18 N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Blinding; 100mm thick under foundations and tie	393	m2	9	86	3874	98	4
B	Blinding; 50mm thick under slabs on grade.	430	m2	5	63	2420	90	3
C	Blinding: 100mm thick under external walls.	217	m2	9	86	2139	62	4
	Reinforced concrete 25N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
D	Foundations.	141	m3	105	63	14893	83	10
E	Tie beams	21	m3	119	72	2514	12	4
G	Columns and Column Necks	81	m3	140	85	11408	85	8
H	Slab on grade, 100 mm thick, to building.	45	m3	98	59	4436	55	6
J	Slab on grade, 100 mm thick, to external pavements.	35	m3	98	59	3450	65	6
K	External basement walls	206	m3	112	68	23212	8	15
L	Water tank walls	52	m3	119	72	6225	44	6
M	External Foundations	48	m3	105	63	5070	24	5
N	External Walls	97	m3	112	68	10929	96	7
	Reinforced concrete 20N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Behind stone elevations	187	m3	105	63	19752	81	100
				Total		110330	3	

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Reinforced cast in situ concrete (Grade 25), Cont'd							
A	Ribbed slabs,310 mm thick.	**458**	**m3**	112	68	51607	44	100
B	Staircases (steps and flights). In side	**13**	**m3**	140	85	1831	5	100
C	Staircases (steps and flights). Out side	**11**	**m3**	140	85	1549	35	20
	Deformed high yield steel bar reinforcement of420N/mm2 minimum yield strength, complete							
A	Various diameters, generally	**110**	**Ton**	915	49	100703	90	90
	Smooth mild steel bar reinforcement of 280 N/mm2 minimum yield strength, complete							
A	Y8 mm.	**28**	**Ton**	943	66	26422	48	90
				Total		**292444**	**25**	

	Contractor #1 Eng. Hisham Altaamari					page # 117		
	BILL NO. 3							
	BLOCK WORKS							
tem	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	
	BLOCK WORK							
	Hollow concrete blocks bedded and jointed in cement sand mortar (1:3) to:							
A	Walls; 100 mm thick	**732**	**m2**	8	45	6185	40	60
B	Walls; 150 mm thick	**264**	**m2**	11	27	2975	28	30
C	Walls; 200 mm thick	**153**	**m2**	15	49	2369	97	20
D	**Hollow concrete rib block, size 400/360x200x240 mm high.**	**16266**	**nr**	0	56	9108	96	25
E	insulation for external walls of basement	**529**	**m2**	9	86	5215	94	15
F	stone walls.	**951**	**m2**	9	86	9376	86	19
	TOTAL BLOCK WORKS CARRIED TO SUMMARY			**Total**		**35232**	**41**	

	Contractor #1 Eng. Hisham Altaamari					page # 118		
	BILL NO. 4							
	ROOFING AND INSULATION SYSTEMS							
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Foam concrete, minimum 50 mm thick laid to falls and cross falls including preparing top surfaces smooth to receive waterproofing membrane, complete							
A	To roofs.	430	m2	12	68	5452	40	6
	Cement sand screed, minimum 30mm thick laid to falls including forming angle fillets at perimeter and all abutments, complete							
B	To roofs.	430	m2	4	23	1818	90	3
	4mm thick torch applied modified							
G	To roofs.	430	m2	9	86	4239	80	4
				Total		11511	10	

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	4mm thick torch applied modified bituminous polymer water- proofing membrane; reinforced with 180g/m^2 polyester, including bitumen primer, all necessary preparation and fixing works, complete							
A	For slabs on grade.	410	m2	9	86	4042	60	4
B	To basement walls	529	m2	9	86	5215	94	6
	PVC WATER STOP ACCORDING TO PLANS FOR WATER TANK WALLS	56	mr	7	4	394	24	1
	Damp proofing membrane comprising of two perpendicular coats of emulsified asphalt reinforced with non asbestos fibers, cold applied, complete according to manufacturer instructions and technical specifications							
F	To basement walls.	2650	m2	7	4	18656	0	13
				Total		39819	88	

	Contractor #1 Eng. Hisham Altaamari						page # 120		
	BILL NO. 5								
	MASONRY WORKS								
tem	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	
	MASONRY WORK								
A	Local (AJLON) stone fixed to faces of concrete for all elevations.								
	First class no less than 50mm thick and 400mm length, 250mm hight.								
	stone colour shall be approved by the enginner.								
	corner stones, jambs, Lintels are included with the pure engieered m2 price.								
	The price included the form works and whatever needed to complete the work.								
	CASE(1)Mechanical push hammered face finish		1151	m2	56	34	64847	34	100
	CASE (2) light chisled face finish		unit	m2	56	34	64847	34	100
	CASE(3)Rough chirled face finish		unit	m2	63	38	72950	38	100
	CASE(4) (طبزة) FACE FINISH		unit	m2	84	51	97271	1	120
B	Stone coping (local AJLON) according to plans and architectural details300*50mm thik mechanical bush hammrerd curved.to walls and sills		356	mr	28	17	10028	52	20

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	
c	Approved first quality (KARAK) marble grey color; bedded on and including cement sand mortar (1:3); sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, using stainless anchor bolts and steel dowelsand and according with specifications 250mm hight x 50mm thick.		95	m2	63	38	6021	10	30
	NOTE: masonary bill may be calculated in								
D	Ajlon local cornice stone380mm hight 215mm wide 40 mmthik .honed finish in accoordance to detalis fixd to walls .		25	mr	98	59	2464	75	10
	TOTAL MASONARY WORKS				Total				
	CARRIED TO SUMMARY						318430	44	

	Contractor #1 Eng. Hisham Altaamari					page # 122		
	BILL NO. 01							
	INTERNAL AND EXTERNAL FINISHES							
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	FLOOR FINISHES							
	Precast terrazzo tiles, natural color, bedded on sand including cement sand mortar (1:3), cleaning and polishing upon completion, selection to Engineer's approval:							
	To floors, size 400x100x30 mm thick for guards rooms	52	m^2	14	8	732	16	4
	Approved first quality JERUSALEM stone marble tiles bedded on and including cement sand mortar (1:3); pointing with neat tinted cement to match colour of marble; sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, complete							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	63	38	36380	12	30
B	To skirting size 600x100x6mm thick	360	mr	14	8	5068	80	6
	(STANDBY ITEM) DITTO BUT ITALIAN MARBLE.							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	70	42	40421	8	30
B	To skirting size 600X100X6mm thick	*360*	*mr*	*14*	*8*	*5068*	*80*	*6*
	Ditto but Omani or stone like ceramic tiles							
A	To floors 400x400x20 mm thick.	365	m^2	63	38	23133	70	30
B	To skirting size 300x100x6mm thick	247	mr	14	8	3477	76	6
	Imported Spanish (or equivalent) ceramic coloured floor tiles; natural color; laid on sand, including cement sand mortar (1:3) and pointing with approved grout, complete							
	To kitchens floors size 400x400x9 mm thick.	137	m^2	28	17	3859	29	17

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Ditto but EMIRATES R.A.K ceramic coloured floor tiles.							
A	To floors, size 300x300x9 mm thick for maids rooms	36	m^2	23	94	861	84	3
B	To skirting, size 300x100x6 mm thick for maids rooms	43	mr	7	4	302	72	1
c	Ditto but local ceramic coloured floor tiles for Boiler and maids bathrooms 200*200*9 thick.	86	m^2	21	13	1817	18	6
	One piece Jerusalem stone to steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	168	mr	84	51	14197	68	30
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	108	mr	28	17	3042	36	10
	One piece gravelled tiles to external steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	28	mr	35	21	985	88	3
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	25	mr	28	17	704	25	2
	Precast interlock concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions.							
A	To walkway at parking and ramps size 400x400x40 mm	333	m2	14	8	4688	64	10
B	Standby itme ditto but basalt stone	333	m^2	28	17	9380	61	10
	Precast concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions for external paving	163	m^2	14	8	2295	4	5

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	WALL FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:							
A	To walls, internally.	7783	m^2	4	23	32922	9	80
B	To walls, internally behind ceramic walls.	1010	m^2	6	34	6403	40	10
C	To walls, internally for water tanks walls.	240	m^2	7	4	1689	60	6
D	To walls, externally.	270	m^2	8	45	2281	50	5
	Glazed imported SPANISH ceramic coloured wall tiles in plain and decorative colours, bedding and jointing on approved adhesive to plastered backing, pointing in matching coloured grout and special coved ceramic pieces for corners and skirting.Joints 3mm wide using spacers, all according to drawings, manufacturer and Engineer's instructions, complete.							
	To walls size 300x300x9 mm thick for Bathrooms	510	m^2	28	17	14366	70	15
	Ditto but to walls size 100x100x9 mm thick mosaic for kitchens.	320	m^2	49	30	15776	0	10
	Ditto but Jerusalem wall tiles for basement1 entrance complete	60	m^2	35	21	2112	60	5
	Ditto but local glazed colored ceramic wall tiles, complete							
A	To walls size 200x200x8 mm thick for Boiler	110	m^2	23	94	2633	40	4
B	To walls size 200x200x8 mm thick for maids rooms (white colour)	78	m^2	21	13	1648	14	3

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	CEILING FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:	1828	m2	4	23	7732	44	30
	JERUSALEM stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking columns	35	m^2	63	38	2218	30	3
	JERUSALEM stone cladding, fixed to faces of concrete with 20mm thick with cement mortar in according to specifications and details drawings 350mm height for main entrances	36	m^2	56	34	2028	24	3
	AJLOON stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking walls and entrance	65	m^2	56	34	3662	10	4
	SUSPENDED CEILINGS							
	12mm thick gypsum board suspended ceiling panels finished with skim coat including concealed galvanized suspension system, stepped decorations, strips, drop, molding and all painting, fire retardant plywood backing (where necessary), access doors and making openings for different services, all as shown on drawings, complete	47	m2	22	54	1059	38	4
	800mm*300mm height gypsum cornice suspend finished with skim coat including concealed galvanized suspension system, stepped decorations, molding and all painting, fire retardant making openings for different services, all as shown on drawings, complete for saloons, TV and dinning ceilings.	211	mr	50	0	10550	0	7
				TOTAL		**263501**	**80**	

	Contractor #1 Eng. Hisham Altaamari					**page # 126**		
		BILL NO. 04						
		PAINTING AND DECORATION						
Item	**Description**	**Qty.**	**Unit**	**Rate**		**Amount**		**Duration**
				$	**cent**	**$**	**cent**	**Day**
	INTERNALLY							
	Emulsion PVA - based paint, matt finish for interior, quality in one priming coat and three finishing coats, for application to walls and ceilings, using full coverage putty, including all necessary preparation works and undercoats, application to all heights as required of works, all according to manufacturer (DELUXE or approved equivalent) instructions, complete							
	To walls	4783	m2	2	82	13488	6	65
	EXTERNALLY							
	Resin base waterproofing acrylic textured decorative coating (the binder shall be pure acrylic) pigments and binders are resistant to weather pollution ...etc., including all necessary preparation work and under coats, complete							
	To exterior walls	265	m2	3	52	932	80	22
	To walls at roof	196	m2	8	45	1656	20	19
	Non-toxic epoxy paint including primer all as specified, complete to floor, walls and ceiling of water tanks	328	m2	14	8	4618	24	21
		Total carried to summary				**20695**	**30**	

	Contractor #1 Eng. Hisham Altaamari						page # 127		
	BILL NO. 5								
	FITTINGS AND EQUIPMENTS								
Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	CORNER GUARDS								
	supply and fix rubber corner guards for columns at parking areas, fixed with stainless steel flathead fastener flush and plastic cement adhesive according to manufacturer instructions and detailed drawing.								
	100x100 mm, 1200 mm height		4	nr.	210	0	840	0	7
	Mirrors								
	6mm thick mirrors with 20 mm stainless steel frame including 8mm thick plywood backing, all as shown on drawings and as specified, complete								
A	Size 1050 x 2600 mm high.		2	nr	550	0	1100	0	4
B	Size 1600 x 1300 mm high.		3	nr	400	0	1200	0	5
C	Size 800 x 1300 mm high.		19	nr	250	0	4750	0	11

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	VANITY COUNTER								
	Local KARAK marble countertop 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing, cutting openings, silicon mastic sealing and all associated works, complete as detailed on drawings and to Engineers approval, complete								
A	size 1700 x 600 mm wide		2	nr	550	0	1100	0	2
B	size 2800 x 600 mm wide		1	nr	700	0	700	0	1
C	size 2000 x 600 mm wide		1	nr	550	0	550	0	1
D	size 1800 x 600 mm wide		1	nr	550	0	550	0	1
E	size 1200 x 600 mm wide		2	nr	450	0	900	0	2
F	size 2200 x 600 mm wide		2	nr	600	0	1200	0	2
G	size 1900 x 600 mm wide		3	nr	550	0	1650	0	3
H	size 2600 x 600 mm wide		1	nr	700	0	700	0	1
	Total carried to summary						**14690**	**0**	

Contractor #1 Eng. Hisham Altaamari					page # 129		
BILL NO. 6							
Planting							
Item Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones as per drawings.	254	m3	15	49	3934	46	22
Total carried to summary					3934	46	

	APPENDIX 2						**page #**	**130**	
	Contractor #2 Eng. Elia Mesalam								

BILL NO. 1

EXCAVATION AND EARTH WORKS

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	EXCAVATION AND EARTH WORKS							
	Excavation starting at existing ground level including removal of surplus excavated materials:							
A	Excavation To foundations Levels	3.825	m3	8	45	32321	25	12
B	Excavation for external works.	683	m3	7	4	4808	32	7
	Filling, laid and compacted in layers:							
A	Approved filling inside building.	540	m3	7	75	4185	0	6
B	Approved filling outside building.	736	m3	7	4	5181	44	8
	Crushed aggregate base course, compacted to 100% modified AASHTO density CBR ≥ 80%, complete							
A	200 mm thickn inside building	410	m2	3	52	1443	20	5
	TOTAL EXCAVATION & EARTH WORKS							
	CARRIED TO SUMMARY			**Total**		**47939**	**21**	

	Contractor #2 Eng. Elia Mesalam						Page #	131	
	BILL NO. 2								
	CONCRETE								
Item	Description		Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Plain concrete 18 N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete								
A	Blinding; 100mm thick under foundations and tie beams.		393	m2	9	86	3874	98	5
B	Blinding; 50mm thick under slabs on grade.		430	m2	5	63	2420	90	4
C	Blinding: 100mm thick under external walls.		217	m2	9	86	2139	62	7
	Reinforced concrete 25N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete								
D	Foundations.		141	m3	132	39	18666	99	8
E	Tie beams		21	m3	126	76	2661	96	7
G	Column and Column Necks		81	m3	154	93	12549	33	5
H	Slab on grade, 100 mm thick, to building.		45	m3	112	68	5070	60	4
J	Slab on grade, 100 mm thick, to external pavements.		35	m3	112	68	3943	80	4
K	External basement walls		206	m3	112	68	23212	8	17
L	Water tank walls		52	m3	119	72	6225	44	10
M	External Foundations		48	m3	126	76	6084	48	8
N	External Walls		97	m3	119	72	11612	84	18

Item	Description		Qty.	Unit	Rate		Amount		Duration Day
	Reinforced concrete 20N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete								
A	Behind stone elevations		187	m3	112	68	21071	16	145
		To Collection		**unit**	**$ /**	**cent**	**119534**	**18**	
	Reinforced cast in situ concrete (Grade 25), Cont'd								
A	Ribbed slabs,310 mm thick.		458	m3	126	76	58056	8	145
B	Staircases (steps and flights). In side		13	m3	133	80	1739	40	135
C	Staircases (steps and flights). Out side		11	m3	133	80	1471	80	25
	Deformed high yield steel bar reinforcement of420N/mm2 minimum yield strength, complete								
A	Various diameters, generally		110	Ton	985	92	108451	20	160
	Smooth mild steel bar reinforcement of 280 N/mm2 minimum yield strength, complete								
A	Y8 mm.		28	Ton	915	49	25633	72	150
					Total		**314886**	**38**	

	Contractor #2 Eng. Elia Mesalam						Page #	133	
	BILL NO. 3								
	BLOCK WORKS								
Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	BLOCK WORK								
	Hollow concrete blocks bedded and jointed in cement sand mortar (1:3) to:								
A	Walls; 100 mm thick		732	m2	12	68	9281	76	8
B	Walls; 150 mm thick		264	m2	15	49	4089	36	3
C	Walls; 200 mm thick		153	m2	18	31	2801	43	2
D	Hollow concrete rib block, size 400/360x200x240 mm high.		16266	nr		99	16103	34	
E	Concrete block 100mm thick. Behind the insulation for external walls of basement		529	m2	11	27	5961	83	6
F	Concrete block 100mm thick. Behind the stone walls.		951	m2	12	68	12058	68	15
	TOTAL BLOCK WORKS								
	CARRIED TO SUMMARY					Total	43405	61	

	Contractor #2 Eng. Elia Mesalam					Page #	134	
	BILL NO. 4							
	ROOFING AND INSULATION SYSTEMS							
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Foam concrete, minimum 50 mm thick laid to falls and cross falls including preparing top surfaces smooth to receive waterproofing membrane, complete							
A	To roofs.	430	m2	4	93	2119	90	7
	Cement sand screed, minimum 30mm thick laid to falls including forming angle fillets at perimeter and all abutments, complete							
B	To roofs.	430	m2	3	52	1513	60	7
	4mm thick torch applied modified bituminous water-proofing membrane; skirting with additional mineral chipping faced membrane tucked into grooves and pointed with mastic, including bitumen primer one coat, complete							
G	To roofs.	430	m2	7	4	3027	20	10
	To Collection		unit	$	cent	6660	70	
	4mm thick torch applied modified bituminous polymer water- proofing membrane; reinforced with 180g/m^2 polyester, including bitumen primer, all necessary preparation and fixing works, complete							
A	For slabs on grade.	410	m2	7	75	3177	50	16
B	To basement walls	529	m2	11	27	5961	83	24

