Naval facilities, Diego Garcia, British Indian Ocean Territory: management and administration

T. Tucker and B. T. Doughty

Mr J. E. Clifford, *Consulting engineer*

The project is a good example of one completed on time and to budget. The preliminary works such as those carried out by the Seabees provide a valuable base from which to start the major development in a remote location. Was the possibility of the major work contemplated at that time?

69. The base fee of $1\frac{1}{2}\%$, presumably on total turnover, sounds small. The award fee of a proportion of 5.2% judged against performance, seems small even if the risk is removed from the contractor, particularly as no indication is given in the Paper of when the contractor was paid. In other words, what was his cash flow between spending money and getting it? Were there advance payments or was the outstanding finance regarded as part of the cost which was then measured and money rates charged to it?

70. Information on waves and tides is usually given in descriptions of marine works, although a mention was made of the piling template being damaged in a storm. Was that particular location, although inside the lagoon, expected to be exposed to occasional storms? The cells seem large in diameter, but it is difficult to judge because it is not stated what the depth of water is at the wharf. Although the piles are 85 ft long it is not known what the freeboard is, what the penetration is or what the soils are. Could the Author give more information on this; why was this particular cellular cofferdam design chosen?

71. Mention was made of waste disposal and it is said that little living coral exists, but presumably there is some. Considerable care was presumably taken to look after the environment, in particular to minimize pollution during dredging and in waste disposal, but were there any specific studies made? Was there any professional environmental advice obtained or monitoring undertaken?

72. Reverting to the overall picture of the project, the initial contract seems to have been regularly extended and additional works added, which presumably means that both the Client and the Contractor were satisfied, and they presumably both thought they had got it right. Would they do the same if they had to do the work again?

73. It is evident that comparisons must be between the work done in the Falklands and that done in Diego Garcia. The Falklands were highlighted largely by Papers on Mount Pleasant Airport.³⁻⁵ Work was carried out at much the same time but over a slightly shorter period. That was largely measured work with some items set aside for cost reimbursement. The Falklands project was carried out in the full glare of publicity, and with a considerable amount of political argument

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going on in the UK. Was a similar level of debate, and political and media exposure occurring while the Diego Garcia project was proceeding? Mowlem were involved in both the Falklands Airport and in Diego Garcia—do they feel able to make comparison of the way the projects were set up and what was done to complete them?

Mr J. M. Thomas, Consultant

In 1966 I was the project manager designate of the British consortium which was going to build a similar facility on the island of Aldabra, presented several disadvantages: the ecology was important—in that the island was inhabited by a number of very rare birds. Also, there was a large tidal range which meant that access to the central lagoon was through a passage which had Spring tides with a 6 knot tidal stream, and this produced all sorts of planning problems. The contract was cancelled for two reasons: the strong lobby of environmentalists and the decision presumably by the US government to build a base in Diego Garcia which to allow a great saving for the British Government.

75. A coral base was to be used for the runway, and the required load classification number for the runway did not suggest any difficulties. In view of the US Navy's experience with coral runways, it was notable that they used imported aggregates, which must have put the cost of the contract up. Can any information be given on whether the coral on Diego Garcia was investigated for use in construction?

Sir Gordon Manzie, Property Services Agency

It appears that the award fee was able to take into account changes as the project developed and that that avoided claims on the contract. Does this mean that occasionally when they wanted to make a small change in the requirement, the Authors were able to adjust the goals under the award fee?

77. Was the base fee adjusted at all? It seemed that the base fee was important, but the Authors did not mention any change in the base fee. Presumably it would rise automatically if the cost changed. All the equipment and supplies came from the USA, little different from what was done in the Falklands. However, the list of contractors in the Paper did not indicate whether they were all nominated contractors, or whether the main contractors had any discretion in who they chose to the subcontract work.

Mr R. N. Sainsbury, John Mowlem & Co.

