

THE UNITED ARAB EMIRATES
THE MINISTRY OF AGRICULTURE AND FISHERIES
WATER AND SOIL DIREDTORATE

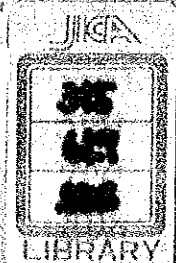
AL BASSEIRAH DAM PROJECT

EVALUATION REPORT ON TENDER NO.22/81

LION FILING FOLDER NO.31 A4

JAPAN INTERNATIONAL COOPERATION AGENCY

JANUARY 1982



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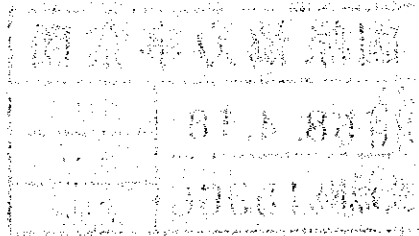
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EVALUATION REPORT
ON
TENDER NO. 22/81

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SUMMARY

- (1) The Ministry of Agriculture and Fisheries, UAE, issued to eight contractors the invitation letter to the tender No. 22/81 dated November 11, 1981, for the Al Bassierah Dam Project, and four contractors, out of the eight, submitted their offers for the Project on the tender opening date of December 13, 1981. The participated tenderers are listed below;
 - o Overseas Ast Co. Ltd.
 - o Dutco Construction Co.(Pvt) Ltd.
 - o Costain International Ltd.
 - o Joannou & Paraskevaides (Overseas) Ltd.
- (2) Their tender quotations have been studied by the representatives of the Ministry of Agriculture and Fisheries and the tender evaluation team assigned by Japan International Cooperation Agency in accordance with the Minute of Discussions on Tendering and Construction Supervision for the Al Bassierah Dam Project concluded between the Ministry and the Agency on November 30, 1981.
- (3) Based on a thorough study on the offers submitted by the tenderers, it is recommended that the Ministry of Agriculture and Fisheries will start the negotiation with Costain International Ltd. as a step toward the contract by the following reasons;
 - a) Equipment and Plant;
The equipment and plant offered by this contractor are the most acceptable among the four offers.
 - b) Experience in Dam Construction
Costain International Ltd. has the richest experience of 35 years in dam construction and 50 years in the other construction works.
 - c) Time for Completion
The construction period of 10 months in total is the shortest though it premises overtime and night works.

d) Evaluation of Prices

- o At the stage of tender opening on December 13, 1981, the tender price of Dutco Construction Co. (Pvt) Ltd. was recorded as the lowest among the four offers, however, in the course of tender evaluation, it was found that this tenderer had failed to quote Item 3.10. Riprap Work in the Main Works.
- o The verification of arithmetical errors among quantities, rates and amounts and the correction of amounts in accordance with Article 2.4. General Requirements of the Instructions to Tenderers in the Tender Procedure and Bill of Quantities have revealed that Costain International Ltd. has offered the lowest corrected tender price.
- o Under the circumstances, the corrected price of Costain International Ltd. has been evaluated through the study on its quotations. Consequently, it is recommended, based on the above-mentioned study as well as the MAF's estimated construction cost, that a reduction of some amounts offered for the main works will be taken up as one of the negotiation items.

(4) A thorough study on the offer of this contractor has been carried out based on the data and information so far submitted, however, further study on the evaluated price will be required in the stage of negotiation. The following major issues should be clarified in the negotiation;

- o Staff organization at site, that is, the mobilization of civil, mechanical and electrical engineers, administrative staff and others;
- o Allocation of the proposed equipment and plant to each item of the construction works which is necessary for the verification of rates;
- o Construction method for each work in relation with the proposed equipment; and,
- o Detailed work program covering i) Setting out and Surveys, ii) Preparation of Construction Drawings and

Construction Planning and iii) Temporary works.

- o Overseas Ast. Co. Ltd. (AST)
- o Dutco Construction Co. (PVT) Ltd. (DUTCO)
- o Costain International Ltd. (COSTAIN)
- o Joannou & Paraskevaides (Overseas) Ltd. (J&P)

Table I-1 summarizes the general information on these four tenderers. The bid bond, trade licence and registration certificate submitted by each of these tenderers have been judged to be satisfactory to the tender requirement of the MAF. The total cost of the tender and the completion period offered by each tenderer are tabulated below;

<u>Tenderer</u>	<u>Total Tender Cost</u>	<u>Completion Period</u>
AST	66,818,336.00 DH	20 months
DUTCO	25,943,490.00	15
COSTAIN	27,879,188.42	10
J&P	33,788,782.00	12

A copy of the trade licence and registration certificate of each participated tenderer is herein attached as Appendix B.

I-4. Participants in the Tender Evaluation

In accordance with the minute of discussions on the tendering and construction supervision of the Project dated November 30, 1981, JICA dispatched a tender evaluation team (T/E team) to UAE on December 16, 1981, in order to study the tender documents submitted by the tenderers, to select negotiable tenderers and to negotiate with such tenderers for the contract under the cooperations of the MAF. The participants in the tender evaluation are listed in Appendix C.

TABLE 1-1. INFORMATION ABOUT TENDERS

DESCRIPTION	AST	DUTCO	COSTAIN	J & P
1. Name of Contractors Home Address Telephone Number Cable Address Telex Address Established where and when Registered Capital Contractor's Bank (s)	Overseas Ast. Co. Ltd. P.O.Box 350, Dubai 221107 AMEC 45428 EM By Charter of Ruler of Dubai, 1964 Share holders equity over Dh. 10 million Citibank, Dubai, Abu Dhabi; British Bank of the Middle East; Chartered Bank	Dutco Construction Co. (P.V.I.) Ltd. P.O. Box 233, Dubai 257213 DICON 46911 Dubai, 1977 Dh. 5,000,000/- National Bank of Dubai	Costain International Ltd. 111 Westminster Bridge Rd 01-928-4977 COSDOWN LONDON SE1 8811804 COSDOWN England Est., 1930 U.K. £1,800,100 Sterling Loyds Bank Ltd., London	Joannou & Faraskevaide (Overseas Ltd.) St. Peter Port, Guernsey 25232 GUERNSEY MON Channel Island, U.K., 1961 U.K. £10,000,000 Grindlays; BEME; Lloyds
2. Address in UAE Telephone Number Name of Authorized Representative Private Address of Representative Registration Number in UAE Registered Capital Contractor's Bank in UAE	P.O. Box 350, Dubai 221107 E. Belgil P.O. Box 350, Dubai N/A As above As above	P.O. Box 233, Dubai 257213 J.A. Hancock P.O. Box 233, Dubai 6780 As above As above	P.O. Box 2526, Dubai 45075679 S.P. Said P.O. Box 2526, Dubai 916/sh 2886 Non Standard Chartered Bank, Dubai	P.O. Box 4624, Dubai 664800 M. Zambarloukos P.O. Box 4624, Dubai Abu Dhabi 1; Dubai 559; As above Grindlays; BEME; BCCI; National Bank; Lloyds
3. Bid Bond Sum (DH) Bank	3,800,000/- Citibank	1,500,000/- Dubai Bank Ltd.	1,500,000/- Lloyds Bank Ltd.	2,150,000/- United Arab Bank
4. Form of Tender Tender Total Cost Completion Period Performance Bond Mobilization Period Time for Completion	Dh. 66,918,336/- 20 months 10% agreed 4 weeks 20 months	Dh. 25,943,490/- 15 months 10% agreed 1 month 15 months	Dh. 27,879,188.42 10 months 10% agreed 15days 10 months	Dh. 33,788,782/- 12 months 10% agreed 1 month 11 months
5. Trade Licence	Acceptable	Acceptable	Acceptable	Acceptable
6. Registration Certificate	Acceptable	Acceptable	Acceptable	Acceptable

TABLE 1-2. QUESTIONNAIRE

DESCRIPTION	AST	DUTCO	COSTAIN	J & P
1. STAFF QUESTIONNAIRE				
1-1 In what manner have you inspected this project?	Site Visit	We have studied all the relevant tender documents and our engineers have visited the site and surrounding areas to examine the nature of the works and to investigate availability of construction materials.	Site visits by the Estimating Team	A qualified team of engineers has visited the site and carefully examined the location of the works.
1-2 Are you satisfied as to availability of labour, water and locally obtained materials?	Yes	Yes, excepting labour for riprap as discussed in our tender letter.	Yes	Yes
1-3 What arrangements do you propose to make in respect of the repair and maintenance of the mechanical plant detailed in the forms hereinafter?	Construct site workshop.	We already have a large and well organized plant repair workshop in Dubai from which experienced personnel will be drawn to operate a small on-site workshop capable of handling routine maintenance and all repairs other than major ones. Major repairs will be dealt with in our Dubai workshops.	Major maintenance/repairs can be carried out our extensive plant yard facility in Dibba. A service facility will be provided at Dam Site.	At our workshop
1-4 State the proposed location of your main site office, plant yard, etc.	To be advised.	Adjacent to the Dam Site.	Dibba harbour, with site facilities as needed.	Near the site of the works.
1-5 If you intend to sub-let part or parts of the works, state, if known, the name/s and address/es of Sub-Contractor/s stating qualification and experience.	Not envisaged at this stage.	Blasting: Land & Marine Drilling Co. (PVT) Ltd. Dubai. P.O. Box 2891, Dubai. Replacement of Power Distribution Line: B.K. Gulf (PVT) Ltd. P.O. Box 10079, Dubai	N/A	None
1-6 Details of Contractor's Technical Staff for the execution of this Contract.	To be advised on award.	Technical staff will be drawn from one staff of approximately 100 engineers and technicians.	Experienced qualified staff will be recruited from within the Costain Group organization.	Six (6) Engineers

II. STUDY ON OFFERS

The T/E team studied the tender documents taking into consideration the counter offers made by the tenderers. The offers and their evaluation are herein described by the major evaluation items.

II-1. Technical Staff

The offer on technical staff for the execution of construction works for the Project is the basic information needed for evaluation of the tender documents as required in the questionnaire items 5.7A and 5.7B of the Tendering Procedure and Bill of Quantities (hereinafter referred to as the "TP/BQ"). However, all the tenderers except J&P have made insufficient offers as follows;

AST: "To be advised on award"
DUTCO: "Technical staff will be drawn from our staff of approximately 100 engineers and technicians."
COSTAIN: "Experienced qualified staff will be recruited from within the Costain group organization."
J&P: Six engineers proposed

In this connection, negotiable tenderers to be selected should submit the detailed offer on the above-mentioned technical staff organization for the Project in the early stage of negotiation.

II-2. Equipment

Needless to say, the offer on equipment to be used for construction works is indispensable for evaluation of tenders together with that on the organization of technical staff and laborers. The following offers have been made by the tenderers in respect of the equipment list required in the questionnaire item 5.8 of the TP/BQ;

AST: "A complete list of plant fully owned with utilized in UAE. Plant on order but not delivered has not been included."

DUTCO: Totally 35 units of equipment in 10 types

COSTAIN: Totally 105 units of equipment in 26 types

J&P: Totally 37 units of equipment in 12 types

Tables 2-1 and 2-2 show the details of equipment offered by the tenderers. These tables indicate that all the tenderers except COSTAIN have proposed insufficient units and types of equipment for the Project. Furthermore, their arrangement of equipment for each item of the construction works for the Project, that is, the dam foundation works, embankment works, spillway works and others, is not properly made. In consequence, COSTAIN is deemed the most advantageous among the four tenderers so far as their offers for the equipment are concerned.

II-3. Similar Works Executed

In respect of the questionnaire item 5.9 "Reference of Similar Works Executed", the tenderers have submitted the following information;

AST:

- o Three fishing harbour projects, two at Kalba and one at Fujairah in UAE, of which projects value totals DH 85 millions.
- o 15 years' experience in dam construction and 20 years' experience in the other works.

DUTCO:

- o Two harbour and marine projects both in Dubai, UAE, of which projects value totals DH 1,570 millions.
- o No experience in dam construction and 34 years' experience in the other works.

COSTAIN:

- o Six dam projects abroad of which project value totals £ 33.47 millions.