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	PVC WATER STOP ACCORDING TO PLANS FOR WATER TANK WALLS	56	mr	12	68	710	8	5
	Damp proofing membrane comprising of two perpendicular coats of emulsified asphalt reinforced with non asbestos fibers, cold applied, complete according to manufacturer instructions and technical specifications							
F	To basement walls.	2650	m2	6	34	16801	0	26
	To Collection		**$ / cent**			**33311**	**11**	

BILL NO. 5

MASONRY WORKS

Page # 136

Contractor #2 Eng. Elia Mesalam

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	MASONRY WORK							
A	Local (AJLON) stone fixed to faces of concrete for all elevations.							
	First class no less than 50mm thick and 400mm length, 250mm hight.							
	stone colour shall be approved by the enginner.							
	corner stones, jambs, Lintels are included with the pure engieered m2 price.							
	The price included the form works and whatever needed to complete the work.							
	CASE(1)Mechanical push hammered face finish	1151	m2	63	38	72950	38	150
	CASE (2) light chisled face finish	unit	m2	67	61	77819	11	150
	CASE(3)Rough chirled face finish	unit	m2	67	61	77819	11	150
	CASE(4) (طبزة) FACE FINISH	unit	n2	70	42	81053	42	150
B	Stone coping (local AJLON) according to plans and architectural details300*50mm thik mechanical bush hammrerd curved.to walls and sills	356	mr	70	42	25069	52	30
C	**Approved first quality (KARAK) marble grey color; bedded on and including cement sand mortar (1:3); sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, using stainless anchor bolts and steel dowelsand and according with specifications 250mm hight x 50mm thick.**	95	m2	42	25	4013	75	15
D	**Ajlon local cornice stone380mm hight 215mm wide 40 mmthik .honed finish in accoordance to detalis fixd to walls .**	25	mr	49	30	1232	50	10
	TOTAL MASONARY WORKS			**Total**		**339957**	**79**	
	CARRIED TO SUMMARY							

Contractor #2 Eng. Elia Mesalam — Page # 1 137

BILL NO. 01

INTERNAL AND EXTERNAL FINISHES

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	FLOOR FINISHES							
	Precast terrazzo tiles, natural color, bedded on sand including cement sand mortar (1:3), cleaning and polishing upon completion, selection to Engineer's approval:							
	To floors, size 400x100x30 mm thick for guards rooms	52	m^2	15	49	805	48	2
	Approved first quality JERUSALEM stone marble tiles bedded on and including cement sand mortar (1:3); pointing with neat tinted cement to match colour of marble; sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, complete							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	42	25	24251	50	6
B	To skirting size 600x100x6mm thick	360	mr	4	22	1519	20	3
	(STANDBY ITEM) DITTO BUT ITALIAN MARBLE.							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	70	42	40421	8	6
B	To skirting size 600X100X6mm thick	360	mr	7	4	2534	40	3
	Ditto but Omani or stone like ceramic tiles							
A	To floors 400x400x20 mm thick.	365	m^2	56	33	20560	45	5
B	To skirting size 300x100x6mm thick	247	mr	5	63	1390	61	4
	Imported Spanish (or equivalent) ceramic coloured floor tiles; natural color; laid on sand, including cement sand mortar (1:3) and pointing with approved grout, complete							
	To kitchens floors size 400x400x9 mm thick.	137	m^2	28	16	3857	92	5
	Ditto but EMIRATES R.A.K ceramic coloured floor tiles.							
A	To floors, size 300x300x9 mm thick for maids rooms	36	m^2	25	35	912	60	3
B	To skirting, size 300x100x6 mm thick for maids rooms	43	mr	5	63	242	9	2
c	Ditto but local ceramic coloured floor tiles for Boiler and maids bathrooms 200x200x9 thick.	86	m^2	16	90	1453	40	4
	One piece Jerusalem stone to steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	168	mr	28	16	4730	88	5
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	108	mr	11	26	1216	8	3

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	One piece gravelled tiles to external steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	28	mr	21	12	591	36	3
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	25	mr	9	85	246	25	2
	Precast interlock concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions.							
A	To walkway at parking and ramps size 400x400x40 mm	333	m2	12	67	4219	11	10
B	**Standby itme ditto but basalt stone**	333	m^2	16	90	5627	70	10
	Precast concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions for external paving	163	m^2	14	8	2295	4	8
	WALL FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:							
A	To walls, internally.	7783	m^2	6	33	49266	39	90
B	To walls, internally behind ceramic walls.	1010	m^2	5	63	5686	30	30
C	To walls, internally for water tanks walls.	240	m^2	7	4	1689	60	10
D	To walls, externally.	270	m^2	7	4	1900	80	12
	Glazed imported SPANISH ceramic coloured wall tiles in plain and decorative colours, bedding and jointing on approved adhesive to plastered backing, pointing in matching coloured grout and special coved ceramic pieces for corners and skirting.Joints 3mm wide using spacers, all according to drawings, manufacturer and Engineer's instructions, complete.							
	To walls size 300x300x9 mm thick for Bathrooms	510	m^2	28	16	14361	60	10
	Ditto but to walls size 100x100x9 mm thick mosaic for kitchens.	320	m^2	35	21	11267	20	10
	Ditto but Jerusalem wall tiles for basement1 entrance complete	60	m^2	28	16	1689	60	3
	Ditto but local glazed colored ceramic wall tiles, complete							
A	To walls size 200x200x8 mm thick for Boiler	110	m^2	22	53	2478	30	5
B	To walls size 200x200x8 mm thick for maids rooms (white colour)	78	m^2	22	53	1757	34	4

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	CEILING FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:	1828	m2	8	45	15446	60	30
	JERUSALEM stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking columns	35	m^2	84	50	2957	50	5
	JERUSALEM stone cladding, fixed to faces of concrete with 20mm thick with cement mortar in according to specifications and details drawings 350mm height for main entrances	36	m^2	64	78	2332	8	3
	AJLOON stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking walls and entrance	65	m^2	64	78	4210	70	5
	SUSPENDED CEILINGS **12mm thick gypsum board suspended ceiling panels finished with skim coat including concealed galvanized suspension system, stepped decorations, strips, drop, molding and all painting, fire retardant plywood backing (where necessary), access doors and making openings for different services, all as shown on drawings, complete**	47	m2	21	12	992	64	5
	800mm*300mm height gypsum cornice suspend finished with skim coat including concealed galvanized suspension system, stepped decorations, molding and all painting, fire retardant making openings for different services, all as shown on drawings, complete for saloons, TV and dinning ceilings.	211	mr	28	16	5941	76	20
			Total carried to summary			**238853**	**56**	

	Contractor #2 Eng. Elia Mesalam					Page #	140	
	BILL NO. 04							
	PAINTING AND DECORATION							
tem	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	INTERNALLY							
	Emulsion PVA - based paint, matt finish for interior, quality in one priming coat and three finishing coats, for application to walls and ceilings, using full coverage putty, including all necessary preparation works and undercoats, application to all heights as required of works, all according to manufacturer (DELUXE or approved equivalent) instructions, complete							
	To walls	4783	m2	2	81	13440	23	60
	EXTERNALLY							
	Resin base waterproofing acrylic textured decorative coating (the binder shall be pure acrylic) pigments and binders are resistant to weather pollution ...etc., including all necessary preparation work and under coats, complete							
	To exterior walls	265	m2	7	4	1865	60	20
	To walls at roof	196	m2	7	4	1379	84	18
	Non-toxic epoxy paint including primer all as specified, complete to floor, walls and ceiling of water tanks	328	m2	5	63	1846	64	25
			Total carried to summary			**18532**	**31**	

	Contractor #2 Eng. Elia Mesalam					Page	# 141	
	BILL NO. 5							
	FITTINGS AND EQUIPMENTS							
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	CORNER GUARDS							
	supply and fix rubber corner guards for columns at parking areas, fixed with stainless steel flathead fastener flush and plastic cement adhesive according to manufacturer instructions and detailed drawing.							
	100x100 mm, 1200 mm height	4	nr.	42	25	169	0	4
	Mirrors							
	6mm thick mirrors with 20 mm stainless steel frame including 8mm thick plywood backing, all as shown on drawings and as specified, complete							
A	Size 1050 x 2600 mm high.	2	nr	105	63	211	26	2
B	Size 1600 x 1300 mm high.	3	nr	77	46	232	38	3
C	Size 800 x 1300 mm high.	19	nr	42	25	802	75	7
	VANITY COUNTER							
	Local KARAK marble countertop 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing, cutting openings, silicon mastic sealing and all associated works, complete as detailed on drawings and to Engineers approval, complete							
A	size 1700 x 600 mm wide	2	nr	56	33	112	66	1
B	size 2800 x 600 mm wide	1	nr	98	59	98	59	1
C	size 2000 x 600 mm wide	1	nr	70	42	70	42	1
D	size 1800 x 600 mm wide	1	nr	61	97	61	97	1
E	size 1200 x 600 mm wide	2	nr	42	25	84	50	2
F	size 2200 x 600 mm wide	2	nr	73	23	146	46	2
G	size 1900 x 600 mm wide	3	nr	63	38	190	14	2
H	size 2600 x 600 mm wide	1	nr	87	32	87	32	1
	Total carried to summary					**2267**	**45**	

	Contractor #2 Eng. Elia Mesalam					**Page :**	**# 142**	
	BILL NO. 6							
	Planting							
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones as per drawings.	254	m^3	4	22	1071	88	20
			Total carried to summary			**1071**	**88**	

	APPENDIX 3					**Page #**	**143**	
	Contractor #3 Eng. Munther Alkharoof							

BILL NO. 1

EXCAVATION AND EARTH WORKS

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	EXCAVATION AND EARTH WORKS							
	Excavation starting at existing ground level including removal of surplus excavated materials:							
A	Excavation To foundations Levels	3.825	m3	7	4	26928	0	10
B	Excavation for external works.	683	m3	7	4	4808	32	3
	Filling, laid and compacted in layers:							
A	Approved filling inside building.	540	m3	9	86	5324	40	5
B	Approved filling outside building.	736	m3	9	86	7256	96	7
	Crushed aggregate base course, compacted to 100% modified AASHTO density CBR ≥ 80%, complete							
A	200 mm thickn inside building	410	m2	11	27	4620	70	7
	TOTAL EXCAVATION & EARTH WORKS							
	CARRIED TO SUMMARY			**Total**		**48938**	**38**	

BILL NO. 2

CONCRETE

Contractor #3 Eng. Munther Alkharoof

Item	Description		Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Plain concrete 18 N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete								
A	Blinding; 100mm thick under foundations and tie beams.		393	m2	11	27	4429	11	5
B	Blinding; 50mm thick under slabs on grade.		430	m2	7	75	3332	50	3
C	Blinding: 100mm thick under external walls.		217	m2	11	27	2445	59	3
	Reinforced concrete 25N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete								
D	Foundations.		141	m3	105	63	14893	83	15
E	Tie beams		21	m3	112	68	2366	28	7
G	Column and Column Necks		81	m3	126	76	10267	56	25
H	Slab on grade, 100 mm thick, to building.		45	m3	105	63	4753	35	6
J	Slab on grade, 100 mm thick, to external pavements.		35	m3	105	63	3697	5	5
K	External basement walls		206	m3	119	72	24662	32	23
L	Water tank walls		52	m3	119	72	6225	44	7
M	External Foundations		48	m3	105	63	5070	24	8
N	External Walls		97	m3	119	72	11612	84	14
	Reinforced concrete 20N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete								
A	Behind stone elevations		187	m3	105	63	19752	81	45
		To Collection		**unit**	**$**	**cent**	**113508**	**92**	

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Reinforced cast in situ concrete (Grade 25), Cont'd								
A	Ribbed slabs,310 mm thick.		458	m3	105	63	48378	54	60
B	Staircases (steps and flights). In side		13	m3	126	76	1647	88	30
C	Staircases (steps and flights). Out side		11	m3	126	76	1394	36	30
	Deformed high yield steel bar reinforcement of420N/mm2 minimum yield strength, complete								
A	Various diameters, generally		110	Ton	845	7	92957	70	75
	Smooth mild steel bar reinforcement of 280 N/mm2 minimum yield strength, complete								
A	Y8 mm.		28	Ton	915	49	25633	72	25
					Total		**283521**	**12**	

	Contractor #3 Eng. Munther Alkharoof					Page #	146	
	BILL NO. 3							
	BLOCK WORKS							
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	BLOCK WORK							
	Hollow concrete blocks bedded and jointed in cement sand mortar (1:3) to:							
A	Walls; 100 mm thick	732	m2	8	45	6185	40	20
B	Walls; 150 mm thick	264	m2	10	56	2787	84	9
C	Walls; 200 mm thick	153	m2	12	68	1940	4	5
D	**Hollow concrete rib block, size 400/360x200x240 mm high.**	16266	nr	1	20	19519	20	15
E	Concrete block 100mm thick. Behind the insulation for external walls of basement	529	m2	7	75	4099	75	18
F	Concrete block 100mm thick. Behind the stone walls.	951	m2	7	75	7370	25	25
	TOTAL BLOCK WORKS							
	CARRIED TO SUMMARY				**Total**	**41902**	**48**	

	Contractor #3 Eng. Munther Alkharoof						Page #	147	
	BILL NO. 4								
	ROOFING AND INSULATION SYSTEMS								
Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Foam concrete, minimum 50 mm thick laid to falls and cross falls including preparing top surfaces smooth to receive waterproofing membrane, complete								
A	To roofs.		430	m2	7	4	3027	20	9
	Cement sand screed, minimum 30mm thick laid to falls including forming angle fillets at perimeter and all abutments, complete								
B	To roofs.		430	m2	3	52	1513	60	11
	4mm thick torch applied modified bituminous water-proofing membrane; skirting with additional mineral chipping faced membrane tucked into grooves and pointed with mastic, including bitumen primer one coat, complete								
G	To roofs.		430	m2	9	86	4239	80	9
			To Collection		$ / cent		50683	8	

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	4mm thick torch applied modified bituminous polymer water-proofing membrane; reinforced with 180g/m² polyester, including bitumen primer, all necessary preparation and fixing works, complete								
A	For slabs on grade.		410	m2	7	4	2886	40	12
B	To basement walls		529	m2	8	45	4470	5	22
	PVC WATER STOP ACCORDING TO PLANS FOR WATER TANK WALLS		56	mr	14	8	788	48	3
	Damp proofing membrane comprising of two perpendicular coats of emulsified asphalt reinforced with non asbestos fibers, cold applied, complete according to manufacturer instructions and technical specifications								
F	To basement walls.		2650	m2	4	93	13064	50	25
		To Collection		**$ / cent**			**71892**	**51**	

Contractor #3 Eng. Munther Alkharoof							Page #	149
	BILL NO. 5							
	MASONRY WORKS							
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	MASONRY WORK							
A	Local (AJLON) stone fixed to faces of concrete for all elevations.							
	First class no less than 50mm thick and 400mm length, 250mm hight.							
	stone colour shall be approved by the enginner.							
	corner stones, jambs, Lintels are included with the pure engieered m2 price.							
	The price included the form works and whatever needed to complete the work.							
	CASE(1)Mechanical push hammered face finish	1151	m2	49	30	56744	30	46
	CASE (2) light chisled face finish	unit	m2	49	30	56744	30	
	CASE(3)Rough chirled face finish	unit	m2	49	30	56744	30	
	CASE(4) (طبزة) FACE FINISH	unit	m2	63	38	72950	38	
B	Stone coping (local AJLON) according to plans and architectural details300*50mm thik mechanical bush hammrerd curved.to walls and sills	356	mr	21	13	7522	28	17
C	**Approved first quality (KARAK) marble grey color; bedded on and including cement sand mortar (1:3); sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, using stainless anchor bolts and steel dowelsand and according with specifications 250mm hight x 50mm thick.**	95	m2	91	55	8697	25	12
D	**Ajlon local cornice stone380mm hight 215mm wide 40 mmthik .honed finish in accoordance to detalis fixd to walls .**	25	mr	140	85	3521	25	8
	TOTAL MASONARY WORKS							
	CARRIED TO SUMMARY			**Total**		**262924**	**6**	

Contractor #3 Eng. Munther Alkharoof — Page # 150

BILL NO. 01

INTERNAL AND EXTERNAL FINISHES

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	FLOOR FINISHES							
	Precast terrazzo tiles, natural color, bedded on sand including cement sand mortar (1:3), cleaning and polishing upon completion, selection to Engineer's approval:							
	To floors, size 400x100x30 mm thick for guards rooms	52	m^2	12	68	659	36	4
	Approved first quality JERUSALEM stone marble tiles bedded on and including cement sand mortar (1:3); pointing with neat tinted cement to match colour of marble; sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, complete							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	53	52	30720	48	7
B	To skirting size 600x100x6mm thick	360	mr	9	86	3549	60	4
	(STANDBY ITEM) DITTO BUT ITALIAN MARBLE.							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	70	42	40421	8	5
B	To skirting size 600X100X6mm thick	360	mr	11	27	4057	20	3
	Ditto but Omani or stone like ceramic tiles							
A	To floors 400x400x20 mm thick.	365	m^2	56	34	20564	10	5
B	To skirting size 300x100x6mm thick	247	mr	11	27	2783	69	3
	Imported Spanish (or equivalent) ceramic coloured floor tiles; natural color; laid on sand, including cement sand mortar (1:3) and pointing with approved grout, complete							
	To kitchens floors size 400x400x9 mm thick.	137	m^2	49	30	6754	10	6
	Ditto but EMIRATES R.A.K ceramic coloured floor tiles.							
A	To floors, size 300x300x9 mm thick for maids rooms	36	m^2	30	99	1115	64	4
B	To skirting, size 300x100x6 mm thick for maids rooms	43	mr	9	86	423	98	3
c	Ditto but local ceramic coloured floor tiles for Boiler and maids bathrooms 200x200x9 thick.	86	m^2	21	13	1817	18	4
	One piece Jerusalem stone to steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	168	mr	119	72	20112	96	5
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	108	mr	14	8	1520	64	3