My opinion, as one not involved in this contract but able to observe its progress, is that the US Navy have handled the project well. They set up a perceptive form of contract and administered it in the way that brought them the best advantage. The award fee appraisals were serious analyses of what was being done, and were handled in an informed manner by the Navy. The granting of these awards definitely had an effect; after each fee adjudication great efforts were made to ensure that next time we would be nearer to the Navy's aspirations and would secure a bigger fee.

79. In trying to interest people in the UK in this version of management contracting I have encountered a Catch 22 attitude. 'If we employ a firm on a fixed fee we expect to be given a 100% performance. Are you suggesting that, without an added incentive, you will not give of your best?'

80. That does not seem to be fair, nor does it acknowledge the realities of life. Of course we always endeavour to do an excellent job—but people do respond to incentives. This is pertinent at a time when, in many fields of contracting in the UK there will probably be insufficient resources available to achieve the performance that everybody wants. It may be in some Clients' interests to start thinking along the lines that the US Navy have followed, and if they are capable of discharging their part with equal skill they might get extremely good results.

Mr J. A. Armitt, *John Laing Construction*

It has been said that subcontractors were not nominated, but it was not clear whether the subcontractors were working on a CPAF basis or whether they were on a separate basis directly to the main contractor.

82. Captain Tucker has referred to feeling like the fourth arm of the joint venture, and in the Paper reference is made to the fact that the Authors found themselves doing battle with the Navy Board. How did they find themselves on a project team within the Navy, and what effect did that have on relationships between them as the Navy talking to the Navy Board. Presumably they were on occasions subject to criticism and comment that they were far too involved in the project and were seeing the contractor's point of view too often.

83. The Paper says how the labour was targeted and measured against the targets which had been identified in pricing the work. Reference was made to an award once a month. Was that the only reward or was the labour paid not just a flat rate but also some sort of incentive bonus?

84. As a contractor finding himself in a situation where the Client is operating a totally cost-plus form of contract, does Mr Doughty see the Client in that situation as being as effective and as efficient as he can be, because clearly the Client is in a position where he could feel free to make as many changes as he liked? The Paper states that it had a considerable effect on progress because the cumulative effect of these changes to the design was apparent. Is there therefore a risk that the Client was not as effective as he might have been under a different form of contract?

Mr J. N. Barber, *Consultant*

It is rare to hear reports that a form of contract has succeeded in motivating a contractor to pursue the goals intended by the employer. If motivation is reflected in results, the success of this form of contract is directly measurable by the grades awarded to the contractor over the ten award fee evaluation periods and, in particular, the progress made towards reaching the maximum. The overall figures are given in Table 2. Can the Authors provide a breakdown of the grades for the four separate heads of assessment (quality, management, performance and cost) to show the relative success achieved in each?

Mr P. D. Hunter, *Sir Alexander Gibb & Partners*

With regard to the tender procedure, is the evaluation of the tenders as objective or more or less objective than it would be with a measured contract? Are there any particular problems in the evaluation of tenders, and do the sizes of the fees also feature as part of the tendering procedure, or were they set out in the original bid documents?

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Mr J. O'Reilly, L. G. Mouchel & Partners

With regard to the four main percentages awarded to the four areas, namely, quality of work, management, performance and cost, what was the basis for these percentages? It seems odd that quality of work should be the smallest of the four percentages involved.

Mr A. N. Beal, Member

It seems curious that the section of the Paper dealing with ecology refers to the various animals, plants, fish and birds affected by construction of the airbase but makes no mention of the plight of the island's human inhabitants. In 1965, Diego Garcia was home to 2000 people. However, from then on those who left to visit Mauritius found that they were barred from returning to their homes. Eventually, those who remained were forced to leave by the stopping of food supplies. Although this eviction of the people from their homes predates the activities described in the Paper, it was clearly directly related and thus merits serious discussion. In particular, the description of the purpose of the development as defence seems hard to justify when it is considered that it involved eviction of people from their homeland to make way for the armed forces of a foreign power (the USA).

89. The Iran hostages and Soviet invasion of Afghanistan are cited as reasons for establishing the base. As the Iran hostage crisis is now long past and agreement has now been reached for the withdrawal of Soviet troops from Afghanistan are there plans to allow the Illois people to return to their homes on Diego Garcia?