TABLE 2-1. EQUIPMENT OFFERED BY TENDERS (1)

EQUIPMENT	AST	DUTCO	COSTAIN	J & P
1. Bulldozer		CAT D8 3 units	CAT D8 CAT D6 3 units	CAT D9 CAT D8 CAT D6 1 unit 1 1
2. Loader		CAT 966 CAT 950 6 2	CAT 980 CAT 965 3 2	CAT 977 CAT 966 CAT 950 CAT 930 2 2 2 1
3. Backhoe		HYMAC 590 1	HYMAC 580 1	
4. Truck (Dump) (Tipper)		VOLVO N1033 6	FODEN FC27 VOLVO N1033 VOLVO N1027 15	FODEN FC15 MAN/MAGIRUS 4 9
5. Roller				AV BAR T208 ING HAND SP54 1 1
6. Vibrating Roller		DYNAPAC CA25 2	DYNAPAC CC41 DYNAPAC CH47 BOMAG B75 F 1 1 1	
7. Tractor			FORD 5 Ton 4 10	
8. Grader		CAT 14 G 1	CAT 14G 1	CAT 14G 1
9. Bowser		3,000 Gall. 2	BEDFORD/FODEN 2	SCANIA (15 ton) 3
10. B1 Plant				VIA NOVA (150 ton/hr) 1
11. Concrete Plant			WINGET 1	ROSS (20m ³ /hr) 1
12. Truck Mixer			ELBU (6m ³) 4	WINGET 2
13. Concrete Mixer				
14. Crusher			PARKER 1	
15. Screen Plant			PARKER 1	
16. Truck Crane			RAMSON-RAIPUR P&H (40ton) GROVE (25ton) 1 1 1	PETTI BOVE (15 ton) 1
17. Drill Rig				ING. RAND 601 1
18. Truck Drill			INGERSOL RAND 2	
19. Compressor			CP 4	ING. RAND 750CFH 1
20. Blower				JCB 5C 1

TABLE 2-2. EQUIPMENT OFFERED BY TENDERS (2)

EQUIPMENT	AST	DUTCO	COSTAIN	J & P
21. Hammer		1 unit		
22. Dumper		MONTABERT S01		
23. Flatbed		BENTON (2ton)	1 unit	
24. Pump			BENFORD (7ton)	
25. Generator			FLYGT SYRES	1 1
26. Lighting			CAT (225 KVA) CAT (150 KVA)	3 3
27. Welding Set			WYSEPOWER	20
28. Mortar Mixer			LINGON	1
29. Car			WINGET	1
30. Pickup			TOYOTA	3
31. Mini-bus			TOYOTA	5
32. Bus			BEDFORD	1
33. Diesel Bowser			FODEN	2
	<p>A completed list of plant fully owned with utilized in the U.A.E.</p> <p>Plant on order but not delivered has not been included.</p>			1

TABLE 2-3. SIMILAR WORKS EXECUTED

DESCRIPTION	AST	DUTCO	COSTAIN	J & P
o Name of Projects	(1) Kaiba Fishing Harbour (2) Fujairah Fishing Harbour (3) Khorkaba Harbour Development	(1) Jebel Ali Harbor (2) Hassan Marine	(1) VSK Reservoir (2) Qudiem Dam (3) El Cadilla Dam (4) Balcher Head Reservoir (5) Nyumba Dam (6) Kirindi Oya Dam	(1) Pomas & Kalopa M Dam (2) Puwais F. Plant (3) Fujairah-Khorfakkan Highway (4) Dhaid-Fujairah Carriage-way (5) Asprokremmos Dam
o Places	(1) Kaiba (2) Fujairah (3) Kaiba	(1) Dubai (2) Dubai	(1) (2) and (4) U.K. (3) Argentina (5) Tanzania (6) Sri Lanka	(1) and (5) Cyprus (2), (3) and (4) U.A.E.
o Value of Projects	(1) Dh. 32 M. (2) Dh. 16 M. (5) Dh. 37 M.	(1) Dh. 1,500 M. (2) Dh. 70 M.	(1) £2.5 M. (2) £4.35 M. (3) £13.0 M. (4) £2.5 M. (5) £1.5 M. (6) £10.0 M.	(1) \$0.25 M. (2) Dh. 9.26M. (3) Dh. 76.9M. (4) Dh. 102.17M. (5) \$ 23.0 M.
o Clients' Names	(1) H.H. The Ruler of Dubai (2) H.H. The Ruler of Dubai (3) Ministr of Public Works & Housing	(1) Government of Dubai (2) Government of Dubai	(1) Swan Sea Corp. (2) North of Scotland E/B (3) Govt. of Tucuman (4) Tees Valley W/B (5) Govt. of Tanzania (6) Rivers Valleys Board	(1) Water Dev. Dept. of Cyprus (2) Abu Dhabi N.O.C. (3) and (4) Public Works Dept. (4) Water Dev. Dep. of Cyprus
o Description of Works	(1) 0.7 MCM Quarrying (2) 0.3 MCM Quarrying (3) Bridge Dredging	(1) Civil Construction of Breakwaters (2) Rockfill and Concrete Breakwaters	(1) E/F: L=450m, H=33.5m (2) B/F: L=335m, H=37m (3) E/F: L=500m, H=67m (4) E/F: L=915m, H=50m (5) R/F: L=400m, H=40m (6) E/F: L=5km, H=25m	(1) E/F: Irrigation Tunnel (2) Earth Works 1.2 MCM (3) Earth Works 1.0 MCM, L=25 km (4) Earth Works 1.6 MCM, L=65 km (5) E/F
o Summary of Experience	15 years 20 years in UAE	- 34 years	35 years 50 years	6 years 20 years
* Earth or Rockfill Dam				
* Other Works				

- o 35 years' experience in dam construction and 50 years' experience in the other works.

J&P:

- o Two dam projects abroad of which projects value totals £ 23.25 millions and the other projects in UAE of which projects value totals DH 188.33 millions.
- o Six years' experience in dam construction and 20 years' experience in the other works.

The detailed information on experience of the tenderers in dam construction and the other works is shown in Table 2-3. From the view point of experience, COSTAIN has the richest experience in constructing earthfill and rockfill dams as well as in the other works among the four tenderers. Moreover, COSTAIN has experienced various scales of dams with a dam length ranging from 335 m to 5,000 m and with a dam height of 25 m to 67 m in their six dam projects. Apart from COSTAIN, J&P has constructed only two dams, AST mentions that it has 15 years' experience in dam construction, however, no description on such dam projects is given in its offer, and DUTCO has no experience in dam construction although these contractors have 20 to 34 years' experience in the other works in UAE and abroad. In this aspect, the two companies of COSTAIN and J&P are acceptable as negotiable tenderers, however, COSTAIN has richer experience in dam construction than J&P.

III-4. Proposed Work Programs

As for the questionnaire item 5.10 of the TP/BQ, the tenderers have offered the following estimated work programs;

Estimated Work Program

<u>Description</u>	(Unit: month)			
	<u>AST</u> (%)	<u>DUCTO</u> (%)	<u>COSTAIN</u> (%)	<u>J&P</u> (%)
Mobilization	2.0(6)	3.0(7)	1.0(5)	2.0(8)
Temporary Works	2.0(6)	2.0(5)	3.0(14)	4.0(15)
Foundation W.(1)	4.0(11)	3.0(7)	5.0(23)	4.0(15)
Dam Body W. (2)	10.0(29)	12.0(29)	9.0(41)	6.0(23)
Sub-total(1)+(2)	<u>14.0(40)</u>	<u>15.0(36)</u>	<u>14.0(63)</u>	<u>10.0(38)</u>
Spillway Works	9.0(25)	14.0(34)	4.0(18)	4.0(16)
Miscellaneous W.	8.0(23)	7.0(18)	-	6.0(23)
<u>Total</u>	<u>35.0(100)</u>	<u>41.0(100)</u>	<u>22.0(100)</u>	<u>26.0(100)</u>
<u>Program Period</u>	<u>20.0</u>	<u>15.0</u>	<u>10.0</u>	<u>12.0</u>

Paying particular attention to the dam construction, all the tenderers have proposed a 14- to 15-month period for the foundation and dam body works except J&P. Specially, COSTAIN gives 63 percent of the total work program period (22 months) to the foundation and dam body works, which suggests that the work program of this tenderer is the most acceptable in comparison with the others. On the other hand, all the tenderers have scheduled to complete the temporary works within two to four months. Apart from their offers, the temporary works, which should cover the site installation of plant and equipment as well as camping facilities such as buildings for office, workshop, repair shop, laboratory, canteen and labours accommodation, are considered to take at least three to four months. However, DUCTO and COSTAIN have offered to commence the main works one month after the site handover to the contractor. It is deemed that these two tenderers have not fully taken into consideration a period needed for preparation works in their work program, therefore, their intention in respect of the time schedule for the following preparation works should be made clear in the negotiation period, if they are selected;

- a) Setting out of and surveying on the dam axis, spillway and service road and routing of the center line

- replacement of the existing power distribution line.
- b) Preparation of construction drawings, computation of the quantities of necessary materials, decision of construction methods in consideration of equipment, formulation of a detailed construction schedule for each work item inclusive of the temporary works.
 - c) Site installation of plant, equipment, contractor's camping facilities, laboratory, labours' accommodation and others.

For the above-mentioned preparatory works, the contractor shall prepare and submit a detailed schedule to the Engineer for its approval prior to the commencement of the works if not otherwise directed by the Engineer.

II-5. Construction Materials

All the tenderers have answered "Yes" to the questionnaire item 5.2. "Are you satisfied as to availability of labour, water and locally obtained materials?" except DATCO who answered "Yes, excepting labour for riprap as discussed in our tender letter." As for the construction materials, the negotiable tenderers should submit the detailed offers dividing the construction materials into these for the major construction works such as cement, reinforcing bar, fuel, dynamite, etc., and these locally obtained.

II-6. Counter Offers

The counter offers made by tenderers are shown in Table 2-5. The following suggestions are herein made against their counter offers along with the basic lines of the Tender Documents specially of the Instruction to Tenderers as well as the Tender Drawings;

(1) AST

AST has submitted a list of staff and plant owned and utilized in UAE in spite that the Tender Documents

TABLE 2-4. PROPOSED WORK PROGRAMS

Item	Month	2	4	6	8	10	12	14	16	18	20
<u>AST</u>											
Mobilization		1									
Temporary Works		1	3								
Foundation Works		1	3								
Dam Body Works		1	3								
Spillway Works		1	3								
Miscellaneous		1	3								
<u>DUTCO</u>											
Mobilization		1									
Temporary Works		1	3								
Foundation Works		1	3								
Dam Body Works		1	3								
Spillway Works		1	3								
Miscellaneous		1	3								
<u>COSTAIN</u>											
Mobilization		1									
Temporary Works		1	3								
Foundation Works		1	3								
Dam Body Works		1	3								
Spillway Works		1	3								
Miscellaneous		1	3								
<u>J & P</u>											
Mobilization		1									
Temporary Works		1	3								
Foundation Works		1	3								
Dam Body Works		1	3								
Spillway Works		1	3								
Miscellaneous		1	3								

instruct to tenderers to submit the list of staff and plant that they intend to mobilize and bring into for the construction works in the Project, which suggests that this contractor might not be ready to meet the requirements.

(2) DUTCO

DUTCO has submitted three memoranda as follows;

- (a) Payment of an advance of 25 % of the construction cost:

This proposal should be rejected in accordance with Article 2.20 "Advance Payment by the Employer" of the Instructions to Tenderers in the TP/BQ.

- (b) Request for the order to commence the works by end April, 1982

This matter shall be discussed with the MAF if this contractor is selected for negotiation.

- (c) 30 cm thick stone-filled gabion mattresses in place of the riprap works for Item 3.10, Part III, "Main Dam" of the TP/BQ.

This proposal should be rejected in accordance with Article 2.4. "General Requirement" of the Instructions to Tenderers as explained in detail in Section II-7 of this report.

(3) COSTAIN

COSTAIN has submitted 13 items of clarification on the tender as listed in Table 2-5. The following counter offers are herein taken up, and the others are regarded as negotiation items as mentioned in Chapter IV of this report.

- (a) Gabion (3 mm wire 7.5 cm mesh on a 3.9 mm frame)

COSTAIN shall be requested to submit the supporting data on the reduction to DH 27,494,188.00 by monetary terms for reference.

- (b) Conduit Pipe (1.4 m diameter asbestos cement pipe)

This offer should be rejected in accordance with Article 2.4. "General Requirement" of the Instructions to Tenderers in the TP/BQ.