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	One piece gravelled tiles to external steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete								
A	To treads and risers		28	mr	63	38	1774	64	4
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.		25	mr	7	4	176	0	2
	Precast interlock concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions.								
A	To walkway at parking and ramps size 400x400x40 mm		333	m2	14	8	4688	64	11
B	**Standby itme ditto but basalt stone**		333	m^2	28	17	9380	61	12
	Precast concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions for external paving		163	m^2	14	8	2295	4	9
	WALL FINISHES								
	Three coats cement and sand (1:4) plastering; smooth finish as specified:								
A	To walls, internally.		7783	m^2	7	4	54792	32	95
B	To walls, internally behind ceramic walls.		1010	m^2	6	34	6403	40	35
C	To walls, internally for water tanks walls.		240	m^2	8	45	2028	0	9
D	To walls, externally.		270	m^2	8	45	2281	50	10
	Glazed imported SPANISH ceramic coloured wall tiles in plain and decorative colours, bedding and jointing on approved adhesive to plastered backing, pointing in matching coloured grout and special coved ceramic pieces for corners and skirting.Joints 3mm wide using spacers, all according to drawings, manufacturer and Engineer's instructions, complete.								
	To walls size 300x300x9 mm thick for Bathrooms		510	m^2	38	3	19395	30	8
	Ditto but to walls size 100x100x9 mm thick mosaic for kitchens.		320	m^2	49	30	15776	0	8

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Ditto but Jerusalem wall tiles for basement1 entrance complete		60	m^2	49	30	2958	0	2
	Ditto but local glazed colored ceramic wall tiles, complete								
A	To walls size 200x200x8 mm thick for Boiler		110	m^2	23	94	2633	40	6
B	To walls size 200x200x8 mm thick for maids rooms (white colour)		78	m^2	23	94	1867	32	5
	CEILING FINISHES								
	Three coats cement and sand (1:4) plastering; smooth finish as specified:		1828	m2	8	45	15446	60	35
	JERUSALEM stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking columns		35	m^2	63	38	2218	30	5
	JERUSALEM stone cladding, fixed to faces of concrete with 20mm thick with cement mortar in according to specifications and details drawings 350mm height for main entrances		36	m^2	56	34	2028	24	3
	AJLOON stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking walls and entrance		65	m^2	63	38	4119	70	7
	SUSPENDED CEILINGS **12mm thick gypsum board suspended ceiling panels finished with skim coat including concealed galvanized suspension system, stepped decorations, strips, drop, molding and all painting, fire retardant plywood backing (where necessary), access doors and making openings for different services, all as shown on drawings, complete**		47	m2	22	54	1059	38	5
	800mm*300mm height gypsum cornice suspend finished with skim coat including concealed galvanized suspension system, stepped decorations, molding and all painting, fire retardant making openings for different services, all as shown on drawings, complete for saloons, TV and dinning ceilings.		211	mr	16	90	3565	90	25
				Total carried to summary			**289388**	**30**	

	Contractor #3 Eng. Munther Alkharoof					Page #	153	
	BILL NO. 04							
	PAINTING AND DECORATION							
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	INTERNALLY							
	Emulsion PVA - based paint, matt finish for interior, quality in one priming coat and three finishing coats, for application to walls and ceilings, using full coverage putty, including all necessary preparation works and undercoats, application to all heights as required of works, all according to manufacturer (DELUXE or approved equivalent) instructions, complete							
	To walls	4783	m2	2	82	13488	6	65
	EXTERNALLY							
	Resin base waterproofing acrylic textured decorative coating (the binder shall be pure acrylic) pigments and binders are resistant to weather pollution ...etc., including all necessary preparation work and under coats, complete							
	To exterior walls	265	m2	8	45	2239	25	22
	To walls at roof	196	m2	8	45	1656	20	18
	Non-toxic epoxy paint including primer all as specified, complete to floor, walls and ceiling of water tanks	328	m2	4	93	1617	4	22
		Total carried to summary				19000	55	

	Contractor #3 Eng. Munther Alkharoof					Page #	154	
	BILL NO. 5							
	FITTINGS AND EQUIPMENTS							
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	CORNER GUARDS							
	supply and fix rubber corner guards for columns at parking areas, fixed with stainless steel flathead fastener flush and plastic cement adhesive according to manufacturer instructions and detailed drawing.							
	100x100 mm, 1200 mm height	4	nr.	211	27	845	8	5
	Mirrors							
	6mm thick mirrors with 20 mm stainless steel frame including 8mm thick plywood backing, all as shown on drawings and as specified, complete							
A	Size 1050 x 2600 mm high.	2	nr	563	38	1126	76	3
B	Size 1600 x 1300 mm high.	3	nr	422	54	1267	62	4
C	Size 800 x 1300 mm high.	19	nr	281	69	5352	11	6
	VANITY COUNTER							
	Local KARAK marble countertop 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing, cutting openings, silicon mastic sealing and all associated works, complete as detailed on drawings and to Engineers approval, complete							
A	size 1700 x 600 mm wide	2	nr	563	38	1126	76	2
B	size 2800 x 600 mm wide	1	nr	704	23	704	23	1
C	size 2000 x 600 mm wide	1	nr	563	38	563	38	1
D	size 1800 x 600 mm wide	1	nr	563	38	563	38	1
E	size 1200 x 600 mm wide	2	nr	492	96	985	92	2
F	size 2200 x 600 mm wide	2	nr	633	80	1267	60	2
G	size 1900 x 600 mm wide	3	nr	563	38	1690	14	3
H	size 2600 x 600 mm wide	1	nr	704	23	704	23	1
				Total carried to summary		**16197**	**21**	

	Contractor #3 Eng. Munther Alkharoof				Page #	155	
	BILL NO. 6						
	Planting						
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones as per drawings.	254	m3	11	27	2862	58	23
	Total carried to summary					2862	58	

	APPENDIX 4						Page #	156	
	Contractor #4Eng. Mazen haddad								
	BILL NO. 1								
	EXCAVATION AND EARTH WORKS								
Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	EXCAVATION AND EARTH WORKS								
	Excavation starting at existing ground level including removal of surplus excavated materials:								
A	Excavation To foundations Levels		3.825	m3	7	0	26775	0	8
B	Excavation for external works.		683	m3	10	0	6830	0	5
	Filling, laid and compacted in layers:								
A	Approved filling inside building.		540	m3	11	27	6085	80	7
B	Approved filling outside building.		736	m3	11	27	8294	72	7
	Crushed aggregate base course, compacted to 100% modified AASHTO density CBR ≥ 80%, complete								
A	200 mm thickn inside building		410	m2	3	50	1435	0	4
	TOTAL EXCAVATION & EARTH WORKS				Total		49420	52	
	CARRIED TO SUMMARY								

BILL NO. 2

Page # 157

CONCRETE

Contractor #4Eng. Mazen haddad

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Plain concrete 18 N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Blinding; 100mm thick under foundations and tie beams.	393	m2	7	75	3045	75	4
B	Blinding; 50mm thick under slabs on grade.	430	m2	4	23	1818	90	3
C	Blinding: 100mm thick under external walls.	217	m2	7	75	1681	75	8
	Reinforced concrete 25N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
D	Foundations.	141	m3	112	68	15887	88	8
E	Tie beams	21	m3	119	73	2514	33	6
G	Column and Column Necks	81	m3	126	77	10268	37	4
H	Slab on grade, 100 mm thick, to building.	45	m3	8	45	380	25	4
J	Slab on grade, 100 mm thick, to external pavements.	35	m3	8	45	295	75	5
K	External basement walls	206	m3	105	64	21761	84	15
L	Water tank walls	52	m3	119	72	6225	44	8
M	External Foundations	48	m3	112	68	5408	64	7
N	External Walls	97	m3	105	64	10247	8	15
	Reinforced concrete 20N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Behind stone elevations	187	m3	65	41	12231	67	150
	To Collection		unit	$/	cent	**91767**	**65**	

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Reinforced cast in situ concrete (Grade 25), Cont'd								
A	Ribbed slabs,310 mm thick.		458	m3	119	72	54831	76	130
B	Staircases (steps and flights). In side		13	m3	140	85	1831	5	130
C	Staircases (steps and flights). Out side		11	m3	140	85	1549	35	20
	Deformed high yield steel bar reinforcement of420N/mm2 minimum yield strength, complete								
A	Various diameters, generally		110	Ton	845	8	92958	80	150
	Smooth mild steel bar reinforcement of 280 N/mm2 minimum yield strength, complete								
A	Y8 mm.		28	Ton	915	50	25634	0	150
					Total		**268572**	**61**	

	Contractor #4Eng. Mazen haddad						Page #	159	
	BILL NO. 3								
	BLOCK WORKS								
Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	BLOCK WORK								
	Hollow concrete blocks bedded and jointed in cement sand mortar (1:3) to:								
A	Walls; 100 mm thick		732	m2	7	5	5160	60	150
B	Walls; 150 mm thick		264	m2	10	0	2640	0	150
C	Walls; 200 mm thick		153	m2	15	50	2371	50	150
D	Hollow concrete rib block, size 400/360x200x240 mm high.		16266	nr		78	12687	48	150
E	Concrete block 100mm thick. Behind the insulation for external walls of basement		529	m2	6	34	3353	86	30
F	Concrete block 100mm thick. Behind the stone walls.		951	m2	7	5	6704	55	150
	TOTAL BLOCK WORKS								
	CARRIED TO SUMMARY					Total	32917	99	

	Contractor #4 Eng. Mazen haddad					Page #	160	
	BILL NO. 4							
	ROOFING AND INSULATION SYSTEMS							
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Foam concrete, minimum 50 mm thick laid to falls and cross falls including preparing top surfaces smooth to receive waterproofing membrane, complete							
A	To roofs.	430	m2	9	86	4239	80	7
	Cement sand screed, minimum 30mm thick laid to falls including forming angle fillets at perimeter and all abutments, complete							
B	To roofs.	430	m2	5	64	2425	20	8
	4mm thick torch applied modified bituminous water-proofing membrane; skirting with additional mineral chipping faced membrane tucked into grooves and pointed with mastic, including bitumen primer one coat, complete							
G	To roofs.	430	m2	11	27	4846	10	10
	To Collection		**$ / cent**			**11511**	**10**	

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	4mm thick torch applied modified bituminous polymer water-proofing membrane; reinforced with 180g/m² polyester, including bitumen primer, all necessary preparation and fixing works, complete							
A	For slabs on grade.	410	m2	7	5	2890	50	14
B	To basement walls	529	m2	9	86	5215	94	25
	PVC WATER STOP ACCORDING TO PLANS FOR WATER TANK WALLS	56	mr	14	9	789	4	5
	Damp proofing membrane comprising of two perpendicular coats of emulsified asphalt reinforced with non asbestos fibers, cold applied, complete according to manufacturer instructions and technical specifications							
F	To basement walls.	2650	m2	7	5	18682	50	26
	To Collection		**$ / cent**			**39089**	**8**	

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BILL NO. 5

MASONRY WORKS

Contractor #4 Eng. Mazen haddad

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	MASONRY WORK							
A	Local (AJLON) stone fixed to faces of concrete for all elevations.							
	First class no less than 50mm thick and 400mm length, 250mm hight.							
	stone colour shall be approved by the enginner.							
	corner stones, jambs, Lintels are included with the pure engieered m2 price.							
	The price included the form works and whatever needed to complete the work.							
	CASE(1)Mechanical push hammered face finish	1151	m2	59	16	68093	16	150
	CASE (2) light chisled face finish	unit	m2	59	16	68093	16	150
	CASE(3)Rough chirled face finish	unit	m2	59	16	68093	16	150
	CASE(4) (طبزة) FACE FINISH	unit	m2	77	47	89167	97	150
B	Stone coping (local AJLON) according to plans and architectural details300*50mm thik mechanical bush hammrerd curved.to walls and sills	356	mr	16	91	6019	96	15
C	**Approved first quality (KARAK) marble grey color; bedded on and including cement sand mortar (1:3); sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, using stainless anchor bolts and steel dowelsand and according with specifications 250mm hight x 50mm thick.**	95	m2	70	43	6690	85	150
D	**Ajlon local cornice stone380mm hight 215mm wide 40 mmthik .honed finish in accoordance to detalis fixd to walls .**	25	mr	63	38	1584	50	40
	TOTAL MASONARY WORKS			Total		**307742**	**76**	
	CARRIED TO SUMMARY							

	Contractor #4 Eng. Mazen haddad						**Page # 163**		
	BILL NO. 01								
	INTERNAL AND EXTERNAL FINISHES								
Item	**Description**		**Qty.**	**Unit**	**Rate**		**Amount**		**Duration**
					$	**cent**	**$**	**cent**	**Day**
	FLOOR FINISHES								
	Precast terrazzo tiles, natural color, bedded on sand including cement sand mortar (1:3), cleaning and polishing upon completion, selection to Engineer's approval:								
	To floors, size 400x100x30 mm thick for guards rooms		52	m^2	12	68	659	36	5
	Approved first quality JERUSALEM stone marble tiles bedded on and including cement sand mortar (1:3); pointing with neat tinted cement to match colour of marble; sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, complete								
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.		574	m^2	56	34	32339	16	9
B	To skirting size 600x100x6mm thick		360	mr	8	45	3042	0	6
	(STANDBY ITEM) DITTO BUT ITALIAN MARBLE.								
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.		574	m^2	70	42	40421	8	4
B	To skirting size 600X100X6mm thick		360	mr	11	27	4057	20	3
	Ditto but Omani or stone like ceramic tiles								
A	To floors 400x400x20 mm thick.		365	m^2	59	15	21589	75	6
B	To skirting size 300x100x6mm thick		247	mr	9	86	2435	42	5
	Imported Spanish (or equivalent) ceramic coloured floor tiles; natural color; laid on sand, including cement sand mortar (1:3) and pointing with approved grout, complete								
	To kitchens floors size 400x400x9 mm thick.		137	m^2	46	48	6367	76	5
	Ditto but EMIRATES R.A.K ceramic coloured floor tiles.								
A	To floors, size 300x300x9 mm thick for maids rooms		36	m^2	38	3	1369	8	2
B	To skirting, size 300x100x6 mm thick for maids rooms		43	mr	7	4	302	72	3
c	Ditto but local ceramic coloured floor tiles for Boiler and maids bathrooms 200x200x9 thick.		86	m^2	25	35	2180	10	6

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	One piece Jerusalem stone to steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	168	mr	49	30	8282	40	4
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	108	mr	11	27	1217	16	4
	One piece gravelled tiles to external steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	28	mr	30	99	867	72	3
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	25	mr	5	63	140	75	4
	Precast interlock concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions.							
A	To walkway at parking and ramps size 400x400x40 mm	333	m2	15	49	5158	17	12
B	Standby itme ditto but basalt stone	333	m^2	39	44	13133	52	10
	Precast concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions for external paving	163	m^2	12	68	2066	84	8
	WALL FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:							
A	To walls, internally.	7783	m^2	6	34	49344	22	97
B	To walls, internally behind ceramic walls.	1010	m^2	4	23	4272	30	28
C	To walls, internally for water tanks walls.	240	m^2	7	4	1689	60	9
D	To walls, externally.	270	m^2	6	34	1711	80	10

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Glazed imported SPANISH ceramic coloured wall tiles in plain and decorative colours, bedding and jointing on approved adhesive to plastered backing, pointing in matching coloured grout and special coved ceramic pieces for corners and skirting.Joints 3mm wide using spacers, all according to drawings, manufacturer and Engineer's instructions, complete.								
	To walls size 300x300x9 mm thick for Bathrooms		510	m^2	49	30	25143	0	8
	Ditto but to walls size 100x100x9 mm thick mosaic for kitchens.		320	m^2	56	34	18028	80	7
	Ditto but Jerusalem wall tiles for basement1 entrance complete		60	m^2	63	38	3802	80	4
	Ditto but local glazed colored ceramic wall tiles, complete								
A	To walls size 200x200x8 mm thick for Boiler		110	m^2	28	17	3098	70	5
B	To walls size 200x200x8 mm thick for maids rooms (white colour)		78	m^2	28	17	2197	26	4
	CEILING FINISHES								
	Three coats cement and sand (1:4) plastering; smooth finish as specified:		1828	m2	5	63	10291	64	34
	JERUSALEM stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking columns		35	m^2	84	51	2957	85	7
	JERUSALEM stone cladding, fixed to faces of concrete with 20mm thick with cement mortar in according to specifications and details drawings 350mm height for main entrances		36	m^2	84	51	3042	36	5
	AJLOON stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking walls and entrance		65	m^2	63	38	4119	70	7
	SUSPENDED CEILINGS 12mm thick gypsum board suspended ceiling panels finished with skim coat including concealed galvanized suspension system, stepped decorations, strips, drop, molding and all painting, fire retardant plywood backing (where necessary), access doors and making openings for different services, all as shown on drawings, complete		47	m2	16	90	794	30	4
	800mm*300mm height gypsum cornice suspend finished with skim coat including concealed galvanized suspension system, stepped decorations, molding and all painting, fire retardant making openings for different services, all as shown on drawings, complete for saloons, TV and dinning ceilings.		211	mr	9	86	2080	46	28
				Total carried to summary			278204	98	