90. I appreciate that these are not narrow technical questions and that they concern matters outside the Authors' direct responsibility. However, as professionals I am sure that they are aware of their wider responsibilities and their thoughts on these matters would be interesting and valuable.

Mr Doughty

With regard to the apparently small fee, mentioned by *Mr Clifford*, there has to be considered the size of the project as well as the amelioration of the contractor's risk. It is best to answer this by including it with the point raised about the contractor's cash flow position. The arrangement was that the contractor did not in fact pay for, or own, any of the material procured for the project. We acted as agents for the US Government, issued purchase orders and received funds before our suppliers and subcontractors had to be paid. Consequently our cash flow was almost zero. That is one of the reasons why a particularly low fee was agreed. The Award Fee Board met at six monthly intervals, but reimbursement to the contractor for material, equipment, fixed fee generated by work in place and a proportion of award fee was paid on a weekly basis. In reply to *Mr Hunter*, both the base and the award fees were negotiated at the time the original proposals were evaluated. Under this type of CPAF type of contract the base fee can reach a maximum of 3% but in this case was agreed at 1.5%. The general answer is that the fee was part of the negotiation process. The Authors consider that a breakdown of the award fee grades into the four separate heads of assessment (quality, management, performance and cost), suggested by *Mr Barber* and *Mr O'Reilly*, would convey little information without a thorough study of the related award fee goals. Space does not permit such a review.

92. Referring to the question of wave and storm damage, the tidal range on the

island is small, approximately 5 feet between mean low and high tides. The island lies in an area subject to cyclones and the size of the lagoon, 13 miles long, allows substantial waves to develop. Although storms are fairly frequent, the storm that damaged the piling template was unusually severe and not one which would have been typically predicted during the construction period.

93. The design of the sheet pile cells was produced by a firm of architect-engineers under contract to PACDIV and the contractor was not advised of the governing parameters. The depth of water varies across the lagoon, but it is deep enough to accommodate any vessel the US Navy may wish to bring into Diego Garcia. The design was not contractor influenced other than the way in which we chose to install the cells from a floating template.

94. The Contractors learned a great deal from working with the US Navy on this project. If involved in this type of project on a similar scale again we would want greater recognition for the value of the savings we generated. We were given some recognition during award fee evaluations but that had a cap on it. We would want a slightly modified form of contract with a mechanism for sharing savings with the client.

95. In reply to *Mr Thomas*, coral was considered for use in construction on the island several times. All the construction work undertaken by the Seabees, before the arrival of RBRM in 1981, utilized coral that was mined from the seaward side of the reef on the western side of the island. This coral provided a satisfactory aggregate for use in concrete and base course and the original runway on Diego Garcia was constructed using coral concrete. Once we had mobilized on island, studies were undertaken to determine the volume of aggregate that would be required to complete projected facilities. It was determined that the volume of material required would have ruined the reef on the western side of the entire island and would have seriously upset the ecological balance. It was determined that aggregate could be imported at an almost insignificant increase over the cost of mining coral on the island. We also conducted studies using the dredged coral to see whether it would produce suitable concrete, and found that coral dredged from the interior of the lagoon was significantly weaker than the coral from the seaward reef.

96. In answer to *Sir Gordon Manzie*, none of the subcontractors were nominated but were appointed on a competitively bid basis. The performance requirements were established in discussion with the US Navy who were also a party to the determination of who should be a subcontractor on the project.

97. The Paper describes several mechanisms available to adjust the target value of any particular project. These were a site instruction, a PVN, or a change order. Change orders were typically used to add extra projects to the scope of work. The project variance notice was a device developed by the contractor to tell the Navy they were making changes to the project which impacted on both cost and schedule. This was used to change the baseline so that when award fee time came around we could demonstrate that the reasons we had strayed from the original target cost were valid and due to client design changes, or other changes that had taken place and had been agreed with the Navy during that period. Site instructions were handled on site with the OICC's deputy in a similar manner and incorporated into the base cost for any particular project. The award fee total and the base fee total did not change. If the result of these PUNs were to add 30% to the cost of the project, this did not affect the total available base fee or award fee that the contractor could receive.