TABLE 2-5. COUNTER OFFERS OF TENDERS

AST	DUTCO	COSTAIN	J & P
<p><u>Tender Submission:</u></p> <p>A complete list of staff and plant fully owned and utilized in the UAE</p> <p>Plant on order but not delivered has not been included.</p>	<p><u>Memorandum of Offer:</u></p> <p>Our tender inclusive and is based on the following:</p> <ol style="list-style-type: none"> 1) Payment of an advance of 25% of the Contract Sum to us as a National Contractor. 2) We should require an order to commence the works by end April 1982 because of seasonal weather. 3) In view of the difficulty and delays in obtaining the large number of masons and labourers that would be required to dress and place the very large quantities of stone for riprap, we are unable to offer this method of slope protection. We would offer 30cm thick stone filled gabion mattresses as protection to the faces of the dam. 	<p><u>Clarification of Tender:</u></p> <ol style="list-style-type: none"> 1. Gabions 2. Conduit Pipe 3. Curved Formwork 4. Resident Engineer's Accommodation 5. Overtime and night working 6. Sand 7. Concrete temperature 8. Source of materials 9. Suitability of materials 10. Riprap 11. Existing facilities 12. Spoil bank 13. Quarry site-stripping <p>The details clarification of tender is as attached in Appendix.</p>	<p><u>Tender Submission:</u></p> <p>Should we be successful in this tender, we intend to carry out this work in J/7 with Messrs. National Construction Est. as attached letter dated 30th November, 1981 from Messrs N.C.E. in Appendix.</p>

(4) J&P

J&P has proposed to carry out the works in the joint venture with National Construction Est (NCE). This proposal conflict with no articles of the Instructions to Tenderers in the TP/BQ, and is acceptable. If selected as a negotiable tenderer, the company's qualification of NCE shall be submitted to the MAF from this tenderer.

I-7. Bill of Quantities

(1) General

A study on the bill of quantities (B/Q) submitted by each tenderer is carried out in the following manners;

- a) Verification of computations made in the B/Q;
- b) In case that mis-computations are found in respect of some items of the B/Q, the lower between the original amounts and the corrected amounts are adopted in accordance with Article 2.4 of the Instructions to Tenderers. In other words, if the corrected amounts are lower than the original amounts offered by the tenderers, the corrected amounts are applied for such mis-computed items. On the contrary, if the corrected amounts are higher than the original amounts, the original amounts are applied for such items, and the related rates are corrected.
- c) In case that counter offerers made by a tenderer is rejected, the highest rates offered by the other tenderers are applied for the items involved in the counter offers, for price comparison only whereas the lowest rates offered by the other tenderers are applied for payment after awarding the contract.
- d) Along with the above-mentioned directions, all mis-computations are corrected.
- e) Rates offered by each tenderer for important items of the B/Q are analyzed.
- f) The rates offered by the most acceptable tenderer are evaluated.

The above-mentioned verification of computations has revealed that all of the four offers involve some mis-computations. Except the offers of DUTCO and COSTAIN, corrected amounts are lower than the original amounts, therefore, the corrected amounts are applied for the mis-computed items of their offers. On the other hand, DUTCO's mis-computations result in high corrected amounts in comparison with the original amounts, the rates originally offered by this tenderer are applied to its mis-computed items. The following table shows the mis-computed items and the corrected rates as well as amounts of each tenderer;

Mis-computed Items and Corrected Rates and Amounts

<u>Item No.</u>	<u>Description</u>	<u>Rate</u> (DH)	<u>Amount</u> (DH)
o AST			
Part V.	CONDUIT		
5.05.	Reinforcing Bar	3.70	92,500.00*
o DUTCO			
Part VII.	DAYWORK SCHEDULE		
7.12	Sand	10.00*	300.00
o COSTAIN			
Part VII.	DAYWORK SCHEDULE		
7.02	Mason	94.02	6,581.40*
7.03	Concretor	94.02	6,581.40*
7.04	Bar Bender	94.02	6,581.40*
7.05	Carpenter	94.02	6,581.40*
o J&P			
Part V.	CONDUIT		
5.05	Level Concrete	552.93	27,646.50*
5.04	Reinforced Concrete	580.31	377,201.50*
5.10	R.C. Pipe	720.46	93,659.80*
5.13	Wire Stabler of Pipe	128.25	16,672.50*

Note: Figures with * show the corrected ones whereas figures without * show the original ones.

Furthermore, DUTCO has offered to substitute gabion mattresses for the riprap works in respect of Item 3.10. As mentioned above, this offer is rejected in accordance with the General Requirements of the Instructions to Tenderers, and DUTCO is regarded to have failed to quote this item. The highest rate offered by J&P for this item, that is, DH 208.24, is applied to DUTCO's rate for price comparison, resulting in the amount of DH 8,537,840.00 accordingly. The originally offered total tender price and the corrected one of each tenderer in consideration of the above-mentioned mis-computations and rejection are tabulated below;

<u>Tenderer</u>	<u>Total Tender Price</u>	
	<u>Original Price</u>	<u>Corrected Price</u>
AST	66,818,330.00	66,817,836.00
DUTCO	25,943,490.00	28,601,330.00
COSTAIN	27,879,188.42	28,011,900.40
J&P	33,788,782.00	33,788,780.30

(Unit: DH)

As seen in the above table, DUTCO has offered the lowest total tender price, however, after the correction, COSTAIN's total tender price becomes the lowest. The breakdown of the above total tender prices is shown in Tables 2-6 to 2-10.

(2) Analysis of the Bill of Quantities

The bill of quantities for which the price analyses are herein made consists of seven parts. The seven parts are grouped into the following three volumes;

Volume 1:	Part I.	General
	Part II.	Site Installation
Volume 2:	Part III.	Main Dam
	Part IV.	Spillway
	Part V.	Conduit
	Part VI.	Miscellaneous Works
Volume 3:	Part VII.	Dayworks Schedule

TABLE 2-6. OFFERED BILL OF QUANTITIES AND CORRECTIONS (1)

ITEM NO.	DESCRIPTION	QUANTITY	AST		DUTCO		COSTAIN		J & P	
			RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT
PART I. GENERAL										
1.01	As-built Drawings	L.S.		61,440		10,000		INCL		17,100
1.02	Setting Out	L.S.		132,800		100,000		23,404		INCL
1.03	Signpost and Notice Board	L.S.		9,600		10,000		5,939		25,650
1.04	Engineer's Office	L.S.		112,640		350,000		394,402		595,798
1.05	Engineer's Residences	L.S.		403,200		150,000		196,472		346,993
1.06	Engineer's Transportation	L.S.		268,800		500,000		234,591		432,004
1.07	Progress Report and Photographs	Month	21 ^m x 6144 =	129,074	15 ^m x 4400 =	66,000	10 ^m x 1604 =	16,040	12 x 8550 =	102,600
	Sub-Total			1,117,504		1,185,000		870,848		1,530,145
PART II. SITE INSTALLATION										
2.01	Construction & Running of Necessary facilities	L.S.		11,200,300		500,000		3,644,726		INCL
2.02	Custody and Protection	L.S.		98,000		100,000		59,718		INCL
2.03	Illumination	L.S.		251,597		200,000		INCL		INCL
2.04	Telecommunication	L.S.		94,500		200,000		88,918		INCL
2.05	Access	L.S.		378,000		200,000		163,711		171,000
2.06	Storing Area	L.S.		29,000		100,000		INCL		INCL
2.07	Power Supply	L.S.		221,000		200,000		355,762		INCL
2.08	Water Supply	L.S.		486,000		100,000		23,757		INCL
2.09	Accident and Fire Prevention	L.S.		21,250		100,000		INCL		INCL
2.10	Safety Precautions	L.S.		161,280		100,000		INCL		INCL
2.11	Sanitation and Medical Care	L.S.		208,320		100,000		54,048		INCL
2.12	Facilities for Site Operation	L.S.		274,000		100,000		1,009,610		461,187
2.13	Cleaning-up, Restoration	L.S.		603,000		100,000		118,786		INCL
2.14	Waste Disposal & Sewage Treatment	L.S.		76,000		100,000		10,691		INCL
2.15	Construction Precession Plants	L.S.		214,000		760,350		IN RATES		307,800
2.16	Field Laboratory	L.S.		341,000		500,000		165,052		554,665
	Sub-Total			14,657,247		3,460,350		5,674,780		1,494,652

TABLE 2-7. OFFERED BILL OF QUANTITIES AND CORRECTIONS (2)

ITEM NO.	DESCRIPTION	QUANTITIES	AST		DUTCO		COSTAIN		J & P	
			RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT
PART III. MAIN DAM										
3.01	Stripping	110,000cu.m	8.80	968,000	4.20	462,000	4.55	500,500	11.32	1,245,200
3.02	Common Excavation	56,000cu.m	21.70	1,215,200	4.40	246,400	4.81	269,360	11.32	633,920
3.03	Rock Excavation of Dam Abutment	400cu.m	175.00	70,000	180.00	72,000	19.37	7,748	28.16	11,264
3.04	Embankment of Sand & Gravel	370,000cu.m	12.95	4,791,500	7.40	2,738,000	7.72	2,856,400	15.42	5,705,400
3.05	Embankment of Filter	59,000cu.m	28.40	1,675,600	22.60	1,333,400	47.61	2,808,990	44.94	2,651,460
3.06	Embankment of Rock	210,000cu.m	82.50	17,325,000	25.00	5,250,000	22.17	4,655,700	20.74	4,355,400
3.07	Plain Concrete	300cu.m	1,275.00	382,500	250.00	69,000	338.18	101,454	508.50	152,550
3.08	Formworks	1,400sq.m	92.00	128,800	22.00	30,800	22.60	31,640	60.41	84,574
3.09	Paving of Dam Crest by Gravel	800cu.m	140.40	112,320	20.00	16,000	41.86	33,488	50.39	40,312
3.10	Riprap	41,000cu.m	56.00	2,296,000	(208.24)	8,537,840	119.37	4,894,170	208.24	8,537,840
3.11 *	Cablon Mattress	84,000sq.m	-	-	70.00	5,880,000	-	-	-	-
	Sub-Total			28,964,920		16,097,600		16,159,450		23,417,920
	Sub-Total (after correction)					18,755,440				
PART IV. SPILLWAY										
4.01	Common Excavation	10,000cu.m	28.00	280,000	4.30	43,000	4.81	48,100	11.32	113,200
4.02	Rock Excavation	73,000cu.m	95.00	6,935,000	17.00	1,241,000	16.48	1,203,040	24.86	1,814,780
4.03	Reinforced Concrete	2,000cu.m	675.00	1,350,000	270.00	540,000	417.97	835,940	580.31	1,160,620
4.04	Reinforcing Bar	13,000Kg	4.16	54,080	2.70	35,100	2.42	31,460	3.64	47,320
4.05	Formworks	300sq.m	127.00	38,100	35.00	10,500	41.19	12,357	60.41	18,123
4.06	Curved Formworks	700sq.m	234.00	163,800	65.00	45,500	58.28	40,796	90.63	63,441
4.07	Cablon	5,500cu.m	538.00	2,959,000	130.00	715,000	191.00	1,050,500	155.29	854,095
	Sub-Total			11,779,980		2,630,100		3,222,193		4,071,579
<p>NOTE: 1) Gabion Mattress of DUTCO is counter offer which is rejected. 2) Rate and Amount of Riprap of DUTCO is the highest ones in accordance with 2.4.d) of Instructions to Tenderers.</p>										

TABLE 2-8. OFFERED BILL OF QUANTITIES AND CORRECTIONS (3)

ITEM NO.	DESCRIPTION	QUANTITIES	AST		DUTCO		COSTAIN		J & P	
			RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT
PART V. CONDUIT										
5.01	Conduit Excavation	4,500cu.m	87.00	391,500	4.40	19,800	7.13	32,085.00	28.08	126,360.00
5.02	Backfill	600cu.m	48.00	28,800	11.00	6,600	4.75	2,850.00	53.30	31,980.00
5.03	Level Concrete	50cu.m	826.00	41,300	200.00	10,000	352.15	17,607.50	552.93	* 27,646.50
5.04	Reinforced Concrete	650cu.m	1,481.00	962,650	500.00	195,000	499.09	324,408.50	580.31	* 377,201.50
5.05	Reinforced Bar	25,000kg	3.70	* 92,500	3.00	75,000	2.42	60,500.00	3.64	91,000.00
5.06	Formworks	500sq.m	296.00	148,000	23.00	11,500	41.19	20,595.00	60.41	30,205.00
5.07	Dowel Bar	600No.	157.00	94,200	10.00	6,000	17.82	10,692.00	51.30	30,780.00
5.08	Water Stop (B=400mm)	140m	527.00	73,780	210.00	29,400	67.29	9,420.60	342.00	47,880.00
5.09	Elastic Filter	100sq.m	3,600.00	360,000	70.00	7,000	356.36	35,636.00	76.95	7,695.00
5.10	R.C. Pipe	130m	1,829.00	237,770	500.00	65,000	(1,829.00	237,770)	720.46	* 93,659.80
5.11	Masonry	800cu.m	657.80	526,240	240.00	192,000	166.30	133,040.00	230.05	184,040.00
5.12	Gabion	2,600cu.m	475.00	1,235,000	130.00	338,000	191.00	496,600.00	155.29	403,754.00
5.13	Wire Stabler of Pipe	130No.	697.00	90,610	115.00	14,950	59.39	7,720.70	128.25	* 16,672.50
	Sub-Total			4,282,850		970,250		1,255,343.80		1,468,876.00
	Sub-Total (after correction)			4,280,350				1,388,925.30		1,468,873.30
PART VI. MISCELLANEOUS WORKS										
6.01	Service Road (w=7.0m Asphalt paving)	2,000m	1,043.00	2,086,000	536.00	1,072,000	159.04	318,080	571.14	1,142,280
6.02	Replacement of Power Distribution Line	2,000m	1,715.00	3,430,000	51.00	102,000	52.3%	104,680	75.00	150,000
	Sub-Total			5,516,000		1,174,000		422,760		1,292,280

NOTE: * mean corrected figures in accordance with 2.4c) of instructions to Tenderers.
Rate and Amount of R.C. Pipe of COSTAIN are the highest ones in accordance with 2.4d) of Instructions to Tenderers.