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BILL NO. 04

PAINTING AND DECORATION

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	INTERNALLY							
	Emulsion PVA - based paint, matt finish for interior, quality in one priming coat and three finishing coats, for application to walls and ceilings, using full coverage putty, including all necessary preparation works and undercoats, application to all heights as required of works, all according to manufacturer (DELUXE or approved equivalent) instructions, complete							
	To walls	4783	m2	3	52	16836	16	70
	EXTERNALLY							
	Resin base waterproofing acrylic textured decorative coating (the binder shall be pure acrylic) pigments and binders are resistant to weather pollution ...etc., including all necessary preparation work and under coats, complete							
	To exterior walls	265	m2	4	23	1120	95	25
	To walls at roof	196	m2	4	23	829	8	17
	Non-toxic epoxy paint including primer all as specified, complete to floor, walls and ceiling of water tanks	328	m2	7	4	2309	12	20
	Total carried to summary					**21095**	**31**	

Contractor #4 Eng. Mazen haddad

page # 167

BILL NO. 5

FITTINGS AND EQUIPMENTS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	CORNER GUARDS							
	supply and fix rubber corner guards for columns at parking areas, fixed with stainless steel flathead fastener flush and plastic cement adhesive according to manufacturer instructions and detailed drawing.							
	100x100 mm, 1200 mm height	4	nr.	28	17	112	68	8
	Mirrors							
	6mm thick mirrors with 20 mm stainless steel frame including 8mm thick plywood backing, all as shown on drawings and as specified, complete							
A	Size 1050 x 2600 mm high.	2	nr	84	51	169	2	3
B	Size 1600 x 1300 mm high.	3	nr	70	42	211	26	5
C	Size 800 x 1300 mm high.	19	nr	56	34	1070	46	10
	VANITY COUNTER							
	Local KARAK marble countertop 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing, cutting openings, silicon mastic sealing and all associated works, complete as detailed on drawings and to Engineers approval, complete							
A	size 1700 x 600 mm wide	2	nr	774	65	1549	30	2
B	size 2800 x 600 mm wide	1	nr	915	49	915	49	1
C	size 2000 x 600 mm wide	1	nr	845	7	845	7	1
D	size 1800 x 600 mm wide	1	nr	774	65	774	65	1
E	size 1200 x 600 mm wide	2	nr	633	80	1267	60	2
F	size 2200 x 600 mm wide	2	nr	845	7	1690	14	2
G	size 1900 x 600 mm wide	3	nr	845	7	2535	21	3
H	size 2600 x 600 mm wide	1	nr	985	92	985	92	1
	Total carried to summary					**12126**	**80**	

	Contractor #4 Eng. Mazen haddad						**Page # 168**		
	BILL NO. 6								
	Planting								
Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones as per drawings.		254	m3	21	13	5367	2	22
			Total carried to summary				5367	2	

APPENDIX 5 Page # 169

Contractor # 5 Eng. Baker Alnabulsi

BILL NO. 1

EXCAVATION AND EARTH WORKS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	EXCAVATION AND EARTH WORKS							
	Excavation starting at existing ground level including removal of surplus excavated materials:							
A	Excavation To foundations Levels	3.825	m3	7	4	26928	0	9
B	Excavation for external works.	683	m3	5	63	3845	29	7
	Filling, laid and compacted in layers:							
A	Approved filling inside building.	540	m3	14	8	7603	20	10
B	Approved filling outside building.	736	m3	11	26	8287	36	10
	Crushed aggregate base course, compacted to 100% modified AASHTO density CBR ≥ 80%, complete							
A	200 mm thickn inside building	410	m2	16	90	6929	0	6
	TOTAL EXCAVATION & EARTH WORKS CARRIED TO SUMMARY			**Total**		**53592**	**85**	

	BILL NO. 2							Page # 170
	CONCRETE							
	Contractor # 5 Eng. Baker Alnabulsi							
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Plain concrete 18 N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Blinding; 100mm thick under foundations and tie beams.	393	m2	7	74	3041	82	5
B	Blinding; 50mm thick under slabs on grade.	430	m2	9	85	4235	50	4
C	Blinding: 100mm thick under external walls.	217	m2	8	45	1833	65	10
	Reinforced concrete 25N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
D	Foundations.	141	m3	98	59	13901	19	10
E	Tie beams	21	m3	98	59	2070	39	8
G	Column and Column Necks	81	m3	105	63	8556	3	5
H	Slab on grade, 100 mm thick, to building.	45	m3	105	63	4753	35	4
J	Slab on grade, 100 mm thick, to external pavements.	35	m3	105	63	3697	5	6
K	External basement walls	206	m3	56	33	11603	98	20
L	Water tank walls	52	m3	112	67	5858	84	10
M	External Foundations	48	m3	112	67	5408	16	8
N	External Walls	97	m3	105	63	10246	11	14
	Reinforced concrete 20N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Behind stone elevations	187	m3	77	46	14485	2	160
	To Collection		**unit**	**$**	**cent**	**89691**	**9**	

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Reinforced cast in situ concrete (Grade 25), Cont'd							
A	Ribbed slabs,310 mm thick.	458	m3	105	63	48378	54	140
B	Staircases (steps and flights). In side	13	m3	112	67	1464	71	135
C	Staircases (steps and flights). Out side	11	m3	119	71	1316	81	18
	Deformed high yield steel bar reinforcement of420N/mm2 minimum yield strength, complete							
A	Various diameters, generally	110	Ton	760	56	83661	60	145
	Smooth mild steel bar reinforcement of 280 N/mm2 minimum yield strength, complete							
A	Y8 mm.	28	Ton	774	64	21689	92	145
				Total		**162541**	**7**	

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BILL NO. 3
BLOCK WORKS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	BLOCK WORK							
	Hollow concrete blocks bedded and jointed in cement sand mortar (1:3) to:							
A	Walls; 100 mm thick	732	m2	8	45	6185	40	160
B	Walls; 150 mm thick	264	m2	9	85	2600	40	160
C	Walls; 200 mm thick	153	m2	11	26	1722	78	160
D	**Hollow concrete rib block, size 400/360x200x240 mm high.**	16266	nr	0	70	11386	20	160
E	Concrete block 100mm thick. Behind the insulation for external walls of basement	529	m2	9	85	5210	65	30
F	Concrete block 100mm thick. Behind the stone walls.	951	m2	11	26	10708	26	160
	TOTAL BLOCK WORKS							
	CARRIED TO SUMMARY				Total	**37813**	**69**	

Contractor # 5 Eng. Baker Alnabulsi **Page # 173**

BILL NO. 4

ROOFING AND INSULATION SYSTEMS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Foam concrete, minimum 50 mm thick laid to falls and cross falls including preparing top surfaces smooth to receive waterproofing membrane, complete							
A	To roofs.	430	m2	11	26	4841	80	7
	Cement sand screed, minimum 30mm thick laid to falls including forming angle fillets at perimeter and all abutments, complete							
B	To roofs.	430	m2	5	63	2420	90	10
	4mm thick torch applied modified bituminous water- proofing membrane; skirting with additional mineral chipping faced membrane tucked into grooves and pointed with mastic, including bitumen primer one coat, complete							
G	To roofs.	430	m2	7	4	3027	20	12
	To Collection		$ / cent			10289	90	
	4mm thick torch applied modified bituminous polymer water-proofing membrane; reinforced with 180g/m^2 polyester, including bitumen primer, all necessary preparation and fixing works, complete							
A	For slabs on grade.	410	m2	8	45	3464	50	12
B	To basement walls	529	m2	8	45	4470	5	25

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	PVC WATER STOP ACCORDING TO PLANS FOR WATER TANK WALLS		56	mr	5	63	315	28	4
	Damp proofing membrane comprising of two perpendicular coats of emulsified asphalt reinforced with non asbestos fibers, cold applied, complete according to manufacturer instructions and technical specifications								
F	To basement walls.		2650	m2	7	4	18656	0	25
		To Collection		$/cent			**37195**	**73**	

Contractor # 5 Eng. Baker Alnabulsi **Page # 175**

BILL NO. 5

MASONRY WORKS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	MASONRY WORK							
A	Local (AJLON) stone fixed to faces of concrete for all elevations.							
	First class no less than 50mm thick and 400mm length, 250mm hight.							
	stone colour shall be approved by the engineer.							
	corner stones, jambs, Lintels are included with the pure engieered m2 price.							
	The price included the form works and whatever needed to complete the work.							
	CASE(1)Mechanical push hammered face finish	1151	m2	49	29	56732	79	160
	CASE (2) light chisled face finish	unit	m2	49	29	56732	79	160
	CASE(3)Rough chirled face finish	unit	m2	42	25	48629	75	160
	CASE(4) (طبزة) FACE FINISH	unit	m2	90	14	103751	14	160
B	Stone coping (local AJLON) according to plans and architectural details300*50mm thik mechanical bush hammrerd curved.to walls and sills	356	mr	35	21	12534	76	16
C	**Approved first quality (KARAK) marble grey color; bedded on and including cement sand mortar (1:3); sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, using stainless anchor bolts and steel dowelsand and according with specifications 250mm hight x 50mm thick.**	95	m2	84	50	8027	50	160
D	**Ajlon local cornice stone380mm hight 215mm wide 40 mmthik .honed finish in accoordance to detalis fixd to walls .**	25	mr	35	21	880	25	40
	TOTAL MASONARY WORKS			**Total**		**287288**	**98**	
	CARRIED TO SUMMARY							

Contractor # 5 Eng. Baker Alnabulsi

BILL NO. 01

INTERNAL AND EXTERNAL FINISHES

Item	Description	Qty.	Unit	Rate		Amount		Duration Day
				$	cent	$	cent	
	FLOOR FINISHES							
	Precast terrazzo tiles, natural color, bedded on sand including cement sand mortar (1:3), cleaning and polishing upon completion, selection to Engineer's approval:							
	To floors, size 400x100x30 mm thick for guards rooms	52	m^2	14	8	732	16	4
	Approved first quality JERUSALEM stone marble tiles bedded on and including cement sand mortar (1:3); pointing with neat tinted cement to match colour of marble; sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, complete							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	49	29	28292	46	8
B	To skirting size 600x100x6mm thick	360	mr	4	22	1519	20	5
	(STANDBY ITEM) DITTO BUT ITALIAN MARBLE.							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	63	38	36380	12	5
B	To skirting size 600X100X6mm thick	360	mr	7	4	2534	40	4
	Ditto but Omani or stone like ceramic tiles							
A	To floors 400x400x20 mm thick.	365	m^2	49	29	17990	85	4
B	To skirting size 300x100x6mm thick	247	mr	5	63	1390	61	3
	Imported Spanish (or equivalent) ceramic coloured floor tiles; natural color; laid on sand, including cement sand mortar (1:3) and pointing with approved grout, complete							
	To kitchens floors size 400x400x9 mm thick.	137	m^2	35	21	4823	77	7
	Ditto but EMIRATES R.A.K ceramic coloured floor tiles.							
A	To floors, size 300x300x9 mm thick for maids rooms	36	m^2	28	16	1013	76	3
B	To skirting, size 300x100x6 mm thick for maids rooms	43	mr	4	22	181	46	2
c	Ditto but local ceramic coloured floor tiles for Boiler and maids bathrooms 200x200x9 thick.	86	m^2	18	30	1573	80	5
	One piece Jerusalem stone to steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	168	mr	25	35	4258	80	5
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	108	mr	12	67	1368	36	3

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	One piece gravelled tiles to external steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	28	mr	28	16	788	48	5
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	25	mr	7	4	176	0	3
	Precast interlock concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions.							
A	To walkway at parking and ramps size 400x400x40 mm	333	m2	14	8	4688	64	10
B	**Standby itme ditto but basalt stone**	333	m^2	12	67	4219	11	13
	Precast concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions for external paving	163	m^2	14	8	2295	4	10
	WALL FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:							
A	To walls, internally.	7783	m^2	7	4	54792	32	100
B	To walls, internally behind ceramic walls.	1010	m^2	6	33	6393	30	30
C	To walls, internally for water tanks walls.	240	m^2	5	63	1351	20	10
D	To walls, externally.	270	m^2	5	63	1520	10	9
	Glazed imported SPANISH ceramic coloured wall tiles in plain and decorative colours, bedding and jointing on approved adhesive to plastered backing, pointing in matching coloured grout and special coved ceramic pieces for corners and skirting.Joints 3mm wide using spacers, all according to drawings, manufacturer and Engineer's instructions, complete.							
	To walls size 300x300x9 mm thick for Bathrooms	510	m^2	30	98	15799	80	9
	Ditto but to walls size 100x100x9 mm thick mosaic for kitchens.	320	m^2	36	61	11715	20	8
	Ditto but Jerusalem wall tiles for basement1 entrance complete	60	m^2	30	98	1858	80	3
	Ditto but local glazed colored ceramic wall tiles, complete							
A	To walls size 200x200x8 mm thick for Boiler	110	m^2	21	12	2323	20	6
B	To walls size 200x200x8 mm thick for maids rooms (white colour)	78	m^2	21	12	1647	36	5

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	CEILING FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:	1828	m2	7	4	12869	12	35
	JERUSALEM stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking columns	35	m^2	91	54	3203	90	6
	JERUSALEM stone cladding, fixed to faces of concrete with 20mm thick with cement mortar in according to specifications and details drawings 350mm height for main entrances	36	m^2	63	38	143745	84	4
	AJLOON stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking walls and entrance	65	m^2	63	38	4119	70	8
	SUSPENDED CEILINGS							
	12mm thick gypsum board suspended ceiling panels finished with skim coat including concealed galvanized suspension system, stepped decorations, strips, drop, molding and all painting, fire retardant plywood backing (where necessary), access doors and making openings for different services, all as shown on drawings, complete	47	m2	22	53	1058	91	5
	800mm*300mm height gypsum cornice suspend finished with skim coat including concealed galvanized suspension system, stepped decorations, molding and all painting, fire retardant making openings for different services, all as shown on drawings, complete for saloons, TV and dinning ceilings.	211	mr	25	35	5348	85	30
				Total carried to summary		381974	62	

Contractor # 5 Eng. Baker Alnabulsi **Page # 179**

BILL NO. 04
PAINTING AND DECORATION

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	INTERNALLY							
	Emulsion PVA - based paint, matt finish for interior, quality in one priming coat and three finishing coats, for application to walls and ceilings, using full coverage putty, including all necessary preparation works and undercoats, application to all heights as required of works, all according to manufacturer (DELUXE or approved equivalent) instructions, complete							
	To walls	4783	m2	3	52	16836	16	67
	EXTERNALLY							
	Resin base waterproofing acrylic textured decorative coating (the binder shall be pure acrylic) pigments and binders are resistant to weather pollution ...etc., including all necessary preparation work and under coats, complete							
	To exterior walls	265	m2	7	74	2051	10	21
	To walls at roof	196	m2	7	4	1379	84	18
	Non-toxic epoxy paint including primer all as specified, complete to floor, walls and ceiling of water tanks	328	m2	4	92	1613	76	24
	Total carried to summary					**21880**	**86**	

Contractor # 5 Eng. Baker Alnabulsi

BILL NO. 5

FITTINGS AND EQUIPMENTS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	CORNER GUARDS							
	supply and fix rubber corner guards for columns at parking areas, fixed with stainless steel flathead fastener flush and plastic cement adhesive according to manufacturer instructions and detailed drawing.							
	100x100 mm, 1200 mm height	4	nr.	197	18	788	72	8
	Mirrors							
	6mm thick mirrors with 20 mm stainless steel frame including 8mm thick plywood backing, all as shown on drawings and as specified, complete							
A	Size 1050 x 2600 mm high.	2	nr	492	95	985	90	5
B	Size 1600 x 1300 mm high.	3	nr	450	70	1352	10	4
C	Size 800 x 1300 mm high.	19	nr	309	85	5887	15	10
	VANITY COUNTER							
	Local KARAK marble countertop 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing, cutting openings, silicon mastic sealing and all associated works, complete as detailed on drawings and to Engineers approval, complete							
A	size 1700 x 600 mm wide	2	nr	633	80	1267	60	2
B	size 2800 x 600 mm wide	1	nr	732	39	732	39	1
C	size 2000 x 600 mm wide	1	nr	492	95	492	95	1
D	size 1800 x 600 mm wide	1	nr	563	38	563	38	1
E	size 1200 x 600 mm wide	2	nr	464	78	929	56	2
F	size 2200 x 600 mm wide	2	nr	633	80	1267	60	2
G	size 1900 x 600 mm wide	3	nr	549	29	1647	87	3
H	size 2600 x 600 mm wide	1	nr	676	5	676	5	1
				Total carried to summary		**16591**	**27**	

Contractor # 5 Eng. Baker Alnabulsi **Page # 181**

BILL NO. 6

Planting

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones as per drawings.	254	m3	9	85	2501	90	25
	Total carried to summary					**2501**	**90**	

APPENDIX 6 — **Page # 182**

Contractor # 6 Eng. Yousif Hussein Saleh

BILL NO. 1

EXCAVATION AND EARTH WORKS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	EXCAVATION AND EARTH WORKS							
	Excavation starting at existing ground level including removal of surplus excavated materials:							
A	Excavation To foundations Levels	3.825	m3	7	4	26928	0	8
B	Excavation for external works.	683	m3	9	86	6734	38	5
	Filling, laid and compacted in layers:							
A	Approved filling inside building.	540	m3	11	27	6085	80	7
B	Approved filling outside building.	736	m3	11	27	8294	72	7
	Crushed aggregate base course, compacted to 100% modified AASHTO density CBR ≥ 80%, complete							
A	200 mm thickn inside building	410	m2	3	52	1443	20	4
	TOTAL EXCAVATION & EARTH WORKS			**Total**		**49486**	**10**	
	CARRIED TO SUMMARY							