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98. The award fee targets were set periodically and varied throughout the contract, an option which was used to maximum advantage by the Navy because as soon as we became extremely proficient in one area they would move the target. Overall the setting of award fee goals had a beneficial effect on the joint venture. People had been drawn from the three companies who had never worked together before, and the award fee goals that were set by the Navy provided a common theme to draw all members of the team together.

99. *Mr Armitt* asked about the basis on which subcontractors worked. When we obtained bids from subcontractors on a competitive basis these were fixed price bids to undertake the work. The difference was that at the time the work had been priced with the Navy, many of the facilities existed only as a two or three sentence description, whereas by subcontract bid stage we had clarified what the requirements were, the drawings were available, and we were able to obtain fixed price bids for all the subcontracts. Productivity and safety were measured monthly on the island and recognition in the form of awards was given to reward crews that had performed well in the respective areas, but there was no incentive scheme applied to the Filipino labourers or to the expatriates, who were both on fixed salary contracts with completion bonuses.

100. The influence of design changes on progress was also raised by *Mr Armitt*. It had been a feature of RBRM's original proposal to the US Navy that we could develop an organization proficient in handling frequent design changes, because we knew that many of the planned facilities were in a preliminary design stage. Once the system had been developed of project variance notices to advise the Client of the cost and schedule impact of his changes, the system worked well. Problems arose only in the area of the many small changes that we allowed to accumulate, and it required a great deal of watchfulness on the part of the contractor's staff to recognize when they started to create an impact. Many of these would have effects on procurement which might not be immediately obvious, but if orders had been placed for certain types of equipment and some design change occurred, one would have to go back to suppliers and obtain revised pricing and delivery. It would then have to be worked out how this would integrate with our shipping arrangements and all the other factors that had to be considered before the Navy could be advised of the total impact of this change.

101. The actions of the British Government in securing Diego Garcia in the 1960s have been documented in the public record. The Authors have no knowledge regarding long-term plans for the island's future. The current bilateral agreement permitting use of the facilities on the island by both the UK and US Governments is subject to periodic review.

Captain Tucker

Environmental studies were carried out and are still performed. Continuous environmental monitoring is conducted by Pacific Division in co-operation with the island commander. On the matter of public debate, nobody seemed concerned. There was not much media involvement. The US Navy were too busy building it. It was satisfying to get a little recognition from time to time, but there was no controversy over the programme.

103. As Client, the US Navy would proceed with such a project in the same way. We were very pleased with the success we had, and knowing what we now know we would probably do it even better next time. This was the first time that the Navy had used a contract like this in over 15 years. Quality was consistently

high; projects were consistently completed on time to meet the customer's requirements; and last, but certainly not least, it was done at a saving of \$22 million from the budgeted programme.

104. It was found that the coral did make an outstanding base course for the runway, taxiway and parking aprons although it was not incorporated into the concrete itself.

105. With regard to contract changes and fee adjustment, there are two features in this cost plus award fee contract which come into play. While they are in some way interrelated, they are also independent. One is the cost reimbursable feature and the other is the award fee. It is not really necessary to have both incorporated in the contract, but it works well when they are. Consider changes in the design of a project which is already in the contract, such as the aeroplane hangar. The cost reimbursable feature gave the client the flexibility of making such design changes and of avoiding claims for delays or other impacts. However, the client and contractor did reach an understanding on what the effect of the design changes should be on our target cost and on our schedule, very much as with a fixed price contract. But for a change in the design feature of a project which was already in the contract, there was normally no adjustment in either the base fee or the award fee.

106. There were, however, several projects added to the initial contract. About 50% of the original contract amount was added in projects for four subsequent fiscal years. As each fiscal year programme was added to the contract, the joint venture and the Navy negotiated the target cost, base fee and award fee for that particular package of projects. So when there was a scope change in the contract by adding additional projects, additional base fee and award fee were added along with those projects. The same is true in reverse. If the effect were to decrease the cost by 30% the fee stayed the same.