TABLE 2-9. OFFERED BILL OF QUANTITIES AND CORRECTIONS (4)

ITEM NO.	DESCRIPTION	QUANTITIES	AST		DUTCO		COSTAIN		J & P	
			RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT
PART VII. DAYWORKS SCHEDULE										
<u>Labour</u>										
7.01	Labourer	700 day	151.00	91,700	100	70,000	71.07	49,749.00	160	112,000
7.02	Mason	70 day	150.00	10,500	170	11,900	94.02	6,581.40	180	12,600
7.03	Concretor	70 day	150.00	10,500	170	11,900	94.02	6,581.40	180	12,600
7.04	Bar Bender	70 day	150.00	10,500	170	11,900	94.02	6,581.40	180	12,600
7.05	Carpenter	70 day	150.00	10,500	170	11,900	94.02	6,581.40	180	12,600
7.06	Mechanic	70 day	190.00	13,300	170	11,900	123.50	8,645.00	250	17,500
7.07	Foreman (incharge of labourers)	70 day	280.00	19,600	170	11,900	129.68	9,077.50	750	52,500
<u>Materials</u>										
7.09	Explosive including Detonator	30 Kg	295.00	8,850	30	900	10.26	307.80	15	450
7.10	Coarse Aggregate	30 cu.m	89.00	2,670	30	900	28.80	864.00	70	2,100
7.11	Fine Aggregate	20 cu.m	71.00	1,420	15	300	28.80	576.00	70	1,400
7.12	Sand	30 cu.m	71.00	2,130	* 10	300	28.80	864.00	70	2,100
7.13	Portland Cement	10 ton	1,680.00	16,800	700	7,000	450.00	4,500.00	875	8,750
7.14	Reinforcing Bar	10 ton	2,150.00	21,500	2,000	20,000	1,980.00	19,800.00	2,450	24,500
7.15	Softwood (all sizes)	10 cu.m	1,125.00	11,250	2,000	20,000	1,080.00	10,800.00	2,275	22,750
7.16	Bitumen 60/70 Penetration Grade	20 ton	1,800.00	36,000	1,800	36,000	1,560.00	31,200.00	2,730	54,600
7.17	Wire (all sizes)	30 Kg	29.00	870	3	90	2.40	72.00	10	300
7.18	Gasoline	300 liter	3.25	975	1	300	1.00	300.00	2	600
7.19	Diesel Oil	150 liter	3.20	480	1	150	0.90	135.00	2	300
7.20	Heavy Oil	150 liter	4.80	720	1	150	0.90	135.00	2	300
<u>Plant</u>										
7.21	Bulldozer from 80 to 100 HP	30 hour	306.00	9,180	250	7,500	98.24	2,947.20	190	5,700
7.22	Bulldozer from 100 to 200 HP	30 hour	412.00	12,360	300	9,000	98.24	2,947.20	386	11,580
7.23	Fulldozer over 200 HP	30 hour	521.00	15,630	400	12,000	212.71	6,381.30	498	14,940
7.24	Scraper from 10 to 12cu.m struck	30 hour	900.00	27,000	500	15,000	424.80	12,744.00	275	8,250
7.25	Scraper over 12 cu.m struck	30 hour	1,215.00	36,450	800	24,000	638.40	19,152.00	375	11,250
7.26	Tractor from 400 to 200 HP	60 hour	276.00	16,560	400	24,000	36.26	2,175.60	386	11,910
7.27	Excavator Shovel from 1.0 to 1.5 cu.m capacity	30 hour	400.00	12,000	350	10,500	76.55	2,296.50	230	6,900

TABLE 2-10. OFFERED BILL OF QUANTITIES AND CORRECTIONS (5)

ITEM NO.	DESCRIPTION	QUANTI-TIES	AST		DUTCO		COSTAIN		J & P	
			RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT
7.28	Wheel Type Loader, from 1.5 to 2.5 cu.m capacity	30 hour	416.00	12,480	380	11,400	136.74	4,102.20	256	7,680.00
7.29	Dump Truck, from 10-12 ton capacity	40 hour	216.00	8,640	200	8,000	120.00	4,800.00	135	5,400.00
7.30	Dump Truck, over 12 ton capacity	30 hour	308.00	9,240	300	9,000	144.00	4,320.00	155	4,650.00
7.31	Vibrating Roller, from 6 to 10 ton	30 hour	217.00	6,510	150	4,500	68.04	2,041.20	107	3,210.00
7.32	Truck Crane, from 10 to 15 ton	30 hour	345.00	10,350	400	12,000	112.40	3,372.00	196	5,880.00
7.33	Crawler Drill, any size	30 hour	217.00	6,510	150	4,500	48.17	1,445.10	122	3,660.00
7.34	Air Compressor, 90 PS or below	30 hour	94.00	2,820	100	3,000	36.00	1,080.00	135	4,050.00
7.35	Air Compressor, over 90 PS	30 hour	176.00	5,280	150	4,500	42.68	1,280.40	165	4,950.00
7.36	Rock Drill, 30 kg class	20 hour	55.00	1,100	50	1,000	2.40	48.00	25	500.00
7.37	Leg Drill, 15 kg class	30 hour	40.00	1,200	30	900	2.40	72.00	25	750.00
7.38	Leg Drill, 30 kg class	30 hour	57.00	1,710	50	1,500	2.40	72.00	35	1,050.00
7.39	Pick Hammer, any size	30 hour	22.00	660	20	600	4.20	126.00	45	1,350.00
7.40	Concrete Mixer, 0.5cu.m class	40 hour	12.00	480	100	4,000	30.00	1,200.00	47	1,860.00
7.41	Concrete Mixer, 0.2cu.m class	40 hour	10.00	400	70	2,800	24.00	960.00	53	2,120.00
7.42	Concrete Vibrator, 4 PS class	70 hour	22.00	1,540	40	2,800	60.00	4,200.00	15	1,050.00
7.43	Pump 10 PS class	70 hour	39.00	2,730	60	4,200	13.68	1,377.60	300	21,000.00
7.44	Generator, over 100 KVA	20 hour	67.00	1,340	100	2,000	45.64	912.80	135	2,700.00
7.45	Generator, 100 KVA or below	20 hour	53.00	1,060	80	1,600	36.00	720.00	90	1,800.00
7.46	Water Lorry, 5000 liter	20 hour	187.00	3,740	200	4,000	50.11	1,002.20	155	3,100.00
7.47	Agitator Car, 3.0cu.m class	20 hour	376.00	7,520	200	4,000	112.92	2,258.40	223	4,460.00
7.48	Mixer Truck, 3.0cu.m class	20 hour	417.00	8,340	250	5,000	112.92	2,258.40	223	4,460.00
7.49	Vibrating Compactor 4PS class	20 hour	79.00	1,580	20	400	24.00	480.00	25	500.00
7.50	Motorgrader, from 80 to 100 HP	20 hour	272.00	5,440	200	4,000	141.05	2,821.00	240	4,800.00
	Sub-Total			499,835		425,190		253,813.62		523,730.00
	Sub-Total (After Correction)							252,944.10		
	TOTAL			66,818,330		25,943,490		27,879,188.42		33,788,782.00
	TOTAL (After Correction)			66,817,836		28,601,330		28,011,900.40		33,788,780.30

NOTE: * means corrected figures in accordance with 2.4.1.c) of Instructions to Tenderer.

The price analyses herein made depend on the corrected rates and amounts. The amounts for Volumes 1 to 3 and their ratio out of the total price are tabulated for each tender as follows;

Amount and Ratio by Volumes

(Unit: DH)

	<u>Volume 1</u>	<u>Volume 2</u>	<u>Volume 3</u>	<u>Total</u>
AST:				
Amount:	15,774,751.00	50,543,250.00	499,835.00	66,817,836.00
Ratio(1)	23.6 %	75.6 %	0.8 %	100 %
Ratio(2)	23.8 %	76.2 %	-	100 %
DUTCO:				
Amount	4,646,350.00	23,529,790.00	425,340.00	28,610,330.00
Ratio(1)	16.2 %	82.3 %	1.5 %	100 %
Ratio(2)	19.4 %	80.6 %	-	100 %
COSTAIN:				
Amount	6,565,628.00	21,193,328.30	252,944.10	28,011,900.40
Ratio(1)	23.4 %	75.7 %	0.9 %	100 %
Ratio(2)	23.7 %	76.3 %	-	100 %
J&P:				
Amount	3,014,797.00	30,250,653.30	523,330.00	33,788,780.30
Ratio(1)	8.9 %	89.6 %	1.5 %	100 %
Ratio(2)	9.1 %	90.9 %	-	100 %

Note: Ratio(1): Price for each volume/ Total price
x 100

Ratio(2): Price for each volume/ Price for Volume
1 + price for Volume 2

It is generally accepted that, in case of construction works of which total construction cost amounts to some DH 30 millions, the reasonable cost for the above-mentioned Volume 1 is equivalent to about 25 percent of the total construction cost. In this view, the amounts offered by AST and COSTAIN for Volume 1 are considered to be reasonable and the amounts of DUTCO and J&P are slightly low.

A) General and Site Installation (Parts I and II)

AST and DUTCO have offered their amounts for all the items under Parts I and II whereas COSTAIN and J&P have expressed their amounts for these items by "INCL" or "in Rates" as shown below;

<u>Item</u>	<u>Description</u>	<u>COSTAIN</u>	<u>J&P</u>
PART I. GENERAL			
1.01	As- built Drawings	INCL	-
1.02	Setting Out	-	INCL
PART II. SITE INSTALLATION			
2.01	Construction and Running of Necessary Facilities	-	INCL
2.02	Custody and Protection	-	INCL
2.03	Illumination	INCL	INCL
2.04	Telecommunication	-	INCL
2.06	Storing Area	INCL	INCL
2.07	Power Supply	-	INCL
2.08	Water Supply	-	INCL
2.09	Accident and Fire Prevention	INCL	INCL
2.10	Safety Precautions	INCL	INCL
2.11	Sanitation and Medical Care	-	INCL
2.13	Cleaning-up, Restoration	-	INCL
2.14	Water Disposal and Sewage Treatment	-	INCL
2.15	Construction Procession Plants	In RATES	-

If selected as negotiable tenderers, COSTAIN and J&P should submit their amounts for all the above-listed items in the stage of negotiation.

o Part I:

Out of the items under Part I, Item 1.04. "Engineer's Office", Item 1.05. "Engineer's Residence" and Item 1.06. "Engineer's Transportation" are most costly. The amounts for the above-mentioned three items roughly consist of the initial investment cost and the maintenance cost in the construction

period of which ratios are deemed to be fifty-fifty in terms of payment conditions. The total amount for these items offered by each tenderer is analyzed as follows:

Analysis of Three Major Items of Part I

(Unit: DH)

<u>Description</u>	<u>AST</u>	<u>DUTCO</u>	<u>COSTAIN</u>	<u>J&P</u>
Total of Items 1.04, 1.05 and 1.06	784,640	1,000,000	825,465	1,374,795
Initial Investment Cost	392,320	500,000	412,733	687,398
Total Maintenance Cost	392,320	500,000	412,732	687,397
Construction Period (Month)	21	15	10	12
Monthly Maintenance Cost	18,682	33,333	41,273	57,283

As seen in the above table, the initial investment and monthly maintenance costs of DUTCO and COSTAIN for these three items are considered to be reasonable whereas those of J&P are too high and AST's are too low.

o Part II:

Regarding Part II. "Site Installation", the study is focussed on the following costly and important items among others;

<u>Item</u>	<u>Description</u>
2.01	Construction and Running of Necessary Facilities
2.07	Power Supply
2.08	Water Supply
2.16	Field Laboratory

The offered amounts for each of the above-mentioned items are as follows;

<u>Item</u>	<u>AST</u>	<u>DUTCO</u>	<u>COSTAIN</u>	<u>J&P</u>
2.01	DH 11,200,300	DH 500,000	DH 3,644,726	INCL
2.07	221,000	200,000	355,763	INCL
2.08	486,000	100,000	23,757	INCL
2.16	341,000	500,000	165,052	554,665

Item 2.10 - Construction & Running of Necessary Facilities

This item consists of the construction cost of contractor's camp and its running cost during the construction period. The tenderers' view on the camp is not clear, however, the above-mentioned construction cost might be around 70 percent of the total amount for this item. DUTCO's amount of DH 500,000 might be insufficient to construct a fully equipped camp. J&P includes the cost of the contractor's camp in the other items. COSTAIN's amount is deemed to be reasonable.