BILL NO. 2

CONCRETE

Contractor # 6 Eng. Yousif Hussein Saleh

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Plain concrete 18 N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Blinding; 100mm thick under foundations and tie beams.	393	m2	7	75	3045	75	4
B	Blinding; 50mm thick under slabs on grade.	430	m2	4	23	1818	90	3
C	Blinding: 100mm thick under external walls.	217	m2	7	75	1681	75	8
	Reinforced concrete 25N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
D	Foundations.	141	m3	112	68	15887	88	8
E	Tie beams	21	m3	119	72	2514	12	6
G	Column and Column Necks	81	m3	140	85	11408	85	4
H	Slab on grade, 100 mm thick, to building.	45	m3	8	45	380	25	4
J	Slab on grade, 100 mm thick, to external pavements.	35	m3	8	45	295	75	5
K	External basement walls	206	m3	105	63	21759	78	15
L	Water tank walls	52	m3	119	72	6225	44	8
M	External Foundations	48	m3	112	68	5408	64	7
N	External Walls	97	m3	105	63	10246	11	15
	Reinforced concrete 20N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Behind stone elevations	187	m3	70	42	13168	54	150
	To Collection		**$/cent**			**82432**	**91**	

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Reinforced cast in situ concrete (Grade 25), Cont'd								
A	Ribbed slabs,310 mm thick.		458	m3	119	72	54831	76	130
B	Staircases (steps and flights). In side		13	m3	140	85	1831	5	130
C	Staircases (steps and flights). Out side		11	m3	140	85	1549	35	20
	Deformed high yield steel bar reinforcement of420N/mm2 minimum yield strength, complete								
A	Various diameters, generally		110	Ton	901	41	99155	10	150
	Smooth mild steel bar reinforcement of 280 N/mm2 minimum yield strength, complete								
A	Y8 mm.		28	Ton	1000	0	28000	0	150
					Total		**267800**	**17**	

	Contractor # 6 Eng. Yousif Hussein Saleh						Page # 185		
	BILL NO. 3								
	BLOCK WORKS								
Item	Description	Qty.	Unit	Rate		Amount		Duration	
				$	cent	$	cent	Day	
	BLOCK WORK								
	Hollow concrete blocks bedded and jointed in cement sand mortar (1:3) to:								
A	Walls; 100 mm thick	732	m2	8	45	6185	40	20	
B	Walls; 150 mm thick	264	m2	10	56	2787	84	9	
C	Walls; 200 mm thick	153	m2	12	68	1940	4	5	
D	Hollow concrete rib block, size 400/360x200x240 mm high.	16266	nr	1	0	16266	0	15	
E	Concrete block 100mm thick. Behind the insulation for external walls of basement	529	m2	7	75	4099	75	18	
F	Concrete block 100mm thick. Behind the stone walls.	951	m2	7	75	7370	25	25	
	TOTAL BLOCK WORKS								
	CARRIED TO SUMMARY				Total	38649	28		

	Contractor # 6 Eng. Yousif Hussein Saleh						Page # 186		
	BILL NO. 4								
	ROOFING AND INSULATION SYSTEMS								
Item	Description	Qty.	Unit	Rate		Amount		Duration	
				$	cent	$	cent	Day	
	Foam concrete, minimum 50 mm thick laid to falls and cross falls including preparing top surfaces smooth to receive waterproofing membrane, complete								
A	To roofs.	430	m2	7	4	3027	20	9	
	Cement sand screed, minimum 30mm thick laid to falls including forming angle fillets at perimeter and all abutments, complete								
B	To roofs.	430	m2	3	52	1513	60	11	
	4mm thick torch applied modified bituminous water-proofing membrane; skirting with additional mineral chipping faced membrane tucked into grooves and pointed with mastic, including bitumen primer one coat, complete								
G	To roofs.	430	m2	9	86	4239	80	9	
	To Collection		$/cent			8780	60		

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	4mm thick torch applied modified bituminous polymer water- proofing membrane; reinforced with 180g/m^2 polyester, including bitumen primer, all necessary preparation and fixing works, complete							
A	For slabs on grade.	410	m2	6	34	2599	40	11
B	To basement walls	529	m2	9	86	5215	94	22
	PVC WATER STOP ACCORDING TO PLANS FOR WATER TANK WALLS	56	mr	15	49	867	44	3
	Damp proofing membrane comprising of two perpendicular coats of emulsified asphalt reinforced with non asbestos fibers, cold applied, complete according to manufacturer instructions and technical specifications							
F	To basement walls.	2650	m2	5	63	14919	50	23
	To Collection		**$ / cent**			**32382**	**88**	

	Contractor # 6 Eng. Yousif Hussein Saleh					Page # 188		
	BILL NO. 5							
	MASONRY WORKS							
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	MASONRY WORK							
A	Local (AJLON) stone fixed to faces of concrete for all elevations.							
	First class no less than 50mm thick and 400mm length, 250mm hight.							
	stone colour shall be approved by the enginner.							
	corner stones, jambs, Lintels are included with the pure engieered m2 price.							
	The price included the form works and whatever needed to complete the work.							
	CASE(1)Mechanical push hammered face finish	1151	m2	63	38	72950	38	150
	CASE (2) light chisled face finish	unit	m2	67	61	77819	11	150
	CASE(3)Rough chirled face finish	unit	m2	67	61	77819	11	150
	CASE(4) (طيزة) FACE FINISH	unit	m2	70	42	81053	42	150
B	Stone coping (local AJLON) according to plans and architectural details300*50mm thik mechanical bush hammrerd curved.to walls and sills	356	mr	70	42	25069	52	30
c	**Approved first quality (KARAK) marble grey color; bedded on and including cement sand mortar (1:3); sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, using stainless anchor bolts and steel dowelsand and according with specifications 250mm hight x 50mm thick.**	95	m2	42	25	4013	75	15
D	**Ajlon local cornice stone380mm hight 215mm wide 40 mmthik .honed finish in accoordance to detalis fixd to walls .**	25	mr	49	30	1232	50	10
	TOTAL MASONARY WORKS			**Total**		**339957**	**79**	
	CARRIED TO SUMMARY							

Contractor # 6 Eng. Yousif Hussein Saleh — Page # 189

BILL NO. 01

INTERNAL AND EXTERNAL FINISHES

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	FLOOR FINISHES							
	Precast terrazzo tiles, natural color, bedded on sand including cement sand mortar (1:3), cleaning and polishing upon completion, selection to Engineer's approval:							
	To floors, size 400x100x30 mm thick for guards rooms	52	m^2	15	49	805	48	2
	Approved first quality JERUSALEM stone marble tiles bedded on and including cement sand mortar (1:3); pointing with neat tinted cement to match colour of marble; sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, complete							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	42	25	24251	50	6
B	To skirting size 600x100x6mm thick	360	mr	4	23	1522	80	3
	(STANDBY ITEM) DITTO BUT ITALIAN MARBLE.							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	70	42	40421	8	6
B	To skirting size 600X100X6mm thick	360	mr	7	4	2534	40	3
	Ditto but Omani or stone like ceramic tiles							
A	To floors 400x400x20 mm thick.	365	m^2	56	34	20564	10	5
B	To skirting size 300x100x6mm thick	247	mr	5	63	1390	61	4
	Imported Spanish (or equivalent) ceramic coloured floor tiles; natural color; laid on sand, including cement sand mortar (1:3) and pointing with approved grout, complete							
	To kitchens floors size 400x400x9 mm thick.	137	m^2	28	17	3859	29	5
	Ditto but EMIRATES R.A.K ceramic coloured floor tiles.							
A	To floors, size 300x300x9 mm thick for maids rooms	36	m^2	25	35	912	60	3
B	To skirting, size 300x100x6 mm thick for maids rooms	43	mr	5	63	242	9	2
c	Ditto but local ceramic coloured floor tiles for Boiler and maids bathrooms 200x200x9 thick.	86	m^2	16	90	1453	40	4
	One piece Jerusalem stone to steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	168	mr	28	17	4732	56	5
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	108	mr	11	27	1217	16	3

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	One piece gravelled tiles to external steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	28	mr	21	13	591	64	3
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	25	mr	9	86	246	50	2
	Precast interlock concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions.							
A	To walkway at parking and ramps size 400x400x40 mm	333	m2	12	68	4222	44	10
B	**Standby itme ditto but basalt stone**	333	m^2	16	90	5627	70	10
	Precast concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions for external paving	163	m^2	14	8	2295	4	8
	WALL FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:							
A	To walls, internally.	7783	m^2	5	63	43818	29	90
B	To walls, internally behind ceramic walls.	1010	m^2	5	63	5686	30	30
C	To walls, internally for water tanks walls.	240	m^2	7	4	1689	60	10
D	To walls, externally.	270	m^2	7	4	1900	80	12
	Glazed imported SPANISH ceramic coloured wall tiles in plain and decorative colours, bedding and jointing on approved adhesive to plastered backing, pointing in matching coloured grout and special coved ceramic pieces for corners and skirting.Joints 3mm wide using spacers, all according to drawings, manufacturer and Engineer's instructions, complete.							
	To walls size 300x300x9 mm thick for Bathrooms	510	m^2	28	17	14366	70	10
	Ditto but to walls size 100x100x9 mm thick mosaic for kitchens.	320	m^2	35	21	11267	20	10
	Ditto but Jerusalem wall tiles for basement1 entrance complete	60	m^2	28	17	1690	20	3
	Ditto but local glazed colored ceramic wall tiles, complete							
A	To walls size 200x200x8 mm thick for Boiler	110	m^2	22	54	2479	40	5
B	To walls size 200x200x8 mm thick for maids rooms (white colour)	78	m^2	22	54	1758	12	4

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	CEILING FINISHES								
	Three coats cement and sand (1:4) plastering; smooth finish as specified:		1828	m2	8	45	15446	60	30
	JERUSALEM stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking columns		35	m^2	84	51	2957	85	5
	JERUSALEM stone cladding, fixed to faces of concrete with 20mm thick with cement mortar in according to specifications and details drawings 350mm height for main entrances		36	m^2	64	79	2332	44	3
	AJLOON stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking walls and entrance		65	m^2	64	79	4211	35	5
	SUSPENDED CEILINGS **12mm thick gypsum board suspended ceiling panels finished with skim coat including concealed galvanized suspension system, stepped decorations, strips, drop, molding and all painting, fire retardant plywood backing (where necessary), access doors and making openings for different services, all as shown on drawings, complete**		47	m2	21	13	993	11	5
	800mm*300mm height gypsum cornice suspend finished with skim coat including concealed galvanized suspension system, stepped decorations, molding and all painting, fire retardant making openings for different services, all as shown on drawings, complete for saloons, TV and dinning ceilings.		211	mr	28	17	5943	87	20
							233432	**22**	
					Total carried to summary				

Contractor # 6 Eng. Yousif Hussein Saleh — **Page # 192**

BILL NO. 04

PAINTING AND DECORATION

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	INTERNALLY							
	Emulsion PVA - based paint, matt finish for interior, quality in one priming coat and three finishing coats, for application to walls and ceilings, using full coverage putty, including all necessary preparation works and undercoats, application to all heights as required of works, all according to manufacturer (DELUXE or approved equivalent) instructions, complete							
	To walls	4783	m2	2	82	13488	6	60
	EXTERNALLY							
	Resin base waterproofing acrylic textured decorative coating (the binder shall be pure acrylic) pigments and binders are resistant to weather pollution ...etc., including all necessary preparation work and under coats, complete							
	To exterior walls	265	m2	7	4	1865	60	20
	To walls at roof	196	m2	7	4	1379	84	18
	Non-toxic epoxy paint including primer all as specified, complete to floor, walls and ceiling of water tanks	328	m2	5	63	1846	64	25
		Total carried to summary				**18580**	**14**	

Contractor # 6 Eng. Yousif Hussein Saleh **Page # 193**

BILL NO. 5

FITTINGS AND EQUIPMENTS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	CORNER GUARDS							
	supply and fix rubber corner guards for columns at parking areas, fixed with stainless steel flathead fastener flush and plastic cement adhesive according to manufacturer instructions and detailed drawing.							
	100x100 mm, 1200 mm height	4	nr.	225	35	901	40	6
	Mirrors							
	6mm thick mirrors with 20 mm stainless steel frame including 8mm thick plywood backing, all as shown on drawings and as specified, complete							
A	Size 1050 x 2600 mm high.	2	nr	598	59	1197	18	4
B	Size 1600 x 1300 mm high.	3	nr	394	37	1183	11	3
C	Size 800 x 1300 mm high.	19	nr	253	52	4816	88	7
	VANITY COUNTER							
	Local KARAK marble countertop 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing, cutting openings, silicon mastic sealing and all associated works, complete as detailed on drawings and to Engineers approval, complete							
A	size 1700 x 600 mm wide	2	nr	563	38	1126	76	2
B	size 2800 x 600 mm wide	1	nr	704	23	704	23	1

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
C	size 2000 x 600 mm wide		1	nr	591	55	591	55	1
D	size 1800 x 600 mm wide		1	nr	563	38	563	38	1
E	size 1200 x 600 mm wide		2	nr	535	21	1070	42	2
F	size 2200 x 600 mm wide		2	nr	704	23	1408	46	2
G	size 1900 x 600 mm wide		3	nr	633	80	1901	40	3
H	size 2600 x 600 mm wide		1	nr	704	23	704	23	1
	Total carried to summary						**16169**	**0**	

Contractor # 6 Eng. Yousif Hussein Saleh — Page # 195

BILL NO. 6

Planting

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones as per drawings.	254	m3	14	8	3576	32	23
	Total carried to summary					3576	32	

	APPENDIX 7						Page # 196			
	Contractor #7 Eng. Waheed Abu Hamza									
	BILL NO. 1									
	EXCAVATION AND EARTH WORKS									
Item	Description		Qty.	Unit	Rate		Amount		Duration	
					$	cent	$	cent	Day	
	EXCAVATION AND EARTH WORKS									
	Excavation starting at existing ground level including removal of surplus excavated materials:									
A	Excavation To foundations Levels		3.825	m3	6	34	24250	50	12	
B	Excavation for external works.		683	m3	5	63	3845	29	7	
	Filling, laid and compacted in layers:									
A	Approved filling inside building.		540	m3	11	27	6085	80	12	
B	Approved filling outside building.		736	m3	11	27	8294	72	15	
	Crushed aggregate base course, compacted to 100% modified AASHTO density CBR ≥ 80%, complete									
A	200 mm thickn inside building		410	m2	3	52	1443	20	5	
	TOTAL EXCAVATION & EARTH WORKS				Total		43919	51		
	CARRIED TO SUMMARY									

	BILL NO. 2							Page #197
	CONCRETE							
	Contractor #7 Eng. Waheed Abu Hamza							
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Plain concrete 18 N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Blinding; 100mm thick under foundations and tie beams.	393	m2	119	72	47049	96	20
B	Blinding; 50mm thick under slabs on grade.	430	m2	84	51	36339	30	5
C	Blinding: 100mm thick under external walls.	217	m2	91	55	19866	35	6
	Reinforced concrete 25N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
D	Foundations.	141	m3	112	68	15887	88	7
E	Tie beams	21	m3	112	68	2366	28	3
G	Column and Column Necks	81	m3	126	76	10267	56	10
H	Slab on grade, 100 mm thick, to building.	45	m3	105	63	4753	35	5
J	Slab on grade, 100 mm thick, to external pavements.	35	m3	105	63	3697	5	5
K	External basement walls	206	m3	119	72	24662	32	12
L	Water tank walls	52	m3	126	76	6591	52	8
M	External Foundations	48	m3	119	72	5746	56	7
N	External Walls	97	m3	119	72	11612	84	7
	Reinforced concrete 20N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Behind stone elevations	187	m3	112	68	21071	16	60
	To Collection			**$ / cent**		**209912**	**13**	

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Reinforced cast in situ concrete (Grade 25), Cont'd							
A	Ribbed slabs,310 mm thick.	458	m3	119	72	54831	76	10
B	Staircases (steps and flights). In side	13	m3	126	76	1647	88	4
C	Staircases (steps and flights). Out side	11	m3	126	76	1394	36	4
	Deformed high yield steel bar reinforcement of420N/mm2 minimum yield strength, complete							
A	Various diameters, generally	110	Ton	887	32	97605	20	45
	Smooth mild steel bar reinforcement of 280 N/mm2 minimum yield strength, complete							
A	Y8 mm.	28	Ton	929	58	26028	24	20
				Total		**391419**	**57**	

	Contractor #7 Eng. Waheed Abu Hamza						Page # 199		
	BILL NO. 3								
	BLOCK WORKS								
Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	BLOCK WORK								
	Hollow concrete blocks bedded and jointed in cement sand mortar (1:3) to:								
A	Walls; 100 mm thick		732	m2	10	57	7737	24	15
B	Walls; 150 mm thick		264	m2	12	68	3347	52	5
C	Walls; 200 mm thick		153	m2	14	79	2262	87	3
D	Hollow concrete rib block, size 400/360x200x240 mm high.		16266	nr	1	0	16266	0	8
E	Concrete block 100mm thick. Behind the insulation for external walls of basement		529	m2	10	57	5591	53	10
F	Concrete block 100mm thick. Behind the stone walls.		951	m2	10	57	10052	7	17
	TOTAL BLOCK WORKS								
	CARRIED TO SUMMARY					Total	45257	23	

	Contractor #7 Eng. Waheed Abu Hamza						Page # 200		
	BILL NO. 4								
	ROOFING AND INSULATION SYSTEMS								
Item	Description	Qty.	Unit	Rate		Amount		Duration	
				$	cent	$	cent	Day	
	Foam concrete, minimum 50 mm thick laid to falls and cross falls including preparing top surfaces smooth to receive waterproofing membrane, complete								
A	To roofs.	430	m2	9	86	4239	80	7	
	Cement sand screed, minimum 30mm thick laid to falls including forming angle fillets at perimeter and all abutments, complete								
B	To roofs.	430	m2	7	5	3031	50	7	
	4mm thick torch applied modified bituminous water- proofing membrane; skirting with additional mineral chipping faced membrane tucked into grooves and pointed with mastic, including bitumen primer one coat, complete								
G	To roofs.	430	m2	6	34	2726	20	5	
	To Collection		$ / cent			9997	50		