107. From the Client's viewpoint, in an ideal sense we ought to get 100% performance with only a fixed fee. In the real world, this ideal view ignores human nature and the reality of the market place in which we all operate. On this contract not only were the award fee and associated goals a positive incentive for the joint venture, they were also a positive incentive for the OICC staff. The OICC actually worked hand in hand with the contractor as a fourth partner trying to achieve those goals, and felt that when they were not being achieved, the OICC had fallen short of expectations also. The goals were constructed to be as objective as possible so it was difficult to skew the interpretation of the results either way. The award fee and the goals were a positive incentive for the entire team—both the contractor and the OICC. Of course, the OICC did not participate with the joint venture when it came to sharing the fees.

108. Relationships with the US Navy Award Fee Evaluation Board were very friendly and professional. To some extent the Board scrutinized not only the contractor but also the entire operation for which the OICC was responsible and accountable. We welcomed the criticism and advice of the various Boards, and it was looked on as a professional critique of how the enterprise was proceeding and had advanced in the past six months. It was an important and integral part of the award fee arrangement to have this formal Board review the contractor every six months. But their reports also contained recommendations to the OICC and the Commander of the Pacific Division. Those recommendations were taken seriously and proved to be of great benefit as we progressed.

109. The question about changes is an excellent point because it was some-

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thing that the OICC considered to be extremely important for the client staff in particular. One of the dangers to the client under this type of contract is to exercise free rein in making whatever changes he wants at whatever whim; but what he forgets is he is paying the cost not only in dollars, but also in time. So we worked hard to ensure that the OICC staff and the Pacific Division staff and our ultimate customers were aware of this.

110. In connection with this question it is appropriate to mention the successful value engineering programme. We incorporated a great many of the contractor's suggestions as to how the construction might be accomplished at a cost savings over what the designer had put on the plans. This was worked into the award fee goals. When these value engineering changes were identified the baseline cost was adjusted downwards, but not by the entire amount of the estimated savings. So by developing these proposals the contractor was able to build in a cushion in the baseline cost which was used to measure his performance in controlling costs.

111. My experience with award fee contracts is limited but the few contracts I have been associated with have been successful. There was a much smaller cost plus award fee contract at the Pearl Harbor Naval Shipyard in Hawaii, with which I was not involved. It involved extensive replacement and repair of underground utility systems in an operational shipyard with consequent interferences, unknowns, record drawings containing many errors and omissions, and all the interruptions associated with an operational shipyard. That contract was a great success, and used the same mechanism that was used on Diego Garcia.

112. I currently have two active contracts for comprehensive base operating services at two Navy bases, one an air station and the other a naval station. These are not CPAF contracts; they are fixed price award fee contracts. The traditional fixed price contract has been used, which is how most of our work is done, added to it the incentive features of the award fee with the accompanying goals, periodic evaluation and incentive for contract performance. In both of those contracts the incentive has been highly successful. Contractors have consistently earned grades in the 90–95% range, and the work so good that we are in the process of awarding two other large base operating services contracts using the award fee mechanism. It is an extremely effective management tool, and we shall continue to use it more.

113. I came on the scene two years into the contract, and somebody else had already established the fees. The original request for proposals, to which many firms responded, contained several evaluation factors which were the basis for selection of the contractor. These included items related to the proposer's technical competency to execute the work involved. I do not know if fee was a factor in the contractor selection process. For contracts we are now in the process of awarding, contractor proposals are evaluated on the basis of price and technical factors.

114. The percentages assigned to the four main award fee evaluation factors were set by the Navy and became part of the original contract. It might be said that quality at 20% seems low, but the client Author has never been involved in a construction project that produced such consistently outstanding work as the job at Diego Garcia. So something must have been right there, although a little more weight might have been placed on quality and on cost. At the end of the project, this structure was reconstructed and another evaluation factor established which had to do with the contractor's effectiveness in planning and executing the demobilization. That was highly effective also; the demobilization was done smartly with significant cost savings.

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