Item 2.07 - Power Supply

This item covers the costs of an independent electric power plant and its maintenance. Power supply is very important both for the construction works and for persons engaged in the works. The amounts of AST and DUTCO are deemed to be insufficient in installation and maintenance of a power supply system to meet the peak and daily demands of power at site and anticipated to be a great hindrance in the execution of construction works. COSTAIN has offered to utilize its own plant yard facilities in Dibba for major maintenance and repairs in addition to the site workshop that will be installed for daily maintenance and repairs. Taking into consideration this arrangement, the amount of COSTAIN for power supply is considered to be too high.

Item 2.08 - Water Supply

This item covers the cost of water supply for construction and labourers and staff. The water source is the existing wells of the MAF. The contractor shall equip this well with pumping facilities for water supply during the construction period. At least about DH 250,000 might be required for pump, pump room and water tank, etc. AST's amount is considered to be reasonable. COSTAIN's amount is only about 1/20 of AST's amount, therefore, the background of COSTAIN's amount for this item should be carefully verified, if this contractor is selected.

Item 2.16 - Field Laboratory

The field laboratory plays an important role in dam construction specially for embankment materials test. The facilities cost inclusive of test equipment and a building has been estimated at DH 130,000 approximately by the MAF. The operation cost of the field laboratory is equivalent to the amount for this item minus the above-mentioned facilities cost. Taking into account the operation period of the field laboratory proposed by each tenderer covering a period for dam body and spillway works and preparatory test period of about one month prior to the commencement of construction works, the monthly operation cost of each tenderer is computed as follows;

Monthly Operation Cost of Field Laboratory

(Unit: DH)

<u>Description</u>	<u>AST</u>	<u>DUTCO</u>	<u>COSTAIN</u>	<u>J&P</u>
Total Amount for Item 2.16	341,000	500,000	165,052	554,665
Facilities Cost	130,000	130,000	130,000	130,000
Operation Cost	211,000	370,000	35,052	424,665
Operation Period (month)	12	13	10	7
Monthly Operation Cost	17,583	28,462	3,505	60,666

The monthly operation cost covers the personnel expenses for laboratory staff and labourers and the cost for various consumable materials. Taking into account the above-mentioned matters, COSTAIN's amount is slightly short whereas the other three amounts are too high. Assuming that DH 85,000 out of the COSTAIN's amount is the facilities cost, the monthly operation cost is computed at DH 8,000 approximately. This monthly operation cost is reasonable, however, it should be carefully checked whether this contractor can manage the laboratory building and test equipment and materials required in the Specifications by the facilities cost of DH 85,000.

B) Main Works

The main works cover all the works under Parts III to VI. The amounts offered by the tenderers for each Part are tabulated below;

<u>Main Works Amount</u>				
(Unit: DH)				
<u>Description</u>	<u>AST</u>	<u>DUTCO</u>	<u>COSTAIN</u>	<u>J&P</u>
Part III. Main Dam	28,964,920	18,755,440	16,159,450	23,417,920
Part IV. Spillway	11,779,980	2,630,100	3,222,193	4,071,579
Part V. Conduit	4,282,350	970,250	1,388,925.3	1,468,874.3
Part VI. Miscellaneous	5,516,000	1,174,000	422,760	1,292,280
<u>Total</u>	<u>50,543,250</u>	<u>23,529,790</u>	<u>21,193,328.3</u>	<u>30,250,653.3</u>

As seen in the above table, the lowest total amount has been offered by COSTAIN although the amounts of this tenderer for the spillway and conduit works are both higher than these of DUTCO who has offered the second lowest total tender price. In order to evaluate the total amount for the main works, rates of each tenderer for costly and important items under Parts III to VI are herein studied in consideration of the major factors such as the rental fee of construction equipment and labour and materials costs. The basic rates have been offered by each tenderer for Part VII. Dayworks Schedule of the B/Q. The daywork rates include the direct cost and overhead, part of which is included also in Part I. General and Part II. Site Installation. Therefore, in order to evaluate the main works cost, the overhead portion in the daywork rate shall be deducted. The ratios of the overhead and the main work cost out of the total amount offered by each tenderer are tabulated below;

Note: The "overhead" herein mentioned is assumed to be the "General and Site Installation" for the purpose of tender evaluation.

Ratios of Overhead and Main Work Costs

<u>Description</u>	<u>AST</u>	<u>DUFICO</u>	<u>COSTAIN</u>	<u>J&P</u>
General and Site Installation (Overhead)	23.8 %	19.4 %	23.7 %	9.1 %
Main Work	76.2 %	80.6 %	76.3 %	90.9 %
<u>Total</u>	100.0 %	100.0 %	100.0 %	100.0 %

Therefore, in this evaluation, the main work cost that is included in the daywork rate is computed by multiplying the daywork rates by the above-tabulated ratio. The rental fee of equipment and the costs of labour and materials are assumed in consideration of the equipment list submitted by each tenderer. For AST who has not submitted an equipment list and for the tenderers who have offered insufficient equipment, the assumption is made, for rate analysis, that the equipment offered by the other tenderers will be utilized for the construction works by such tenderers. Based on this line, the rate analysis is made for the following items;

Part III. Dam Construction

- Item 3.02 Common Excavation
- 3.04 Embankment of Sand and Gravel
- 3.05 Embankment of Filter
- 3.06 Embankment of Rock

Part IV. Spillway

- Item 4.02 Rock Excavation
- 4.03 Reinforced Concrete

Results of the rate analysis are shown in Tables 2-11 to 2-13, and are described below;

Item 3.02 - Common Excavation

The payment to the contractor under this item is made for all excavation works of soil, gravel and sand except strip-ping and excavation for the conduit. In general, the excavation under this item is relatively shallow although it shall be made in a large surface area. Furthermore, it is expected that most of excavated materials could be

utilized for sand and gravel embankment. In general, the following arrangements of construction equipment are considered for the common excavation;

- o Excavation and hauling by motor scraper; and,
- o Excavation by bulldozer, loading by shovel loader and hauling by dump truck.

However, no tenderers intend to use motor scrapers according to their equipment list. The computation is made based on the latter arrangement of equipment, accordingly. Results of the computation are tabulated below;

Evaluated and Offered Rates for Item 302

(Unit: DH)

<u>Description</u>	<u>AST</u>	<u>DUTCO</u>	<u>COSTAIN</u>	<u>J&P</u>
Evaluated Rate	9.48	10.67	4.95	9.01
Offered Rate	21.70	4.40	4.81	11.32

As shown above, a big difference appears between the evaluated rate and the offered rate by each tenderer except these of COSTAIN. In the similar way, the rate analysis is made for the following items for comparison with the offered rates as follows;

Evaluated and Offered Rates for Major Items

(Unit: DH)

<u>Item</u>	<u>AST</u>		<u>DUTCO</u>		<u>COSTAIN</u>		<u>J&P</u>	
	<u>Eval.</u>	<u>Offer.</u>	<u>Eval.</u>	<u>Offer.</u>	<u>Eval.</u>	<u>Offer.</u>	<u>Eval.</u>	<u>Offer.</u>
3.04	16.74	12.95	17.90	7.40	8.21	7.72	15.44	15.42
3.05	96.99	28.40	44.26	22.60	37.67	47.61	97.50	44.94
3.06	98.88	82.50	38.59	25.00	18.44	22.17	34.72	20.74
4.02	111.49	95.00	35.41	17.00	16.58	16.48	28.56	24.86
4.03	777.88	675.00	436.56	270.00	281.30	417.97	537.75	580.31

It is considered that the reasonable rate for Item 3.07. Plain Concrete is about 80 percent of the rate for Item 4.03 and that the reasonable rate for Item 5.04. Reinforced Concrete (Conduit) is by 20 percent higher than the rate for Item 4.03. Reinforced Concrete. The riprap under Item 3.10 is provided for the surface finishing of rock embankment, therefore, the rate for this item covers the

TABLE 2-11. ESTIMATION OF RATE BY DAYWORK RATE (1)

ITEM NO.	DESCRIPTION	QTY	AST		DUTCO		COSTAIN		J & P	
			RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT
3.02	Common Excavation									
	Construction Volume per 1000 cu.m/day									
	1. Excavation Bulldozer D8	9.7 hr.	397.00	3,850.90	326.00	3,162.20	162.09	1,572.27	452.68	4,391.00
	2. Loading Shovel Loader 966	5.3 hr.	316.99	1,680.05	309.70	1,641.41	141.20	748.36	232.70	1,233.31
3. Hauling Dump Truck 11 ton	24.0 hr.	164.59	3,950.16	244.50	5,868.00	109.73	2,633.52	140.90	3,381.60	
	TOTAL			9,481.11	10,671.61		4,954.15		9,005.91	
	Rate per 1.0 cu.m		21.70	9.48	4.40	10.67	4.95		11.32	9.01
	Rate offered									
3.04	Embankment of Sand & Gravel									
	Construction Volume per 1,000 cu.m									
	1. Excavation Bulldozer D8	9.7 hr.	397.00	3,850.90	326.00	3,162.20	162.09	1,572.27	452.68	4,391.00
	2. Loading Shovel Loader 966	5.3 hr.	316.99	1,680.05	309.70	1,641.41	141.20	748.36	232.70	1,233.31
	3. Hauling Dump Truck 11 ton	39.0 hr.	164.59	6,419.01	244.50	9,535.50	109.73	4,279.47	140.90	5,495.10
	4. Spreading Bulldozer D8	6.7 hr.	397.00	2,659.90	326.00	2,184.20	162.09	1,086.00	452.68	3,032.96
	5. Watering Tank Lorry	3.0 hr.	316.99	950.97	163.00	489.00	38.18	114.54	140.90	422.70
	6. Compaction Vibrating Roller 10Ton	5.9 hr.	165.34	975.51	122.25	721.28	51.85	305.92	97.26	573.83
7. Labour Common Labour	2 men	99.82	199.64	81.50	163.00	54.16	108.32	145.44	290.88	
	TOTAL		16,735.98	17,896.59	8,214.88				15,439.78	
	Rate per 1.0 cu.m		12.95	16.74	7.40	17.90	8.21		15.42	15.44
	Rate offered									

TABLE 2-12. ESTIMATION OF RATE BY DAYWORK RATE (2)