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	4mm thick torch applied modified bituminous polymer water- proofing membrane; reinforced with 180g/m² polyester, including bitumen primer, all necessary preparation and fixing works, complete							
A	For slabs on grade.	410	m2	5	64	2312	40	5
B	To basement walls	529	m2	5	64	2983	56	7
	PVC WATER STOP ACCORDING TO PLANS FOR WATER TANK WALLS	56	mr	6	34	355	4	5
	Damp proofing membrane comprising of two perpendicular coats of emulsified asphalt reinforced with non asbestos fibers, cold applied, complete according to manufacturer instructions and technical specifications							
F	To basement walls.	2650	m2	5	64	14946	0	19
	To Collection		**$ / cent**			**30594**	**50**	

	BILL NO. 5								**Page # 202**
	MASONRY WORKS								
	Contractor #7 Eng. Waheed Abu Hamza								
Item	**Description**		**Qty.**	**Unit**	**Rate**		**Amount**		**Duration**
					$	**cent**	**$**	**cent**	**Day**
	MASONRY WORK								
A	Local (AJLON) stone fixed to faces of concrete for all elevations.								
	First class no less than 50mm thick and 400mm length, 250mm hight.								
	stone colour shall be approved by the enginner.								
	corner stones, jambs, Lintels are included with the pure engieered m2 price.								
	The price included the form works and whatever needed to complete the work.								
	CASE(1)Mechanical push hammered face finish		1151	m2	45	78	52692	78	62
	CASE (2) light chisled face finish		unit	m2	45	78	52692	78	62
	CASE(3)Rough chirled face finish		unit	m2	45	78	52692	78	62
	CASE(4) (طبزة) FACE FINISH		unit	m2	63	38	72950	38	62
B	Stone coping (local AJLON) according to plans and architectural details300*50mm thik mechanical bush hammrerd curved.to walls and sills		356	0	17	61	6269	16	6

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
c	Approved first quality (KARAK) marble grey color; bedded on and including cement sand mortar (1:3); sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, using stainless anchor bolts and steel dowelsand and according with specifications 250mm hight x 50mm thick.		95	m2	56	34	5352	30	9
D	Ajlon local cornice stone380mm hight 215mm wide 40 mmthik .honed finish in accoordance to detalls fixd to walls .		25	mr	17	61	440	25	3
	TOTAL MASONARY WORKS				Total		243090	43	
	CARRIED TO SUMMARY								

Contractor #7 Eng. Waheed Abu Hamza — **Page # 204**

BILL NO. 01

INTERNAL AND EXTERNAL FINISHES

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	FLOOR FINISHES							
	Precast terrazzo tiles, natural color, bedded on sand including cement sand mortar (1:3), cleaning and polishing upon completion, selection to Engineer's approval:							
	To floors, size 400x100x30 mm thick for guards rooms	52	m^2	16	91	879	32	5
	Approved first quality JERUSALEM stone marble tiles bedded on and including cement sand mortar (1:3); pointing with neat tinted cement to match colour of marble; sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, complete							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	35	22	20216	28	20
B	To skirting size 600x100x6mm thick	360	mr	7	5	2538	0	5
	(STANDBY ITEM) DITTO BUT ITALIAN MARBLE.							
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	63	38	36380	12	20
B	To skirting size 600X100X6mm thick	360	mr	8	45	3042	0	5
	Ditto but Omani or stone like ceramic tiles							
A	To floors 400x400x20 mm thick.	365	m^2	42	26	15424	90	10
B	To skirting size 300x100x6mm thick	247	mr	7	5	1741	35	3
	Imported Spanish (or equivalent) ceramic coloured floor tiles; natural color; laid on sand, including cement sand mortar (1:3) and pointing with approved grout, complete							
	To kitchens floors size 400x400x9 mm thick.	137	m^2	28	17	3859	29	5

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Ditto but EMIRATES R.A.K ceramic coloured floor tiles.							
A	To floors, size 300x300x9 mm thick for maids rooms	36	m^2	25	36	912	96	2
B	To skirting, size 300x100x6 mm thick for maids rooms	43	mr	4	23	181	89	2
c	Ditto but local ceramic coloured floor tiles for Boiler and maids bathrooms 200x200x9 thick.	86	m^2	19	72	1695	92	3
	One piece Jerusalem stone to steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	168	mr	23	95	4023	60	6
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	108	mr	8	45	912	60	2
	One piece gravelled tiles to external steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	28	mr	18	31	512	68	4
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	25	mr	7	5	176	25	2
	Precast interlock concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions.							
A	To walkway at parking and ramps size 400x400x40 mm	333	m2	14	9	4691	97	7
B	**Standby itme ditto but basalt stone**	333	m^2	21	13	7036	29	7
	Precast concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions for external paving	163	m^2	11	27	1837	1	4

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	WALL FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:							
A	To walls, internally.	7783	m^2	5	64	43896	12	60
B	To walls, internally behind ceramic walls.	1010	m^2	5	64	5696	40	9
C	To walls, internally for water tanks walls.	240	m^2	7	5	1692	0	5
D	To walls, externally.	270	m^2	5	64	1522	80	5
	Glazed imported SPANISH ceramic coloured wall tiles in plain and decorative colours, bedding and jointing on approved adhesive to plastered backing, pointing in matching coloured grout and special coved ceramic pieces for corners and skirting.Joints 3mm wide using spacers, all according to drawings, manufacturer and Engineer's instructions, complete.							
	To walls size 300x300x9 mm thick for Bathrooms	510	m^2	21	13	10776	30	10
	Ditto but to walls size 100x100x9 mm thick mosaic for kitchens.	320	m^2	39	44	12620	80	10
	Ditto but Jerusalem wall tiles for basement1 entrance complete	60	m^2	35	22	2113	20	5
	Ditto but local glazed colored ceramic wall tiles, complete							
A	To walls size 200x200x8 mm thick for Boiler	110	m^2	19	72	2169	20	5
B	To walls size 200x200x8 mm thick for maids rooms (white colour)	78	m^2	19	72	1538	16	4

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	CEILING FINISHES								
	Three coats cement and sand (1:4) plastering; smooth finish as specified:		1828	m2	7	5	12887	40	18
	JERUSALEM stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking columns		35	m^2	42	26	1479	10	5
	JERUSALEM stone cladding, fixed to faces of concrete with 20mm thick with cement mortar in according to specifications and details drawings 350mm height for main entrances		36	m^2	38	3	1369	8	3
	AJLOON stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking walls and entrance		65	m^2	36	62	2380	30	5
	SUSPENDED CEILINGS 12mm thick gypsum board suspended ceiling panels finished with skim coat including concealed galvanized suspension system, stepped decorations, strips, drop, molding and all painting, fire retardant plywood backing (where necessary), access doors and making openings for different services, all as shown on drawings, complete		47	m2	14	9	662	23	2
	800mm*300mm height gypsum cornice suspend finished with skim coat including concealed galvanized suspension system, stepped decorations, molding and all painting, fire retardant making openings for different services, all as shown on drawings, complete for saloons, TV and dinning ceilings.		211	mr	8	45	1782	95	7
				Total carried to summary			**208648**	**47**	

Contractor #7 Eng. Waheed Abu Hamza — **Page # 208**

BILL NO. 04

PAINTING AND DECORATION

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	INTERNALLY							
	Emulsion PVA - based paint, matt finish for interior, quality in one priming coat and three finishing coats, for application to walls and ceilings, using full coverage putty, including all necessary preparation works and undercoats, application to all heights as required of works, all according to manufacturer (DELUXE or approved equivalent) instructions, complete							
	To walls	4783	m2	4	23	20232	9	40
	EXTERNALLY							
	Resin base waterproofing acrylic textured decorative coating (the binder shall be pure acrylic) pigments and binders are resistant to weather pollution ...etc., including all necessary preparation work and under coats, complete							
	To exterior walls	265	m2	5	64	1494	60	7
	To walls at roof	196	m2	5	64	1105	44	5
	Non-toxic epoxy paint including primer all as specified, complete to floor, walls and ceiling of water tanks	328	m2	8	45	2771	60	7
	Total carried to summary					**25603**	**73**	

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BILL NO. 5

FITTINGS AND EQUIPMENTS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	CORNER GUARDS							
	supply and fix rubber corner guards for columns at parking areas, fixed with stainless steel flathead fastener flush and plastic cement adhesive according to manufacturer instructions and detailed drawing.							
	100x100 mm, 1200 mm height	4	nr.	56	34	225	36	2
	Mirrors							
	6mm thick mirrors with 20 mm stainless steel frame including 8mm thick plywood backing, all as shown on drawings and as specified, complete							
A	Size 1050 x 2600 mm high.	2	nr	211	27	422	54	3
B	Size 1600 x 1300 mm high.	3	nr	197	19	591	57	6
C	Size 800 x 1300 mm high.	19	nr	169	2	3211	38	10
	VANITY COUNTER							
	Local KARAK marble countertop 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing, cutting openings, silicon mastic sealing and all associated works, complete as detailed on drawings and to Engineers approval, complete							
A	size 1700 x 600 mm wide	2	nr	98	60	197	20	2
B	size 2800 x 600 mm wide	1	nr	197	19	197	19	1
C	size 2000 x 600 mm wide	1	nr	140	85	140	85	1
D	size 1800 x 600 mm wide	1	nr	112	68	112	68	1
E	size 1200 x 600 mm wide	2	nr	98	60	197	20	2
F	size 2200 x 600 mm wide	2	nr	183	10	366	20	2
G	size 1900 x 600 mm wide	3	nr	140	85	422	55	3
H	size 2600 x 600 mm wide	1	nr	197	19	197	19	1
				Total carried to summary		6281	91	

	Contractor #7 Eng. Waheed Abu Hamza							**Page # 210**	
	BILL NO. 6								
	Planting								
Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones as per drawings.		**254**	**m3**	**10**	**57**	**2684**	**78**	**10**
	Total carried to summary						**2684**	**78**	

	APPENDIX 8							Page # 211	
	Contractor # 8 Eng. Nader Habayba								
	BILL NO. 1								
	EXCAVATION AND EARTH WORKS								
Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	EXCAVATION AND EARTH WORKS								
	Excavation starting at existing ground level including removal of surplus excavated materials:								
A	Excavation To foundations Levels		3.825	m3	16	90	64642	50	9
B	Excavation for external works.		683	m3	15	49	10579	67	3
	Filling, laid and compacted in layers:								
A	Approved filling inside building.		540	m3	2	81	1517	40	6
B	Approved filling outside building.		736	m3	2	81	2068	16	8
	Crushed aggregate base course, compacted to 100% modified AASHTO density CBR ≥ 80%, complete								
A	200 mm thickn inside building		410	m2	2	81	1152	10	6
	TOTAL EXCAVATION & EARTH WORKS				Total		79959	83	
	CARRIED TO SUMMARY								

BILL NO. 2								Page # 212
	CONCRETE							
	Contractor # 8 Eng. Nader Habayba							
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Plain concrete 18 N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Blinding; 100mm thick under foundations and tie beams.	393	m2	7	4	2766	72	6
B	Blinding; 50mm thick under slabs on grade.	430	m2	7	4	3027	20	4
C	Blinding: 100mm thick under external walls.	217	m2	7	4	1527	68	3
	Reinforced concrete 25N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
D	Foundations.	141	m3	98	59	13901	19	13
E	Tie beams	21	m3	98	59	2070	39	7
G	Column and Column Necks	81	m3	98	59	7985	79	27
H	Slab on grade, 100 mm thick, to building.	45	m3	98	59	4436	55	7
J	Slab on grade, 100 mm thick, to external pavements.	35	m3	98	59	3450	65	6
K	External basement walls	206	m3	105	63	21759	78	25
L	Water tank walls	52	m3	112	67	21759	78	6
M	External Foundations	48	m3	119	71	5746	8	9
N	External Walls	97	m3	112	67	10928	99	15
	Reinforced concrete 20N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Behind stone elevations	187	m3	91	54	17117	98	50
				Total		94719	0	

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Reinforced cast in situ concrete (Grade 25), Cont'd							
A	Ribbed slabs,310 mm thick.	458	m3	91	54	41925	32	70
B	Staircases (steps and flights). In side	13	m3	105	63	1373	19	35
C	Staircases (steps and flights). Out side	11	m3	105	63	1161	93	30
	Deformed high yield steel bar reinforcement of420N/mm2 minimum yield strength, complete							
A	Various diameters, generally	110	Ton	774	64	85210	40	70
	Smooth mild steel bar reinforcement of 280 N/mm2 minimum yield strength, complete							
A	Y8 mm.	28	Ton	816	90	22873	20	25
				Total		247263	4	

	Contractor # 8 Eng. Nader Habayba						Page # 214	
	BILL NO. 3							
	BLOCK WORKS							
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	BLOCK WORK							
	Hollow concrete blocks bedded and jointed in cement sand mortar (1:3) to:							
A	Walls; 100 mm thick	732	m2	7	4	5153	28	17
B	Walls; 150 mm thick	264	m2	8	45	2230	80	10
C	Walls; 200 mm thick	153	m2	9	15	1399	95	6
D	Hollow concrete rib block, size 400/360x200x240 mm high.	16266	nr	0	56	9108	96	15
E	Concrete block 100mm thick. Behind the insulation for external walls of basement	529	m2	7	4	3724	16	17
F	Concrete block 100mm thick. Behind the stone walls.	951	m2	7	4	6695	4	23
	TOTAL BLOCK WORKS			Total		28312	19	
	CARRIED TO SUMMARY							

Contractor # 8 Eng. Nader Habayba — Page # 215

BILL NO. 4

ROOFING AND INSULATION SYSTEMS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Foam concrete, minimum 50 mm thick laid to falls and cross falls including preparing top surfaces smooth to receive waterproofing membrane, complete							
A	To roofs.	430	m2	8	45	3633	50	10
	Cement sand screed, minimum 30mm thick laid to falls including forming angle fillets at perimeter and all abutments, complete							
B	To roofs.	430	m2	4	22	1814	60	12
	4mm thick torch applied modified bituminous water- proofing membrane; skirting with additional mineral chipping faced membrane tucked into grooves and pointed with mastic, including bitumen primer one coat, complete							
G	To roofs.	430	m2	8	45	3633	50	10
				Total		9081	60	

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	4mm thick torch applied modified bituminous polymer water- proofing membrane; reinforced with 180g/m^2 polyester, including bitumen primer, all necessary preparation and fixing works, complete							
A	For slabs on grade.	410	m2	6	33	2595	30	11
B	To basement walls	529	m2	9	85	5210	65	22
	PVC WATER STOP ACCORDING TO PLANS FOR WATER TANK WALLS	56	mr	15	49	867	44	3
	Damp proofing membrane comprising of two perpendicular coats of emulsified asphalt reinforced with non asbestos fibers, cold applied, complete according to manufacturer instructions and technical specifications							
F	To basement walls.	2650	m2	5	63	14919	50	23
				Total		32674	49	

	Contractor # 8 Eng. Nader Habayba							Page # 217	
	BILL NO. 5								
	MASONRY WORKS								
	Contractor # 8 Eng. Nader Habayba								
Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	MASONRY WORK								
A	Local (AJLON) stone fixed to faces of concrete for all elevations.								
	First class no less than 50mm thick and 400mm length, 250mm hight.								
	stone colour shall be approved by the enginner.								
	corner stones, jambs, Lintels are included with the pure engieered m2 price.								
	The price included the form works and whatever needed to complete the work.								
	CASE(1)Mechanical push hammered face finish		1151	m2	56	33	64835	83	50
	CASE (2) light chisled face finish		unit	m2	56	33	64835	83	
	CASE(3)Rough chirled face finish		unit	m2	56	33	64835	83	
	CASE(4) (طبزة) FACE FINISH		unit	m2	63	38	72950	38	
B	Stone coping (local AJLON) according to plans and architectural details300*50mm thik mechanical bush hammrerd curved.to walls and sills		356	mr	19	71	7016	76	20

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
c	Approved first quality (KARAK) marble grey color; bedded on and including cement sand mortar (1:3); sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, using stainless anchor bolts and steel dowelsand and according with specifications 250mm hight x 50mm thick.		95	m2	87	32	8295	40	10
	NOTE: masonary bill may be calculated in								
D	Ajlon local cornice stone380mm hight 215mm wide 40 mmthik .honed finish in accoordance to detalis fixd to walls .		25	mr	147	88	3697	0	8
	TOTAL MASONARY WORKS				Total				
	CARRIED TO SUMMARY						286467	3	

	Contractor # 8 Eng. Nader Habayba						Page # 219		
	BILL NO. 01								
	INTERNAL AND EXTERNAL FINISHES								
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day	
	FLOOR FINISHES								
	Precast terrazzo tiles, natural color, bedded on sand including cement sand mortar (1:3), cleaning and polishing upon completion, selection to Engineer's approval:								
	To floors, size 400x100x30 mm thick for guards rooms	52	m^2	11	26	585	52	3	
	Approved first quality JERUSALEM stone marble tiles bedded on and including cement sand mortar (1:3); pointing with neat tinted cement to match colour of marble; sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, complete								
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	56	33	32333	42	7	
B	To skirting size 600x100x6mm thick	360	mr	8	45	3042	0	2	
	(STANDBY ITEM) DITTO BUT ITALIAN MARBLE.								
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	66	19	37993	6	5	
B	To skirting size 600X100X6mm thick	360	mr	14	8	5068	80	3	
	Ditto but Omani or stone like ceramic tiles								
A	To floors 400x400x20 mm thick.	365	m^2	59	15	21589	75	5	
B	To skirting size 300x100x6mm thick	247	mr	14	8	3477	76	5	
	Imported Spanish (or equivalent) ceramic coloured floor tiles; natural color; laid on sand, including cement sand mortar (1:3) and pointing with approved grout, complete								
	To kitchens floors size 400x400x9 mm thick.	137	m^2	42	25	5788	25	4	