ITEM NO.	DESCRIPTION	QTY.	AST		DUTCO		COSTAIN		J & P		
			RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT	
3.05	Embankment of Filter.										
	Material of Filter may be of mixing the coarse aggregate and fine aggregate.										
	Construction Volume per 1000 cu.m										
	1. Materials	650 cu.m	67.82	44,083.00	24.45	15,892.50	21.97	14,280.50	63.63	41,359.50	
	Coarse Aggregate	650 cu.m	54.10	35,165.00	12.23	7,949.50	21.97	14,280.50	63.63	41,359.50	
	Fine Aggregate										
	2. Loading	Shovel loader 966	6.9 hr.	316.99	2,187.23	509.70	3,516.93	171.20	974.28	232.70	1,605.63
3. Hauling	Dump Truck 11 Ton	57.1 hr.	164.59	9,398.09	244.50	13,910.95	103.73	6,265.58	140.90	8,045.39	
4. Spreading	Bulldozer D8	6.7 hr.	397.00	2,659.90	526.00	2,184.20	162.09	1,086.00	452.68	3,032.96	
5. Watering	Tank Lorry	6.7 hr.	316.99	2,123.83	163.00	1,092.10	38.18	255.81	140.90	944.03	
6. Compaction	Vibrating Roller 10 Ton	5.9 hr.	165.34	975.51	122.25	721.28	51.85	305.92	97.26	573.83	
7. Labour	Common Labour	4 men	99.82	399.28	81.50	326.00	54.15	216.64	145.44	581.76	
	TOTAL			96,991.84		44,263.46		37,665.25		97,502.60	
	Rate per 1.0 cu.m		26.40	96.99	22.60	44.26	47.61	37.67		97.50	
	Rate offered									44.94	
3.06	Embankment of Rock										
	34.3% of the material for embankment can be obtained from rock excavation of spillway.										
	65.7% of the material from quarry site.										
	Construction Volume per 520 cu.m/day										
	1. Excavation	Miner	1.3 men	114.30	148.59	138.55	180.12	71.64	93.13	163.62	202.71
	Common Labour		3.0 men	99.82	299.46	81.50	244.50	54.16	162.48	145.44	436.32
	Explosive incl. Detonator		108 Kg.	224.79	24,277.32	24.45	2,640.60	7.82	844.56	13.64	1,473.12
	Other Materials (40%)				9,710.93		1,056.24		377.82		589.25
	Compressor		4.6 hr.	134.11	616.91	122.25	562.35	32.52	149.59	149.99	589.95
	Drill		13.1 hr.	165.35	2,166.09	122.25	1,601.48	36.71	480.90	110.90	1,452.79
	2. Loading	Bulldozer D8	5.0 hr.	397.00	1,985.00	326.00	1,630.00	162.09	810.45	452.68	2,263.40
	Shovel Loading 966		4.4 hr.	316.99	1,394.76	309.70	1,362.68	141.20	621.28	232.70	1,023.88
	3. Hauling	Dump Truck 11 Ton	40.0 hr.	164.59	6,583.60	244.50	9,780.00	109.73	4,389.20	140.90	5,636.00
	4. Spreading	Bulldozer D8	7.0 hr.	397.00	2,779.00	326.00	2,282.00	162.09	1,134.63	452.68	3,168.76
	5. Compaction	Vibrating Roller 10 Ton	7.0 hr.	165.34	1,157.38	122.25	855.75	51.85	362.95	97.26	680.82
Labour	Common Labour	3 men	99.82	299.46	81.50	244.50	54.15	162.48	145.44	436.32	
	TOTAL			54,418.50		20,064.22		9,589.47		18,053.32	
	Rate per 1.0 cu.m		82.54	98.88	25.00	38.59	22.17	18.44		34.72	
	Rate offered									20.74	

TABLE 2-13. ESTIMATION OF RATE BY DAYWORK RATE (3)

ITEM NO.	DESCRIPTION	QTY	AST		DUTCO		COSTAIN		J & P	
			RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT
4.02	Rock Excavation									
	Construction Volume per 520 cu.m/day									
	1. Excavation Miner	2 men	114.50	228.60	138.55	277.10	71.64	143.28	163.62	327.24
	Common Labour	4.5 men	99.82	449.19	81.50	366.75	54.16	243.72	145.44	654.48
	Explosive incl Detonator	165 Kg.	224.79	37,090.35	24.45	4,034.25	7.82	1,290.30	13.64	2,250.60
	Other Materials (20%)			7,418.07		806.85		259.06		450.12
	Compressor	7 hr.	134.11	938.77	122.25	855.75	32.52	227.64	149.99	1,049.93
	Crawler Drill	20 hr.	165.35	3,307.00	122.25	2,445.00	36.71	734.20	110.90	2,218.00
	Bulldozer D8	7.5 hr.	397.00	2,977.50	326.00	2,445.00	162.09	1,215.68	452.68	3,395.10
	Shovel Loader 966	6.7 hr.	316.99	2,123.83	309.70	2,074.99	141.28	2,216.27	232.70	1,559.09
3. Hauling	20.9 hr.	164.59	3,439.93	244.50	5,110.05	109.73	2,293.36	140.90	2,944.81	
TOTAL			57,973.24		18,415.39		8,622.51		14,849.37	
	Rate per 1.0 cu.m		95.00	111.49	17.00	35.41	16.48	16.58	24.86	28.56
	Rate offered									
4.03	Reinforced Concrete (Spillway)									
	Construction Volume is 45 cu.m/day									
	1. Materials	14.4 ton	1,280.16	18,434.30	570.50	8,215.20	343.35	4,944.24	667.63	9,613.87
	Cement 0.32 x 45	19.4 cu.m	54.10	1,049.54	12.23	237.26	21.97	426.22	63.63	1,234.42
	Sand 0.43 x 45	39.2 cu.m	67.82	2,658.54	24.45	958.44	21.97	861.22	63.63	2,494.30
	Gravel 0.87 x 45	1 day	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00	1,500.00
	2. Mixing	14 hr.	286.51	4,011.14	163.00	2,282.00	85.16	1,192.24	170.15	2,392.10
	3. Transport	9 men	114.30	1,028.70	138.55	1,246.95	71.74	645.66	163.62	1,472.58
	4. Concreting	18 men	99.82	1,796.76	81.50	1,467.00	54.23	976.14	145.44	2,617.92
	Common Labour	7 hr.	262.89	1,840.23	326.00	2,282.00	85.76	600.32	178.16	1,247.12
Truck Crane	28 hr.	60.20	1,685.60	16.30	456.40	18.31	512.68	22.73	636.44	
5. Curing			1,000.00		1,000.00		1,000.00		1,000.00	
TOTAL			35,004.81		19,645.25		12,558.72		24,196.75	
	Rate per cu.m		777.88		436.56		281.30		580.31	
	Rate offered				270.00		417.97			

estimated rate for rock embankment and the finishing rate of the surface of rock embankment. Under the situations, the amounts offered for this item could be broken down as follows;

Rate Evaluation for Riprap (Item 3.10)

(Unit: DH)

<u>Description</u>	<u>AST</u>	<u>DUTCO</u>	<u>COSTAIN</u>	<u>J&P</u>
Rock Embankment	98.80	38.59	18.44	34.72
Surface Finishing	99.82	81.52	54.16	145.44
<u>Total</u>	<u>198.70</u>	<u>120.11</u>	<u>72.60</u>	<u>180.16</u>

The comparison of the evaluated rates with the offered rates indicate that the evaluated rates (based on the daywork rates) for the following items are nearly equal to the offered rates;

AST: Item 4.03
 COSTAIN: Items 3.02, 3.04 and 4.02
 J&P: Items 3.04 and 4.03

COSTAIN has offered its rates premising that overtime and night works are permitted throughout the construction period. Therefore, it is necessarily considered that the labour cost offered by this contractor includes an additional payment for overtime and night work. On the other hand, the daywork rates are applied to the works in ordinal working hours in accordance with Article 45 of the Conditions of Contract. Under the situations, COSTAIN's slightly high rates in comparison with the evaluated rates based on the daywork rates are acceptable since these include an additional payment for overtime and nightwork.

C) Dayworks Schedule

Labour Cost-

COSTAIN's offer is the lowest among the four tenderers in every item of the Dayworks Schedule. In general, rates for skilled and unskilled labourers inclusive of overhead are different each other based on the employment conditions of contractors. Even so, it cannot be understood how it

happens that J&P's rates for skilled labourers are almost double of CONSTAIN's rates for the same items. COSTAIN's monthly rate of DH 2,351.25 (94.02 DH/day x 25 days) for skilled labourers inclusive of overhead is deemed reasonable.

Materials-

COSTAIN has offered the lowest rates for all materials except fine aggregate and sand. Furthermore, its total amount for materials is also the lowest. The price of gasoline at Dubai is 3.7 DH/gallon at present, therefore, the reasonable rate of gasoline per liter inclusive of overhead is considered to be around DH 1.00. The offers made by COSTAIN and DUTCO are acceptable in this aspect.

Plant-

As seen in Tables 2-6 to 2-10, COSTAIN's rates are the lowest except a few items. Moreover, the total amount offered by this contractor is also the lowest. However, as clearly seen in Tables 2-14 to 2-16, some of the evaluated rates for the items of "Plant" are higher and the others are lower than the offered rates. The evaluated rates of COSTAIN for labour, gasoline and diesel oil and rental of equipment are higher than the offered rates.

(3) Evaluated Total Price

Based on the studies made in Section II-7, COSTAIN's total price amounting to DH 28,011,900.40, that is, the price corrected in accordance with the Instructions to Tenderers, is herein evaluated.

a) Volume 1. General and Site Installation (DH 6,565,628): COSTAIN's offer for Volume 1 is mostly acceptable, however, its detailed plans and budget for power supply, water supply and field laboratory shall be verified in the stage of negotiation.

b) Volume 2. Main Works (DH 21,193,328.30): COSTAIN's offer for Volume 2 is evaluated based on the above-mentioned evaluated rates. The following table

compares the offered rates and evaluated rates;

Offered Rates and Evaluated Rates

(Unit: DH)

<u>Item</u>	<u>Description</u>	<u>Offered</u>	<u>Evaluated</u>	<u>Surplus</u>
3.05	Embankment(Filter Mat.)	47.61	37.67	9.94
3.06	Embankment(Rock)	22.17	18.44	3.73
3.07	Plain Concrete	338.18	225.04	113.14
3.10	Riprap	119.37	72.60	46.27
4.03	Reinforced Concrete	417.97	281.30	136.67
5.04	Reinforced Concrete	499.09	337.56	161.53
5.10	R.C. Pipe	801.45	500.00 ^{1/}	301.45

Note: In accordance with Article 2.4. of Instructions to Tenderers, the lowest rate of DH 500 offered by DUTCO is applied to Item 5.10 since COSTAIN has failed to quote for this item.

Based on the surplus costs shown in the above table, the evaluated amounts for the seven items are computed as follows;

Evaluated Amounts

(Unit: DH)

<u>Item</u>	<u>Unit</u>	<u>Quantity</u>	<u>Surplus Cost</u>	<u>Amount</u>
3.05	cu.m	59,000	9.94	586,460.00
3.06	cu.m	210,000	3.73	783,300.00
3.07	cu.m	300	113.14	33,942.00
3.10	cu.m	41,000	46.77	1,917,570.00
4.03	cu.m	2,000	136.67	273,340.00
5.04	cu.m	650	161.53	104,994.50
5.10	cu.m	130	301.45	39,188.50
<u>Total</u>				<u>3,738,975.00</u>

Therefore, COSTAIN's amount of DH 21,193,328.30 for the main works decreases to DH 17,454,353.30 after reducing the surplus amount of DH 3,738,975.00.

c) Volume 3. Dayworks Schedule (DH 252,944.10):

Some rates offered by COSTAIN for Volume 3 are higher than the evaluated rates, and the others are lower. However, its rates are, as a whole, acceptable.

Based on the above-described a), b) and c), COSTAIN's corrected price of DH 28,011,900.40 decreases to DH 24,272,925.40 after reducing the following amounts;

Volume 1.	0	DH
Volume 2.	3,738,975.00	DH
Volume 3.	0	DH

On the other hand, the total construction cost estimated by the MAF depends upon the unit prices as of October 1980. The price escalation since then is considered to be about five percent, therefore, the amount of DH 990,000 shall be added to the above-mentioned estimated cost. Moreover, the estimated construction cost premises a 12-month period for the main construction works whereas COSTAIN has offered a 9-month period for the works. Under the situations, a difference of three months shall be evaluated. In other words, the cost for overtime and night work shall be taken into consideration in order to compare COSTAIN's offer with the MAF's estimation. The cost for overtime and night work is estimated at DH 2,482,500 as follows;

Labour Cost	DH 19,800,000 x 0.25 ^{1/}	DH 4,950,000
Contractor's Staff		1,670,000
<u>Total</u>		<u>DH 6,620,000</u>
6,620,000 DH + 3/12 x 1.5 ^{2/}		DH 2,482,500

Note:

1/ The ratio of labour cost out of the total construction cost

2/ Coefficient for overtime and night work

Therefore, the MAF's estimated amount is revised as follows;

Estimated Amount (based upon the unit prices as of October 1980)	DH 19,800,000
Price Escalation (5 %)	990,000
Additional Payment for Overtime and Night Works	2,482,500
<u>Total</u>	<u>DH 23,272,500</u>

Therefore, the MAF's estimated cost is revised to DH 23,273,500 as mentioned above whereas COSTAIN's evaluated total price is DH 24,272,925.40. The difference of about DH 1,000,000 is less than five percent of the total price. It is noted, however, that COSTAIN's evaluated price should be further studied based on detailed offer in respect of the equipment, materials and labour costs which shall be submitted by this contractor in the stage of negotiation.

TABLE 2-14. ESTIMATION OF DAYWORK RATE (1)

ITEM NO.	DESCRIPTION	QTY	AST		DUTCO		COSTAIN		J & P	
			RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT
7.22	Bulldozer from 100 to 200 HP Operator Fuel 23.5 l/hr x 7 hr Others Rental Fee of Bulldozer Overhead TOTAL Rate per one hour Rate offered	1.0 day	150.00	150.00	170.00	170.00	94.02	94.02	180.00	180.00
		164.5 l (30%)	3.20	526.40	1.00	164.50	0.90	148.05	2.00	329.00
		7 hr	93.00	157.92	49.35	44.42	93.00	651.00	93.00	98.70
			(23.8%)	353.51	(19.4%)	200.76	(23.8%)	223.12	(9.1%)	651.00
				1,838.83		1,235.61		1,160.61		1,373.27
				262.69		176.52		165.80		196.18
				412.00		300.00		98.24		386.00
7.28	Wheel Type Loader (Shovel Loader) Operator Fuel 11.0 l/hr x 7 hr Others Rental Fee of Shovel Loader Overhead TOTAL Rate per one hour Rate offered	1.0 day	150.00	150.00	170.00	170.00	94.02	94.02	180.00	180.00
		77.0 l (30%)	3.20	246.40	1.00	77.00	0.90	69.30	2.00	154.00
		7 hr	59.00	73.92	23.10	20.79	59.00	413.00	59.00	46.20
			(23.8%)	210.23	(19.4%)	132.52	(23.8%)	142.11	(7.1%)	413.00
				1,093.55		815.62		739.22		72.18
				156.22		116.52		105.60		865.38
				416.00		380.00		136.74		123.63
7.29	Dump Truck from 10 to 12 ton capacity Operator Fuel 9.0 l/hr x 7 hr Others Rental Fee of Dump Truck 11 ton Overhead TOTAL Rate per one hour Rate offered	1.0 day	150.00	150.00	170.00	170.00	94.02	94.02	180.00	180.00
		63.0 l (30%)	3.20	201.60	1.00	63.00	0.90	56.70	2.00	126.00
		7 hr	29.00	60.48	18.90	17.01	29.00	203.00	29.00	37.80
			(23.8%)	146.39	(19.4%)	88.25	(23.8%)	88.23	(9.1%)	203.00
				761.47		543.15		458.95		49.76
				108.78		77.59		65.57		596.56
				216.00		200.00		120.00		85.22

TABLE 2-15. ESTIMATION OF DAYWORK RATE (2)

ITEM NO.	DESCRIPTION	QTY	AST		DUTCO		COSTAIN		J & P	
			RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT	RATE	AMOUNT
7.31	Vibrating Roller, from 8 to 10 ton	1.0 day	150.00	150.00	170.00	170.00	94.02	94.02	180.00	180.00
	Operator	58.1 l (30%)	3.20	185.92	1.00	58.10	0.90	52.29	2.00	116.20
	Fuel			55.78		17.43		15.69		34.86
	Others			525.00		525.00		525.00		525.00
	Rental Fee of Vibrating Roller	7.0 hr	75.00 (23.8%)	218.17	75.00 (19.4%)	149.48	75.00 (23.8%)	163.51	75.00 (9.1%)	77.90
	Overhead			1,134.87		920.01		850.51		933.96
	TOTAL				162.12		131.43		121.50	
	Rate per one hour		217.00		150.00		68.04			107.00
	Rate offered									
7.35	Air Compressor	1.0 day	150.00	150.00	170.00	170.00	94.02	94.02	180.00	180.00
	Operator	96.6 l (15%)	3.25	313.95	1.00	96.60	1.00	96.60	2.00	193.20
	Fuel L-Gasoline	13.8 l/hr x 7 hr		47.09		14.49		14.49		28.98
	Others			113.00		113.00		113.00		113.00
	Rental Fee of Compressor 100 ps	1.0 day	113.00 (23.8%)	148.52	113.00 (19.4%)	76.45	113.00 (23.8%)	75.71	113.00 (9.1%)	46.88
	Overhead			772.56		470.54		393.82		562.06
	TOTAL			110.37		67.22		56.26		80.29
	Rate per one hour		176.00		150.00		42.68			165.00
	Rate offered									
7.46	Water Lorry 6,000 liter	1.0 day	150.00	150.00	170.00	170.00	94.02	94.02	180.00	180.00
	Operator	123.2 l (20%)	3.20	394.24	1.00	123.20	0.90	110.88	2.00	246.40
	Fuel			78.85		24.64		22.18		49.28
	Others			154.00		154.00		154.00		154.00
	Rental Fee of Water Lorry	7.0 hr	22.00 (23.8%)	184.95	22.00 (19.4%)	91.54	22.00 (23.8%)	90.70	22.00 (9.1%)	57.30
	Overhead			962.04		563.39		471.78		686.98
	TOTAL			137.43		80.48		67.40		98.14
	Rate per one hour		187.00		200.00		90.11			155.00
	Rate offered									

TABLE 2-16 RENTAL FEE OF CONSTRUCTION EQUIPMENT

Equipment	Cost (1,000 Dh)	Life Time	Rate of Depre- ciation Cost (%)	Rate of Mainte- nance Cost (%)	Rate of Opera- tion Cost (%)	Rate of Rental Cost x 10 ⁻⁶	Rental Fee
Bulldozer 180 ps	400	10,000 hr	90	100	42	232	93 Dh/hr
Shovel Loader 2.0 cu.m	270	10,800 hr	90	105	42	219	59 Dh/hr
Dump Truck 11 ton	140	10,200 hr	90	80	40	206	29 Dh/hr
Vibrating Roller 11 ton	240	6,800 hr	90	80	42	312	75 Dh/hr
Water Truck 6 ton	90	9,000 hr	90	90	40	244	22 Dh/hr
Air Compressor	70	1,300 day	90	90	30	1,615	113 Dh/day

III. RECOMMENDATIONS

Based upon the thorough study on the offers submitted by the four tenderers, it is recommended that the MAF will start the negotiation with COSTAIN for one step to the contract by the following reasons;

(1) Equipment and Plant

The equipment and plant offered by COSTAIN are the most acceptable among the four offers. Its offer suggests that this contractor has fully understood the requirements in dam construction.

(2) Experience in Dam Construction

Know-how supported by experience in dam construction is of the vital important for the Project. In this aspect, COSTAIN has the richest experience of 35 years in dam construction and 50 years in the other construction works among the four contractors.

(3) Time for Completion

COSTAIN has offered the construction period of 10 months in total. This time of completion is the shortest among the four as evaluated in detail in Section II-7 of this report. This offer of COSTAIN is acceptable if the doubts mentioned in Section II-4 can be clarified in the negotiation meeting.

(4) Estimate of Construction Cost

As mentioned in Section II-7 of this report, the evaluated amounts for the three volumes are, in principle, acceptable for negotiation.

Volume 1. Cost for General and Site Installation	DH 6,565,628.00
Volume 2. Cost for Main Works	17,454,353.30
Volume 3. Cost for Dayworks	252,944.10
<u>Total</u>	<u>DH 24,272,925.40</u>
	= <u>DH 24,273,000.00</u>

It is noted, however, that further studies on COSTAIN's evaluated amounts will be required for which this contractor shall submit its detailed offer in respect of equipment, materials and labour costs in the stage of negotiation.

IV. NEGOTIATION ITEMS

The following shall be made clear in the negotiation meetings;

- (1) Staff organization at site, that is, the mobilization of civil, mechanical and electrical engineers, administrative staff and others;
- (2) Allocation of the proposed equipment and plant to each item of the construction works, which is necessary for the verification of rates;
- (3) Detailed work program described in a) to c) of Section II-4 of this report; and,
- (5) Evaluated amounts for construction works.

APPENDIX-A

Invitation Letter

The invitation letters were issued to eight contractors as mentioned in Chapter I, however, only a copy of the letter addressed to COSTAIN is herein attached since the reference number, date, context and signature of these letters are same.

UNITED ARAB EMIRATES
MINISTRY OF AGRICULTURE AND FISHERIES
SOIL AND WATER DEPARTMENT

REF: MAF/S&W/32/22/7306 /81
DATE: November 11, 1981

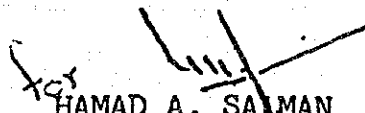
M/S. Costain International Ltd.
P.O. Box 2526. Dubai

INVITATION FOR THE CONSTRUCTION OF
AL BASSIERAH DAM IN DIBBA, U.A.E.

TENDER NO. 22/81

1. The UAE Ministry of Agriculture and Fisheries takes pleasure in inviting your Company to submit an offer for the Construction of a Dam at Al Bassierah in Dibba, U.A.E.
2. The tenderer may be a foreigner provided that he has a UAE National as a partner who owns 51% of the shares of the Company with a formal authenticated agreement showing the payments of such shares and registered with the Chamber of Commerce and Industry in the UAE.
3. You can collect the Tender Documents from our office in Dubai from 11 November, 1981, during normal working hours, against a nonrefundable cash payment of Dhs. 2,000/- only.
4. Your offer must be accompanied by a Bid Bond in Arabic language for 5% of the total tendered sum valid for 120 days from the date of opening of the tender. If successful, your Company will be required to replace this Bid Bond with a Performance Bond equal to 10% of the total contract sum. Cheques will not be accepted.
5. Your offer must be valid for 90 days from the date fixed for the opening of the tenders and this period is extendable.
6. Tender Documents must be submitted in triplicate with each page signed and endorsed by your Company's seal. Copies of the current and valid Trade Licence and Registration Certificate issued by the Chamber of Commerce and Industry must be submitted along with the Tender Documents.
7. Your offer must be enclosed in a plain, wax-sealed envelope, bearing no identification of your firm and marked on the outside only with the abovementioned Tender Number and Title. Your offer should be addressed to: H.E. The Chairman of the Permanent Committee for Projects, Ministry of Planning, Abu Dhabi, U.A.E., and must be hand-delivered at this address not later than 1800 hours on Sunday, 13 December, 1981.

This Invitation is a complementary part of the Tender Documents.


HAMAD A. SALMAN
DEPUTY MINISTER

بسم الله الرحمن الرحيم

دولة الإمارات العربية المتحدة
وزارة الزراعة والثروة السمكية
إدارة المياه والترسية

الرقم : وزس / تم / ٣٢ / ٢٢ / ٧٣٠٦ / ٨١ /

التاريخ : ١١ / ١١ / ١٩٨١ م

مناقصة رقم ٨١ / ٢٢

المحترمين .

السادة / شركة كوستين العالمية المحدودة

الموضوع : دعوة لمناقصة محدودة لبناء سد وادي البصيره بدبا

(١) يسر وزارة الزراعة والثروة السمكية ان توجه الدعوة لشركتكم للاشتراك في مناقصة محدوده لبناء سد وادي البصيره بدبا .

(٢) يجب ان يكون للمقاولين الاجانب شريك موا ان مالكا لما لا يقل عن ٥١٪ من اسهم الشركة بموجب عقد رسمي موثوق مع ما يثبت دفع قيمة الاسهم ، ومسجلين بسجل المقاولين في العام الحالي بالسجل التجاري لدى احد غرف الصناعة والتجارة بالدولة .

(٣) يمكن الحصول على مستندات المناقصة من مكتب الوزارة في دبي خلال ساعات الدوام الرسمي نظير رسم غير قابل للرد وقدره (٢٠٠٠) درهم .

(٤) كل عطاء يجب ان يكون مصحوبا بكفالة مصرفية ابتدائية باللجنة العربية غير مشروطة لا تقل قيمتها عن ٥٪ من اجمالي قيمة العطاء على ان تكون سارية المفعول لمدة لا تقل عن ١٢٠ (مائة وعشرون) يوما تبدأ من تاريخ فتح المظاريف على ان ترفع هذه الضمانة الى ١٠٪ في حالة رسو العطاء ولا تقبل الشينات ولو كانت ممددة .

(٥) يجب ان يكون العطاء سار المفعول لمدة ٩٠ (تسعون) يوما من التاريخ المحدد لفتح المظاريف وتكون هذه المدة قابلة للتتمدد .

(٦) على كل متناقص ان يملأ ثلاث نسخ من العقد محتومه وموقعه في جميع الصفحات ويرفق صور عن رخصة البلدية وشهادة القيد بخرفة التجاره والصناعة سارية المفعول .

(٧) تسلم العطاءات باليد في مظاريف مغلقة ومحتومه بالشمع الاصح ومكتوب عليها رقم المناقصة واسم المشروع فقط ومعنونه بأسم رئيس اللجنة الدائمه للمشروعات وزارة التخطيط في ابو ظبي وذلك قبل الساعة السادسة من مساء يوم الأحد الموافق ١٣ / ١٢ / ١٩٨١ م .

يعتبر هذه الدعوة جزءاً متمماً لشروط المناقصة .