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Ditto but EMIRATES R.A.K ceramic coloured floor tiles.								
A	To floors, size 300x300x9 mm thick for maids rooms		36	m^2	28	16	1013	76	3
B	To skirting, size 300x100x6 mm thick for maids rooms		43	mr	8	45	363	35	3
c	Ditto but local ceramic coloured floor tiles for Boiler and maids bathrooms 200*200*9 thick.		86	m^2	16	90	1453	40	5
	One piece Jerusalem stone to steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete								
A	To treads and risers		168	mr	126	76	21295	68	6
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.		108	mr	11	26	1216	8	4
	One piece gravelled tiles to external steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete								
A	To treads and risers		28	mr	56	33	1577	24	2
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.		25	mr	7	4	176	0	2
	Precast interlock concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions.								
A	To walkway at parking and ramps size 400x400x40 mm		333	m2	11	26	3749	58	12
B	Standby itme ditto but basalt stone		333	m^2	25	35	8441	55	12
	Precast concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions for external paving		163	m^2	14	8	2295	4	10

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	WALL FINISHES								
	Three coats cement and sand (1:4) plastering; smooth finish as specified:								
A	To walls, internally.		7783	m^2	5	63	43818	29	100
B	To walls, internally behind ceramic walls.		1010	m^2	7	4	7110	40	25
C	To walls, internally for water tanks walls.		240	m^2	8	45	2028	0	10
D	To walls, externally.		270	m^2	8	45	2281	50	11
	Glazed imported SPANISH ceramic coloured wall tiles in plain and decorative colours, bedding and jointing on approved adhesive to plastered backing, pointing in matching coloured grout and special coved ceramic pieces for corners and skirting.Joints 3mm wide using spacers, all according to drawings, manufacturer and Engineer's instructions, complete.								
	To walls size 300x300x9 mm thick for Bathrooms		510	m^2	35	21	17957	10	10
	Ditto but to walls size 100x100x9 mm thick mosaic for kitchens.		320	m^2	49	29	15772	80	10
	Ditto but Jerusalem wall tiles for basement1 entrance complete		60	m^2	49	29	2957	40	4
	Ditto but local glazed colored ceramic wall tiles, complete								
A	To walls size 200x200x8 mm thick for Boiler		110	m^2	21	12	2323	20	6
B	To walls size 200x200x8 mm thick for maids rooms (white colour)		78	m^2	25	35	1977	30	5

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	CEILING FINISHES								
	Three coats cement and sand (1:4) plastering; smooth finish as specified:		1828	m2	8	45	15446	60	35
	JERUSALEM stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking columns		35	m^2	70	42	2464	70	6
	JERUSALEM stone cladding, fixed to faces of concrete with 20mm thick with cement mortar in according to specifications and details drawings 350mm height for main entrances		36	m^2	56	33	2027	88	2
	AJLOON stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking walls and entrance		65	m^2	64	78	4210	70	4
	SUSPENDED CEILINGS								
	12mm thick gypsum board suspended ceiling panels finished with skim coat including concealed galvanized suspension system, stepped decorations, strips, drop, molding and all painting, fire retardant plywood backing (where necessary), access doors and making openings for different services, all as shown on drawings, complete		47	m2	21	12	992	64	6
	800mm*300mm height gypsum cornice suspend finished with skim coat including concealed galvanized suspension system, stepped decorations, molding and all painting, fire retardant making openings for different services, all as shown on drawings, complete for saloons, TV and dinning ceilings.		211	mr	19	71	4158	81	22
				TOTAL			276987	56	

	Contractor # 8 Eng. Nader Habayba					Page # 223		
	BILL NO. 04							
	PAINTING AND DECORATION							
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	INTERNALLY							
	Emulsion PVA - based paint, matt finish for interior, quality in one priming coat and three finishing coats, for application to walls and ceilings, using full coverage putty, including all necessary preparation works and undercoats, application to all heights as required of works, all according to manufacturer (DELUXE or approved equivalent) instructions, complete							
	To walls	4783	m2	3	52	16836	16	62
	EXTERNALLY							
	Resin base waterproofing acrylic textured decorative coating (the binder shall be pure acrylic) pigments and binders are resistant to weather pollution ...etc., including all necessary preparation work and under coats, complete							
	To exterior walls	265	m2	7	4	1865	60	25
	To walls at roof	196	m2	5	63	1103	48	20
	Non-toxic epoxy paint including primer all as specified, complete to floor, walls and ceiling of water tanks	328	m2	6	33	2076	24	24
				Total carried to summary		21881	48	

Contractor # 8 Eng. Nader Habayba — Page # 224

BILL NO. 5

FITTINGS AND EQUIPMENTS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	CORNER GUARDS							
	supply and fix rubber corner guards for columns at parking areas, fixed with stainless steel flathead fastener flush and plastic cement adhesive according to manufacturer instructions and detailed drawing.							
	100x100 mm, 1200 mm height	4	nr.	225	35	901	40	6
	Mirrors							
	6mm thick mirrors with 20 mm stainless steel frame including 8mm thick plywood backing, all as shown on drawings and as specified, complete							
A	Size 1050 x 2600 mm high.	2	nr	598	59	1197	18	4
B	Size 1600 x 1300 mm high.	3	nr	394	36	1183	8	3
C	Size 800 x 1300 mm high.	19	nr	253	52	4816	88	7
	VANITY COUNTER							
	Local KARAK marble countertop 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing, cutting openings, silicon mastic sealing and all associated works, complete as detailed on drawings and to Engineers approval, complete							
A	size 1700 x 600 mm wide	2	nr	563	38	1126	76	2
B	size 2800 x 600 mm wide	1	nr	704	22	704	22	1
C	size 2000 x 600 mm wide	1	nr	591	54	591	54	1
D	size 1800 x 600 mm wide	1	nr	563	38	563	38	1
E	size 1200 x 600 mm wide	2	nr	535	21	1070	42	2
F	size 2200 x 600 mm wide	2	nr	704	22	1408	44	2
G	size 1900 x 600 mm wide	3	nr	633	80	1901	40	3
H	size 2600 x 600 mm wide	1	nr	704	22	704	22	1
	Total carried to summary					**18070**	**32**	

	Contractor # 8 Eng. Nader Habayba						**Page # 225**		
	BILL NO. 6								
	Planting								
Item	**Description**		**Qty.**	**Unit**	**Rate**		**Amount**		**Duration**
					$	**cent**	**$**	**cent**	**Day**
	Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones as per drawings.		**254**	**m3**	**15**	**49**	**3934**	**46**	**24**
	Total carried to summary						**3934**	**46**	

APPENDIX 9 Page # 226

Contractor # 9 Eng. Ahmed Alumari

BILL NO. 1

EXCAVATION AND EARTH WORKS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	EXCAVATION AND EARTH WORKS							
	Excavation starting at existing ground level including removal of surplus excavated materials:							
A	Excavation To foundations Levels	3.825	m3	9	86	37714	50	21
B	Excavation for external works.	683	m3	7	5	4815	15	10
	Filling, laid and compacted in layers:							
A	Approved filling inside building.	540	m3	7	5	3807	0	10
B	Approved filling outside building.	736	m3	7	5	5188	80	12
	Crushed aggregate base course, compacted to 100% modified AASHTO density CBR ≥ 80%, complete							
A	200 mm thickn inside building	410	m2	2	82	1156	20	5
	TOTAL EXCAVATION & EARTH WORKS			**Total**		**52681**	**65**	
	CARRIED TO SUMMARY							

BILL NO. 2								Page # 227
CONCRETE								
	Contractor # 9 Eng. Ahmed Alumari							
Item	**Description**	**Qty.**	**Unit**	**Rate**		**Amount**		**Duration**
				$	**cent**	**$**	**cent**	**Day**
	Plain concrete 18 N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Blinding; 100mm thick under foundations and tie beams.	393	m2	11	27	4429	11	5
B	Blinding; 50mm thick under slabs on grade.	430	m2	8	45	3633	50	3
C	Blinding: 100mm thick under external walls.	217	m2	17	78	3858	26	3
	Reinforced concrete 25N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
D	Foundations.	141	m3	105	64	14895	24	15
E	Tie beams	21	m3	119	72	2514	12	7
G	Column and Column Necks	81	m3	126	76	10267	56	25
H	Slab on grade, 100 mm thick, to building.	45	m3	105	64	4753	80	6
J	Slab on grade, 100 mm thick, to external pavements.	35	m3	112	68	3943	80	5
K	External basement walls	206	m3	119	72	24662	32	23
L	Water tank walls	52	m3	119	72	6225	44	7
M	External Foundations	48	m3	105	64	5070	72	8
N	External Walls	97	m3	119	72	11612	84	14
	Reinforced concrete 20N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Behind stone elevations	187	m3	105	64	19754	68	45

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Reinforced cast in situ concrete (Grade 25), Cont'd							
A	Ribbed slabs,310 mm thick.	458	m3	112	68	51607	44	70
B	Staircases (steps and flights). In side	13	m3	140	85	1831	5	15
C	Staircases (steps and flights). Out side	11	m3	140	85	1549	35	10
	Deformed high yield steel bar reinforcement of420N/mm2 minimum yield strength, complete							
A	Various diameters, generally	110	Ton	816	91	89860	10	25
	Smooth mild steel bar reinforcement of 280 N/mm2 minimum yield strength, complete							
A	Y8 mm.	28	Ton	845	7	23661	96	7
				Total		**284131**	**29**	

	Contractor # 9 Eng. Ahmed Alumari						Page # 229
	BILL NO. 3						
	BLOCK WORKS						
Item	Description	Qty.	Unit	Rate		Amount	
				$	cent	$	cent
	BLOCK WORK						
	Hollow concrete blocks bedded and jointed in cement sand mortar (1:3) to:						
A	Walls; 100 mm thick	732	m2	7	5	5160	60
B	Walls; 150 mm thick	264	m2	9	86	2603	4
C	Walls; 200 mm thick	153	m2	12	68	1940	4
D	Hollow concrete rib block, size 400/360x200x240 mm high.	16266	nr	85	0	13826	10
E	Concrete block 100mm thick. Behind the insulation	529	m2	8	45	4470	5
F	Concrete block 100mm thick. Behind the stone	951	m2	8	45	8035	95
	TOTAL BLOCK WORKS			Total		36035	78
	CARRIED TO SUMMARY						

Contractor # 9 Eng. Ahmed Alumari — Page # 230

BILL NO. 4

ROOFING AND INSULATION SYSTEMS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	Foam concrete, minimum 50 mm thick laid to falls and cross falls including preparing top surfaces smooth to receive waterproofing membrane, complete							
A	To roofs.	430	m2	7	5	3031	50	3
	Cement sand screed, minimum 30mm thick laid to falls including forming angle fillets at perimeter and all abutments, complete							
B	To roofs.	430	m2	4	23	1818	90	3
	4mm thick torch applied modified bituminous							
G	To roofs.	430	m2	4	23	1818	90	5
				Total		6669	30	

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	4mm thick torch applied modified bituminous polymer water- proofing membrane; reinforced with 180g/m^2 polyester, including bitumen primer, all necessary preparation and fixing works, complete							
A	For slabs on grade.	410	m2	4	23	1734	30	5
B	To basement walls	529	m2	4	23	2237	67	6
	PVC WATER STOP ACCORDING TO PLANS	56	mr	42	26	2366	56	1
	Damp proofing membrane comprising of two perpendicular coats of emulsified asphalt reinforced with non asbestos fibers, cold applied, complete according to manufacturer instructions and technical specifications							
F	To basement walls.	2650	m2	4	23	11209	50	10
				Total		24217	33	

	BILL NO. 5								Page # 232
	MASONRY WORKS								
	Contractor # 9 Eng. Ahmed Alumari								
Item	Description	Qty.	Unit	Rate		Amount		Duration	
				$	cent	$	cent	Day	
	MASONRY WORK								
A	Local (AJLON) stone fixed to faces of concrete for all elevations.								
	First class no less than 50mm thick and 400mm length, 250mm hight.								
	stone colour shall be approved by the enginner.								
	corner stones, jambs, Lintels are included with the pure engieered m2 price.								
	The price included the form works and whatever needed to complete the work.								
	CASE(1)Mechanical push hammered face finish	1151	m2	42	25	48629	75	46	
	CASE (2) light chisled face finish	unit	m2	42	25	48629	75	46	
	CASE(3)Rough chirled face finish	unit	m2	42	25	48629	75	46	
	CASE(4) (طيزة) FACE FINISH	unit	m2	50	0	57550	0	46	
B	Stone coping (local AJLON) according to plans and architectural details300*50mm thik mechanical bush hammrerd curved.to walls and sills	356	mr	25	0	8900	0	17	
c	**Approved first quality (KARAK) marble grey color; bedded on and including cement sand mortar (1:3); sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, using stainless anchor bolts and steel dowelsand and according with specifications 250mm hight x 50mm thick.**	95	m2	50	0	4750	0	12	
D	**Ajlon local cornice stone380mm hight 215mm wide 40 mmthik .honed finish in accoordance to detalis fixd to walls .**	25	mr	30	0	750	0	8	
	TOTAL MASONARY WORKS								
	CARRIED TO SUMMARY			**Total**		**217837**	**0**		

	Contractor # 9 Eng. Ahmed Alumari							Page # 233	
	BILL NO. 01								
	INTERNAL AND EXTERNAL FINISHES								
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day	
	FLOOR FINISHES								
	Precast terrazzo tiles, natural color, bedded on sand including cement sand mortar (1:3), cleaning and polishing upon completion, selection to Engineer's approval:								
	To floors, size 400x100x30 mm thick for guards rooms	52	m^2	9	86	512	72	2	
	Approved first quality JERUSALEM stone marble tiles bedded on and including cement sand mortar (1:3); pointing with neat tinted cement to match colour of marble; sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, complete								
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	70	42	40421	8	30	
B	To skirting size 600x100x6mm thick	360	mr	14	8	5068	80	10	
	(STANDBY ITEM) DITTO BUT ITALIAN MARBLE.								
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	70	42	40421	8	30	
B	To skirting size 600X100X6mm thick	360	mr	14	8	5068	80	10	
	Ditto but Omani or stone like ceramic tiles								
A	To floors 400x400x20 mm thick.	365	m^2	35	21	12851	65	30	
B	To skirting size 300x100x6mm thick	247	mr	7	4	1738	88	10	
	Imported Spanish (or equivalent) ceramic coloured floor tiles; natural color; laid on sand, including cement sand mortar (1:3) and pointing with approved grout, complete								
	To kitchens floors size 400x400x9 mm thick.	137	m^2	28	17	3859	29	5	

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Ditto but EMIRATES R.A.K ceramic coloured floor tiles.								
A	To floors, size 300x300x9 mm thick for maids rooms		36	m^2	23	94	861	84	2
B	To skirting, size 300x100x6 mm thick for maids rooms		43	mr	4	23	181	89	2
c	Ditto but local ceramic coloured floor tiles for Boiler and maids bathrooms 200*200*9 thick.		86	m^2	21	13	1817	18	4
	One piece Jerusalem stone to steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete								
A	To treads and risers		168	mr	42	25	7098	0	10
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.		108	mr	14	8	1520	64	5
	One piece gravelled tiles to external steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete								
A	To treads and risers		28	mr	28	17	788	76	2
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.		25	mr	9	86	246	50	1
	Precast interlock concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions.								
A	To walkway at parking and ramps size 400x400x40 mm		333	m2	14	8	4688	64	10
B	Standby itme ditto but basalt stone		333	m^2	14	8	4688	64	10
	Precast concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions for external paving		163	m^2	9	86	1607	18	5

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	WALL FINISHES								
	Three coats cement and sand (1:4) plastering; smooth finish as specified:								
A	To walls, internally.		7783	m^2	4	23	32922	9	80
B	To walls, internally behind ceramic walls.		1010	m^2	2	82	2848	20	10
C	To walls, internally for water tanks walls.		240	m^2	7	4	1689	60	6
D	To walls, externally.		270	m^2	5	63	1520	10	5
	Glazed imported SPANISH ceramic coloured wall tiles in plain and decorative colours, bedding and jointing on approved adhesive to plastered backing, pointing in matching coloured grout and special coved ceramic pieces for corners and skirting.Joints 3mm wide using spacers, all according to drawings, manufacturer and Engineer's instructions, complete.								
	To walls size 300x300x9 mm thick for Bathrooms		510	m^2	28	17	14366	70	15
	Ditto but to walls size 100x100x9 mm thick mosaic for kitchens.		320	m^2	30	99	9916	80	10
	Ditto but Jerusalem wall tiles for basement1 entrance complete		60	m^2	35	21	2112	60	5
	Ditto but local glazed colored ceramic wall tiles, complete								
A	To walls size 200x200x8 mm thick for Boiler		110	m^2	21	13	2324	30	4
B	To walls size 200x200x8 mm thick for maids rooms (white colour)		78	m^2	21	13	1648	14	3

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	CEILING FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:	1828	m2	4	23	7732	44	30
	JERUSALEM stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking columns	35	m^2	63	38	2218	30	3
	JERUSALEM stone cladding, fixed to faces of concrete with 20mm thick with cement mortar in according to specifications and details drawings 350mm height for main entrances	36	m^2	63	38	2281	68	3
	AJLOON stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking walls and entrance	65	m^2	56	34	3662	10	4
	SUSPENDED CEILINGS							
	12mm thick gypsum board suspended ceiling panels finished with skim coat including concealed galvanized suspension system, stepped decorations, strips, drop, molding and all painting, fire retardant plywood backing (where necessary), access doors and making openings for different services, all as shown on drawings, complete	47	m2	70	42	3309	74	4
	800mm*300mm height gypsum cornice suspend finished with skim coat including concealed galvanized suspension system, stepped decorations, molding and all painting, fire retardant making openings for different services, all as shown on drawings, complete for saloons, TV and dinning ceilings.	211	mr	50	0	10550	0	7
				TOTAL		232544	36	

	Contractor # 9 Eng. Ahmed Alumari						Page # 237	
	BILL NO. 04							
	PAINTING AND DECORATION							
Item	**Description**	**Qty.**	**Unit**	**Rate**		**Amount**		**Duration**
				$	**cent**	**$**	**cent**	**Day**
	INTERNALLY							
	Emulsion PVA - based paint, matt finish for interior, quality in one priming coat and three finishing coats, for application to walls and ceilings, using full coverage putty, including all necessary preparation works and undercoats, application to all heights as required of works, all according to manufacturer (DELUXE or approved equivalent) instructions, complete							
	To walls	4783	m2	2	11	10092	13	75
	EXTERNALLY							
	Resin base waterproofing acrylic textured decorative coating (the binder shall be pure acrylic) pigments and binders are resistant to weather pollution ...etc., including all necessary preparation work and under coats, complete							
	To exterior walls	265	m2	3	52	932	80	22
	To walls at roof	196	m2	3	52	689	92	18
	Non-toxic epoxy paint including primer all as specified, complete to floor, walls and ceiling of water tanks	328	m2	14	8	4618	24	21
			Total carried to summary			**16333**	**9**	

	Contractor # 9 Eng. Ahmed Alumari							Page # 238	
	BILL NO. 5								
	FITTINGS AND EQUIPMENTS								
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent		Duration Day
	CORNER GUARDS								
	supply and fix rubber corner guards for columns at parking areas, fixed with stainless steel flathead fastener flush and plastic cement adhesive according to manufacturer instructions and detailed drawing.								
	100x100 mm, 1200 mm height	4	nr.	42	25	169	0		9
	Mirrors								
	6mm thick mirrors with 20 mm stainless steel frame including 8mm thick plywood backing, all as shown on drawings and as specified, complete								
A	Size 1050 x 2600 mm high.	2	nr	84	51	169	2		3
B	Size 1600 x 1300 mm high.	3	nr	84	51	253	53		6
C	Size 800 x 1300 mm high.	19	nr	35	21	668	99		9
	VANITY COUNTER								
	Local KARAK marble countertop 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing, cutting openings, silicon mastic sealing and all associated works, complete as detailed on drawings and to Engineers approval, complete								
A	size 1700 x 600 mm wide	2	nr	77	46	154	92		2

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
B	size 2800 x 600 mm wide		1	nr	126	76	126	76	1
C	size 2000 x 600 mm wide		1	nr	98	59	98	59	1
D	size 1800 x 600 mm wide		1	nr	84	51	84	51	1
E	size 1200 x 600 mm wide		2	nr	56	34	112	68	2
F	size 2200 x 600 mm wide		2	nr	105	63	211	26	2
G	size 1900 x 600 mm wide		3	nr	91	55	274	65	3
H	size 2600 x 600 mm wide		1	nr	112	68	112	68	1
	Total carried to summary						**2436**	**59**	

Contractor # 9 Eng. Ahmed Alumari

BILL NO. 6

Planting

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones as per drawings.		254	m3	14	8	3576	32	21
				Total carried to summary			3576	32	

APPENDIX 10 — Page # 241

Contractor # 10 Mr. Sharif Tawfik

BILL NO. 1

EXCAVATION AND EARTH WORKS

Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day
	EXCAVATION AND EARTH WORKS							
	Excavation starting at existing ground level including removal of surplus excavated materials:							
A	Excavation To foundations Levels	3.825	m3	14	8	53856	0	10
B	Excavation for external works.	683	m3	8	45	5771	35	7
	Filling, laid and compacted in layers:							
A	Approved filling inside building.	540	m3	2	82	1522	80	10
B	Approved filling outside building.	736	m3	2	82	2075	52	10
	Crushed aggregate base course, compacted to 100% modified AASHTO density CBR ≥ 80%, complete							
A	200 mm thickn inside building	410	m2	2	82	1156	20	5
	TOTAL EXCAVATION & EARTH WORKS			Total		64381	87	
	CARRIED TO SUMMARY							

BILL NO. 2								Page # 242
	CONCRETE							
	Contractor # 10 Mr. Sharif Tawfik							
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Plain concrete 18 N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Blinding; 100mm thick under foundations and tie beams. beams.	393	m2	21	13	8304	9	3
B	Blinding; 50mm thick under slabs on grade.	430	m2	21	13	9085	90	2
C	Blinding: 100mm thick under external walls.	217	m2	21	13	4585	21	2
	Reinforced concrete 25N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
D	Foundations.	141	m3	91	55	12908	55	7
E	Tie beams	21	m3	91	55	1922	55	7
G	Column and Column Necks	81	m3	98	59	7985	79	8
H	Slab on grade, 100 mm thick, to building.	45	m3	91	55	4119	75	5
J	Slab on grade, 100 mm thick, to external pavements.	35	m3	91	55	3204	25	4
K	External basement walls	206	m3	98	59	20309	54	15
L	Water tank walls	52	m3	112	68	5859	36	5
M	External Foundations	48	m3	91	55	4394	40	7
N	External Walls	97	m3	98	59	9563	23	15

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Reinforced concrete 20N/mm2 at 28 days cube compressive strength with Ordinary Portland cement including all necessary formwork, complete							
A	Behind stone elevations	187	m3	77	46	14485	2	20
				Total		106727	64	

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Reinforced cast in situ concrete (Grade 25), Cont'd							
A	Ribbed slabs,310 mm thick.	458	m3	98	59	45154	22	35
B	Staircases (steps and flights). In side	13	m3	98	59	1281	67	20
C	Staircases (steps and flights). Out side	11	m3	91	55	1007	5	15
	Deformed high yield steel bar reinforcement of420N/mm2 minimum yield strength, complete							
A	Various diameters, generally	110	Ton	845	7	92957	70	30
	Smooth mild steel bar reinforcement of 280 N/mm2 minimum yield strength, complete							
A	Y8 mm.	28	Ton	915	49	25633	72	30
				Total		272762	0	

Contractor # 10 Mr. Sharif Tawfik

BILL NO. 3

BLOCK WORKS

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	BLOCK WORK							
	Hollow concrete blocks bedded and jointed in cement sand mortar (1:3) to:							
A	Walls; 100 mm thick	732	m2	9	86	7217	52	30
B	Walls; 150 mm thick	264	m2	12	68	3347	52	12
C	Walls; 200 mm thick	153	m2	15	49	2369	97	30
D	**Hollow concrete rib block, size 400/360x200x240 mm high.**	16266	nr	0	56	9108	96	10
E	Concrete block 100mm thick. Behind the insulation for external walls of basement	529	m2	9	86	5215	94	30
F	Concrete block 100mm thick. Behind the stone walls.	951	m2	9	86	9376	86	35
	TOTAL BLOCK WORKS			Total		36636	77	
	CARRIED TO SUMMARY							

Contractor # 10 Mr. Sharif Tawfik

BILL NO. 4

ROOFING AND INSULATION SYSTEMS

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Foam concrete, minimum 50 mm thick laid to falls and cross falls including preparing top surfaces smooth to receive waterproofing membrane, complete							
A	To roofs.	430	m2	6	34	2726	20	10
	Cement sand screed, minimum 30mm thick laid to falls including forming angle fillets at perimeter and all abutments, complete							
B	To roofs.	430	m2	4	23	1818	90	10
	4mm thick torch applied modified bituminous water- proofing membrane; skirting with additional mineral chipping faced membrane tucked into grooves and pointed with mastic, including bitumen primer one coat, complete							
G	To roofs.	430	m2	10	56	4540	80	12
				Total		9085	90	

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	4mm thick torch applied modified bituminous polymer water- proofing membrane; reinforced with 180g/m^2 polyester, including bitumen primer, all necessary preparation and fixing works, complete							
A	For slabs on grade.	410	m2	7	4	2886	40	17
B	To basement walls	529	m2	9	15	4840	35	25
	PVC WATER STOP ACCORDING TO PLANS FOR WATER TANK WALLS	56	mr	13	38	749	28	6
	Damp proofing membrane comprising of two perpendicular coats of emulsified asphalt reinforced with non asbestos fibers, cold applied, complete according to manufacturer instructions and technical specifications							
F	To basement walls.	2650	m2	5	63	14919	50	25
				Total		32481	43	

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BILL NO. 5

MASONRY WORKS

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	MASONRY WORK								
A	Local (AJLON) stone fixed to faces of concrete for all elevations.								
	First class no less than 50mm thick and 400mm length, 250mm hight.								
	stone colour shall be approved by the enginner.								
	corner stones, jambs, Lintels are included with the pure engieered m2 price.								
	The price included the form works and whatever needed to complete the work.								
	CASE(1)Mechanical push hammered face finish		1151	m2	18	31	21074	81	60
	CASE (2) light chisled face finish		unit	m2	18	31	21074	81	60
	CASE(3)Rough chirled face finish		unit	m2	18	31	21074	81	60
	CASE(4) (طبزة) FACE FINISH		unit	m2	18	31	21074	81	65
B	Stone coping (local AJLON) according to plans and architectural details300*50mm thik mechanical bush hammrerd curved.to walls and sills		356	mr	22	54	8024	24	7
C	Approved first quality (KARAK) marble grey color; bedded on and including cement sand mortar (1:3); sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, using stainless anchor bolts and steel dowelsand and according with specifications 250mm hight x 50mm thick.		95	m2	9	86	936	70	6
	NOTE: masonary bill may be calculated in								
D	Ajlon local cornice stone380mm hight 215mm wide 40 mmthik .honed finish in accoordance to detalis fixd to walls .		25	mr	12	68	317	0	7
	TOTAL MASONARY WORKS CARRIED TO SUMMARY				Total		93577	18	

	Contractor # 10 Mr. Sharif Tawfik						Page # 248		
	BILL NO. 01								
	INTERNAL AND EXTERNAL FINISHES								
Item	Description	Qty.	Unit	Rate $	Rate cent	Amount $	Amount cent	Duration Day	
	FLOOR FINISHES								
	Precast terrazzo tiles, natural color, bedded on sand including cement sand mortar (1:3), cleaning and polishing upon completion, selection to Engineer's approval:								
	To floors, size 400x100x30 mm thick for guards rooms	52	m^2	16	90	878	80	10	
	Approved first quality JERUSALEM stone marble tiles bedded on and including cement sand mortar (1:3); pointing with neat tinted cement to match colour of marble; sealing backs and sides with approved sealant/coating; polishing and cleaning upon completion, complete								
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	49	29	28292	46	15	
B	To skirting size 600x100x6mm thick	360	mr	4	22	1519	20	12	
	(STANDBY ITEM) DITTO BUT ITALIAN MARBLE.								
A	To floors of saloons, living , TV and master bedrooms areas 600x600x20 mm thick.	574	m^2	42	25	24251	50	15	
B	To skirting size 600X100X6mm thick	360	mr	4	22	1519	20	12	
	Ditto but Omani or stone like ceramic tiles								
A	To floors 400x400x20 mm thick.	365	m^2	56	33	20560	45	12	
B	To skirting size 300x100x6mm thick	247	mr	5	63	1390	61	10	
	Imported Spanish (or equivalent) ceramic coloured floor tiles; natural color; laid on sand, including cement sand mortar (1:3) and pointing with approved grout, complete								
	To kitchens floors size 400x400x9 mm thick.	137	m^2	49	29	6752	73	15	

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	Ditto but EMIRATES R.A.K ceramic coloured floor tiles.							
A	To floors, size 300x300x9 mm thick for maids rooms	36	m^2	70	42	2535	12	7
B	To skirting, size 300x100x6 mm thick for maids rooms	43	mr	6	33	272	19	7
c	Ditto but local ceramic coloured floor tiles for Boiler and maids bathrooms 200*200*9 thick.	86	m^2	16	90	1453	40	10
	One piece Jerusalem stone to steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	168	mr	70	42	11830	56	5
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	108	mr	12	68	1369	44	4
	One piece gravelled tiles to external steps; natural color; laid on grout; including coved noses, pointing with coloured grout according to detailed drawing and engineer's instructions, complete							
A	To treads and risers	28	mr	42	25	1183	0	4
B	Skirting to flights 6 mm thick; overall cut to profile of tread, riser and landing.	25	mr	5	63	140	75	3
	Precast interlock concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions.							
A	To walkway at parking and ramps size 400x400x40 mm	333	m2	15	49	5158	17	12
B	Standby itme ditto but basalt stone	333	m^2	35	21	11724	93	11
	Precast concrete cement floor tiles, comprehensive strength 20N/mm2 at 28 days, price includes cement and sand mortar bed, sand fill material, cutting, fittings, fixing, grouting, and all other need according to drawings and engineer's instructions for external paving	163	m^2	12	68	2066	84	8

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	WALL FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:							
A	To walls, internally.	7783	m^2	7	4	54792	32	96
B	To walls, internally behind ceramic walls.	1010	m^2	5	63	5686	30	30
C	To walls, internally for water tanks walls.	240	m^2	7	4	1689	60	9
D	To walls, externally.	270	m^2	7	4	1900	80	10
	Glazed imported SPANISH ceramic coloured wall tiles in plain and decorative colours, bedding and jointing on approved adhesive to plastered backing, pointing in matching coloured grout and special coved ceramic pieces for corners and skirting.Joints 3mm wide using spacers, all according to drawings, manufacturer and Engineer's instructions, complete.							
	To walls size 300x300x9 mm thick for Bathrooms	510	m^2	42	25	21547	50	8
	Ditto but to walls size 100x100x9 mm thick mosaic for kitchens.	320	m^2	53	52	17126	40	8
	Ditto but Jerusalem wall tiles for basement1 entrance complete	60	m^2	56	34	3380	40	3
	Ditto but local glazed colored ceramic wall tiles, complete							
A	To walls size 200x200x8 mm thick for Boiler	110	m^2	25	35	2788	50	5
B	To walls size 200x200x8 mm thick for maids rooms (white colour)	78	m^2	25	35	1977	30	5

Item	Description	Qty.	Unit	Rate		Amount		Duration
				$	cent	$	cent	Day
	CEILING FINISHES							
	Three coats cement and sand (1:4) plastering; smooth finish as specified:	1828	m2	7	4	12869	12	35
	JERUSALEM stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking columns	35	m^2	70	42	2464	70	6
	JERUSALEM stone cladding, fixed to faces of concrete with 20mm thick with cement mortar in according to specifications and details drawings 350mm height for main entrances	36	m^2	70	42	2535	12	4
	AJLOON stone cladding, fixed to faces of concrete with 30mm thick with cement mortar in according to specifications and details drawings 350mm height for parking walls and entrance	65	m^2	63	38	4119	70	7
	SUSPENDED CEILINGS							
	12mm thick gypsum board suspended ceiling panels finished with skim coat including concealed galvanized suspension system, stepped decorations, strips, drop, molding and all painting, fire retardant plywood backing (where necessary), access doors and making openings for different services, all as shown on drawings, complete	47	m2	21	13	993	11	5
	800mm*300mm height gypsum cornice suspend finished with skim coat including concealed galvanized suspension system, stepped decorations, molding and all painting, fire retardant making openings for different services, all as shown on drawings, complete for saloons, TV and dinning ceilings.	211	mr	14	8	2970	88	26
				TOTAL		259741	10	

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BILL NO. 04

PAINTING AND DECORATION

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	INTERNALLY								
	Emulsion PVA - based paint, matt finish for interior, quality in one priming coat and three finishing coats, for application to walls and ceilings, using full coverage putty, including all necessary preparation works and undercoats, application to all heights as required of works, all according to manufacturer (DELUXE or approved equivalent) instructions, complete								
	To walls		4783	m2	3	52	16836	16	30
	EXTERNALLY								
	Resin base waterproofing acrylic textured decorative coating (the binder shall be pure acrylic) pigments and binders are resistant to weather pollution ...etc., including all necessary preparation work and under coats, complete								
	To exterior walls		265	m2	4	93	1306	45	15
	To walls at roof		196	m2	4	93	966	28	10
	Non-toxic epoxy paint including primer all as specified, complete to floor, walls and ceiling of water tanks		328	m2	5	63	1846	64	15
				Total carried to summary			20955	53	

Contractor # 10 Mr. Sharif Tawfik

BILL NO. 5

FITTINGS AND EQUIPMENTS

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	CORNER GUARDS								
	supply and fix rubber corner guards for columns at parking areas, fixed with stainless steel flathead fastener flush and plastic cement adhesive according to manufacturer instructions and detailed drawing.								
	100x100 mm, 1200 mm height		4	nr.	126	76	507	4	7
	Mirrors								
	6mm thick mirrors with 20 mm stainless steel frame including 8mm thick plywood backing, all as shown on drawings and as specified, complete								
A	Size 1050 x 2600 mm high.		2	nr	140	85	281	70	3
B	Size 1600 x 1300 mm high.		3	nr	281	69	845	7	4
C	Size 800 x 1300 mm high.		19	nr	211	27	4014	13	8
	VANITY COUNTER								
	Local KARAK marble countertop 30 mm thick with molding wash basin including 200 mm dropped cornice, skirting, jointing, cutting openings, silicon mastic sealing and all associated works, complete as detailed on drawings and to Engineers approval, complete								
A	size 1700 x 600 mm wide		2	nr	704	23	1408	46	2
B	size 2800 x 600 mm wide		1	nr	845	7	845	7	1
C	size 2000 x 600 mm wide		1	nr	704	23	704	23	1
D	size 1800 x 600 mm wide		1	nr	633	80	633	80	1
E	size 1200 x 600 mm wide		2	nr	563	38	1126	76	2
F	size 2200 x 600 mm wide		2	nr	704	23	1408	46	2
G	size 1900 x 600 mm wide		3	nr	704	23	2112	69	3
H	size 2600 x 600 mm wide		1	nr	845	7	845	7	1
					Total carried to summary		14732	48	

Contractor # 10 Mr. Sharif Tawfik

BILL NO. 6

Planting

Item	Description		Qty.	Unit	Rate		Amount		Duration
					$	cent	$	cent	Day
	Agricultural soil of clean selected top soil suitable for planting purposes, including laying at planting zones as per drawings.		254	m3	77	46	19674	84	15
			Total carried to summary				19674	84	