محمد عبد الله سلمان
مدير الوزارة

استلمت يوم ١١ / ١١ / ٨١

٨١ / ١١ / ٨١

APPENDIX-B

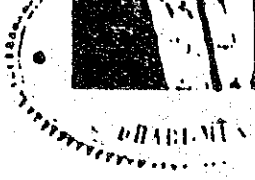
Trade License & Registration Certificate

(Copies)



رقم الملف / التسجيل ٨١٦٩

رقم قيد السجل التجاري ١٧٦٦



دولة الإمارات العربية المتحدة

دائرة بلدية أبوظبي

رقم ٠٥٩٨٨

(رخصة تجارية)

- ١ - اسم صاحب الترخيص شركة اسفند كما وراة منسوبة تساورا رقم الجواز / الهوية
- ٢ - اسماء الشركاء
الجنسية
رقم الجواز / الهوية
- ٣ - اسم الكفيل : *عبدالله محمد التميمي*
- ٤ - الاسم التجاري : *شركة اسفند كما وراة منسوبة تساورا*
- ٥ - نوع العمل : *مشاورات كالمات*
- ٦ - عنوان موقع العمل : *الدمية شارع عمان اسفند محمد الجليل*
- ٧ - الملاحظات :

٨ - تاريخ الاصدار : ٢١٨٨١ / ١١ / ٥٠

٩ - تاريخ الانتهاء : ٢١٩٨٤ / ١١ / ٥٠

توقيع مدير الرخصة

توقيع رئيس قسم الرخص

☆ ممدت الرسوم المستحقة بايصال رقم ٩٤١٥٥

٢١٩٠١ / ١٠ / ٠٠

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



رقم الملف/التسجيل ١١٤٤ / ش

رقم نود السجل التجاري

٦١٤

رقم ٦٢٨٠

قَوْلَةُ الْبُيُوتِ - الْعَرَبِيَّةُ لِلْعَقْدَةِ

بِـ كـ لـ دـ هـ

(خمسة هجائية)

تجارتهم ل... ..

١. اسم صاحب الترخيص شركة دكتور بيوت العربية للتجارة والتمويل رقم الجواز/الهوية

٢. أسماء الشركاء : شركة دكتور بيوت العربية للتجارة والتمويل رقم الجواز/الهوية

» ص. ك. ل. هـ

»

»

»

٣. اسم الكفيل : بيوت

٤. اسم المدير المسئول : نيفل بيوت ٦٨٤١٦٤ جنسيته برون

٥. الاسم التجاري : شركة دكتور بيوت العربية للتجارة والتمويل رقم الجواز/الهوية

٦. نوع العمل : التجارة العامة

٧. عنوان موقع العمل : مكتب رقم ٤٤٤ شارع ٦٦٤١٢٦

٨. الملاحظات :

تقديم طلب تجديد

٩. تاريخ الاصدار : ١٩٨١/١٢/١٢

١٠. تاريخ الانتهاء : ١٩٨٤/١٢/١٢

توقيع مدير الرخصة

اسم

توقيع رئيس قسم الرخص

مدير البلدية

الرقم التسلسل

١٩٨١/٢٩/١٣٦٩

رقم التسجيل

- ٤٢٦٤ -

شهادة تسجيل وصحة تجارة
م.م. شركة تجارة وصناعة دبي

شهادة تسجيل عضوية لعام ١٩٨١

إن خروف تجارة وصناعة دبي، بنار على القانون رقم ٢٠ لعام ١٩٧٥
تدريجاً شركة دتكو للانشاءات من الجمعية الامارات القيم في دبي
الخصوصية المحدودة القيام بأعمال الانشاءات العامة في الفئة الأولى
لمارسه النشاط التجاري، المهني : القيام بأعمال الانشاءات العامة في الفئة الأولى
صدرت هذه الشهادة في دبي بتاريخ ٢٢ من شهر جماد أول عام ١٤٠١ هجرية
الموافق الثامن من شهر مارس عام ألف وتسعمائة وواحد وثمانين ميلادية ويسري مفعولها
حتى الحادي والثلاثين من شهر ديسمبر عام ١٩٨١ ميلادية



م.م. شركة تجارة وصناعة دبي

Handwritten signature

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



رقم الملف/السجل ٥١٦٦

رقم قيد السجل التجاري

٢٨٨٦

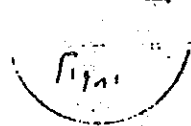
رقم ٩٢٨٥

وزارة التجارة والصناعة

بلدية دهب

تجديديك

(رخصة مهنية)



١. اسم صاحب الترخيص شركة كوستيم الدولية المحدودة

٢. اسم الشركة:

الجنسية	رقم الجواز/الهوية

٣. اسم العميل: شركة كوستيم الدولية المحدودة - رقم السجل التجاري: ٢٨٨٦ - رقم الجواز/الهوية: ٩٢٨٥

٤. اسم المدير المسئول: السيد فليط جرموس سعيد - جنسيتها: رطل

٥. الاسم التجاري: "شركة كوستيم الدولية المحدودة"

٦. نوع العمل: مقاولات بناء

٧. عنوان موقع العمل: مكتبنا في شارع فلسطين - رقم الجواز/الهوية: ٩٢٨٥ - رقم السجل التجاري: ٢٨٨٦

٨. الملاحظات:

صريح لادارة طواوين كوردون

٩. تاريخ الاستدراك: ١٩٨١/١٤/٢٨

١٠. تاريخ الانتهاء: ١٩٨١/١٤/٢٧

توقيع مدير الرخصة

1

توقيع مدير قسم الترخيص

وغير المشقة

١١. سعت الرسوم المستحقة بحسب رقم ٢٧٧٢٤٤

بتاريخ ١٩٨١/١٤/٢٧

CHAMBER OF COMMERCE & INDUSTRY, DUBAI

رقم التسجيل

رقم الترخيص

١٩٨١ ٩٢ ٥٢٤٤

- ٤٣١٠ -

SERIAL NO.
5244/92/1981

REG. NO. 4310

مجلس تجارة وصناعة دبي
Dubai Chamber of Commerce & Industry

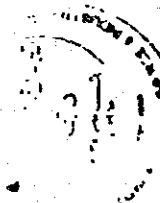
شهادة تسجيل عضوية لعام ١٩٨١

Membership Registration Certificate for 1981

ان خروف تجارة وصناعة دبي ، بن ا على القانون رقم ٢٠ لعام ١٩٧٥
Under the provisions of Rule No. 2 for the year 1975, Chamber of Commerce
and Industry, Dubai has registered شركة كوستن
OSTAIN INTERNATIONAL LIMITED a British

للممارسة النشاط التجاري المهنى : القيام بأعمال مقاولات البناء
resident in Dubai to carry out the building contracting works (Grade A)
صدرت هذه الشهادة في دبي بتاريخ ٨ من شهر شوال عام ١٤٠١ هجرية
الموافق الثامن من شهر أغسطس عام الف وتسعمائة وواحد وتسعين ميلادية ويسري مفعولها
This certificate is issued in Dubai on the 8 th of Shawal 1401 A.H.
which is 8th of August 1981 . This Certificate is valid upto the end of 1981.
حتى الحادي والثلاثين من شهر ديسمبر عام ١٩٨١ ميلادية .

رئيس غرفة تجارة وصناعة دبي



٥٢٢

بسم الله الرحمن الرحيم



رقم الملف/التسجيل ١٨١/ح

رقم قيد السجل التجاري

٢٠٢٨

رقم ٩٢٢٥

وزارة الاقتصاد والتجارة الخارجية

سبلاية د.د.

(رخصة مهنية)

تجسديد

١. اسم صاحب الترخيص هو جوان ويرسكو فريمان اوفر سينير رقم الجواز/الهوية ١٧٨٤١٥١٢١

٢. اسماء الشركاء: جوان ويرسكو فريمان اوفر سينير رقم الجواز/الهوية ١٧٨٤١٥١٢١

الجنسية	رقم الجواز/الهوية

٣. اسم العميل: جوان ويرسكو فريمان اوفر سينير رقم الجواز/الهوية ١٧٨٤١٥١٢١

٤. اسم المدير المسؤول: جوان ويرسكو فريمان اوفر سينير

٥. الاسم التجاري: جوان ويرسكو فريمان اوفر سينير

٦. نوع العمل: تجارة

٧. عنوان موقع العمل: مبنى رقم ٢١/٢٢ شارع ابو نوار - باب الجسر - غزة

٨. الملاحظات: ١٧٨٤١٥١٢١

تاريخ انتهاء الرخصة ١٩٨٤/٥/١٦

٩. تاريخ الاصدار: ١٩٨٤/٥/١٦

١٠. تاريخ الانتهاء: ١٩٨٤/٥/١٦

توقيع مدير الرخصة

توقيع مدير الرخصة

توقيع مدير الرخصة

توقيع مدير الرخصة

* سددت الرسوم المستحقة بايصال رقم (٧٧٤٤٦)

بتاريخ: ١٩٨٤/٥/١٦

رقم التسجيل

— ٨٩٠ —

شهادة تسجيل عضوية لعام ١٩٨١
عبد الرحمن محمد علي وولديه

الرقم التسلسل

١٩٨١/٩٤/٥٢٦٧

شهادة تسجيل عضوية لعام ١٩٨١

ان غرختة تجارة وضاعة دبي ، بن اعل العت انون رشم "٢" لعام ١٩٧٥
و صدر سجلت جوانم برسكو فيسكو اس من اللجنة اليونانية القيمة في دبي
للمارسة النشاط التجاري ، المهني : القيام بأعمال مقاولات البنسلاء في الفئة الاولى
صدرت هذه الشهادة في دبي بتاريخ ١٠ من شهر شوال عام ١٤٠١ هجرية
الموافق العاشر من شهر أغسطس عام ألف وتسعمائة وواحد وثمانين ميلادية ويسري مفعولها
حتى الحادي والثلاثين من شهر ديسمبر عام ١٩٨١ ميلادية .



رئيس غرفة تجارة وصناعة دبي

(Handwritten signature)

APPENDIX C. PARTICIPANTS IN THE TENDER EVALUATION

UAE Team:

Mr. Obaid M. Karki

**Asst. Deputy Minister for Water and Soil Resources Affairs,
the Ministry of Agriculture and Fisheries**

Mr. Taissir Adlbi

Project Co-Manager

Soil and Water Department,

the Ministry of Agriculture and Fisheries, Dubai

Japanese Team:

Mr. Fujio Matsumoto

Leader of JICA Tender Evaluation Team for the Project

Mr. Hiroshi Kondo

Member of the above Team

Mr. Noboru Moritani

Member of the above Team

APPENDIX-D

Copy of COSTAIN's Clarification

COSTAIN INTERNATIONAL LIMITED

CLARIFICATION OF TENDER

AL BASSIERAH DAM

1. GABIONS.

If we are allowed to use 3 mm wire 7.5 cm mesh on a 3.9 mm frame which are available locally and widely used in the U.A.E. on similar projects our Tender sum would be reduced to Dirhams 27,494,188.00 (Dirhams Twenty Seven Million Four Hundred and Ninety Four Thousand One Hundred and Eighty Eight).
(tems 4.07 and 5.12)
2. CONDUIT PIPE.

Our price is based on the use of 1.4 m diameter asbestos cement pipes which are available in Dubai in lieu of the specified concrete pipes.
(Item 5.10)
3. CURVED FORMWORK.

We assume that the measurement unit for Bill Item 4.06 is square metres and not cubic metres.
4. RESIDENT ENGINEER'S ACCOMMODATION.

Our Bid allows for full maintenance etc., for the building which is being provided by the Ministry of Agriculture and Fisheries in Khorfakkan for the R.E's offices and accommodation. However we have assumed that the building will be free of rental charges.
5. OVERTIME AND NIGHT WORKING:

Our price is based on the assumption that Overtime and Night time working will be allowed for the whole of the contract period.
6. SAND.

Our Plant produces sand 6 - 7% passing 200 sieve which will give the required concrete strengths.
7. CONCRETE TEMPERATURE.

From our experience of operating a concrete batching plant with a Water Chiller unit in the Dibba area during the Summer period we were only able to achieve a minimum concrete temperature of 35°C.

8. SOURCE OF MATERIALS.

We have assumed that suitable rock and fill materials can be obtained from Borrow Pits within 1 Km of the Dam.

9. SUITABILITY OF MATERIALS.

We have assumed that the permeability of naturally occurring sand and gravel will be suitable for the Embankment construction.

10. RIP-RAP.

Our understanding of the Specification for Square Rubble or Ashlar Stone is that the rip-rap will not be compacted but will be dumped or placed so as to obtain a high shear strength by the interlocking of the angular fragments. The outer surface, 20 cm minimum thickness, will be from stone well keyed but rough in order to resist wave action effectively.

11. We have allowed within our Bid for the use of our existing facilities at Dibba.

12. SPOIL BANK

We have assumed that the spoil bank location will be no further than 1 Km from the excavations.

13. QUARRY SITE -- STRIPPING.

We have allowed for a reasonable amount of stripping which we regard as being in the order of 10% of the measured rock filling and would wish to clarify this point with you.

(Item 27.3)

