Hurst Spit stabilization: a partnering case study

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The stabilization of a 2 km shingle spit in southern England was initially planned as a traditional civil engineering contract. However, an unforseen delay at the start meant there was a real danger of not completing the work before winter storms, so a partnering approach was introduced—with successful results. This paper starts off by investigating the potential of partnering to achieve the UK's construction improvement targets. Using Hurst Spit as a case study (Fig. 1), it demonstrates that partnering can provide significant benefits for a one-off project without the need for formal agreements. It analyses in particular the culture changes which are required to achieve the full benefits of a partnering way of working.

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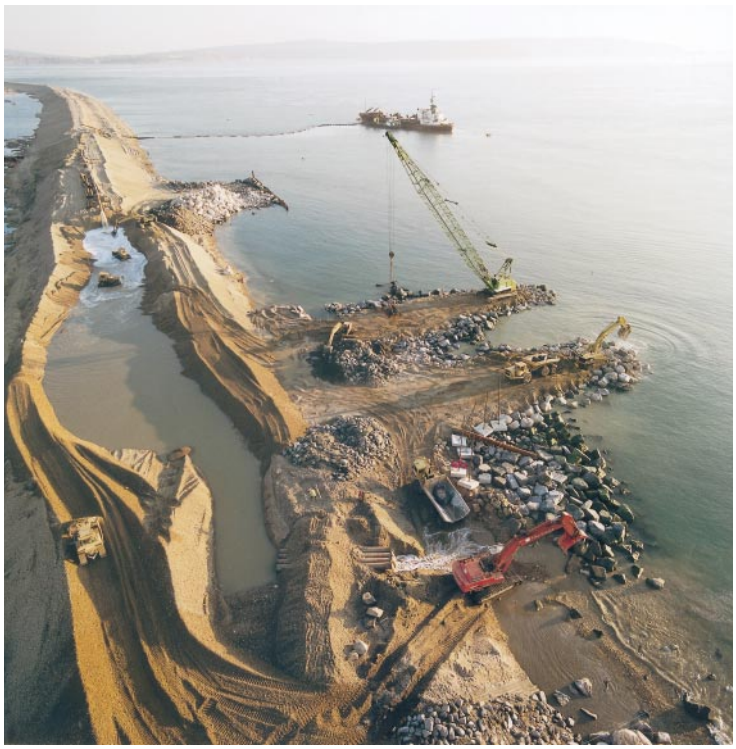

Fig. 1. Hurst Spit stabilization scheme

Introduction

There is a world-wide effort to create significant improvements in the construction industry. To this end, ambitious but achievable targets and deadlines have been established to drive the process forward (Tables 1 and 2).

The emphasis has been on adopting processes which have proved successful in the manufacturing industry. Technical methods such as just in time (JIT), business process re-engineering (BPR), pre-fabrication and standardization are beginning to produce benefits in the construction industry.

But though technical issues are important and need to be improved, the real problem is that of culture. Quantum improvements in the construction industry, as required by the improvement targets, will not be attained purely by technology transfer from manufacturing. Significant improvements can only occur by a process change coming from within the construction industry and dedicated to encompassing the whole culture of construction.

The need for a new contract strategy is clearly evident when it is recognized that the profit margins of construction lawyers specializing in litigation are far in excess of the construction companies that they represent. Adversarial working is being replaced by new ways of working in other industries[1] and has shown great improvements.

The scenario for a paradigm shift in UK construction culture was proposed by Sir Michael Latham[2] in his report that proposed working in partnering arrangements. This proposed long-term partnering relationships with mutually agreed and measurable targets for productivity improvements.

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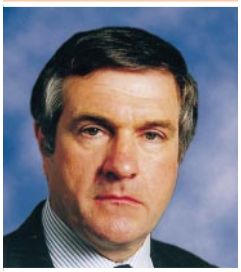

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Table 1 US construction sector performance improvement targets to be achieved by year 2003 [12]

Construction sector performance metric	Year 2003 target improvement	Ranking in importance*
Total project delivery time	Reduce by 50%	First
Operation, maintenance and energy lifetime costs	Reduce by 50%	Second
Productivity and comfort levels of occupants	Increase by 50%	Fifth =
Occupant health and safety costs	Reduce by 50%	Sixth
Waste and pollution costs	Reduce by 50%	Fifth =
Durability and flexibility in use over lifetime	Increase by 50%	Third
Construction worker health and safety costs	Reduce by 50%	Fourth

*Ranking in industry importance obtained from White House construction industry report workshop participants representing the residential, commercial, institutional, industrial, and public works construction sectors.

Table 2 The key UK objectives of EPSRC IMI construction as a manufacturing process

Performance metric	Improvement
Cost	30% reduction
Duration	25% reduction
Defects	Zero
User benefits	20% improved

The major drawback of the Latham approach to partnering is the creation of long-term relationships between partners, typically lasting 3–5 years and with a continuous stream of work being carried out during the lifetime of the partnering arrangement. Unfortunately, this does not address the majority of construction projects in this country where more than 85% are still single one-off projects, and the requirement, in the public sector, of a need to satisfy probity by competitive tendering.

In projects where the client and engineer have embraced the philosophy of non-confrontational working, the goal is then to create a partnering way of working after competitive selection of the contractor while still fulfilling three basic requirements

- a method of contractor selection that achieves the lowest price
- a guarantee that the contractor selected will adopt the partnering philosophy
- a method of allocating risk and profit after the contract has been awarded.

Partnering structure

The advantages of working together have been strongly promoted by Latham [2]. Many clients are now users of partnering arrangements, but this is primarily for building work rather than civil engineering. It is more feasible to develop long-term relationships in this sector of repetitive work loads but considerably more difficult for single one-off projects that predominate in the civil engineering sector. The earlier NEDC report [3] *Partnering: Contracting without Conflict* also provides a good basis for partnering, but again this does not support single one-off projects.

Hellard [4] investigated partnering on a worldwide basis and suggested that partnering is the master key that will unlock the techniques and principles of total quality management (TQM) to improve customer satisfaction. He highlighted some of the problems of partnering, including the danger of no true commitment, those pre-conditioned to adversity, top management paying lip service, the myopic thinking of some to win every battle every day, not bringing all the key players in at an early stage, skimping the early activities or the workshops, culture change not being easy and the use of old standard approaches.

Weston [5] defined partnering as a long-term commitment based on trust, dedication to common goals and an understanding of each other's individual expectations and values. Weston [5] studied 139 contracts with the US Army Corps of Engineers, 39 of which were partnered and 100 of which were not. They show clearly partnering producing significant improvements for all parties to the project.

Partnering projects of all sizes was reported by Bates [6], who suggested the principles should include shared goals arrived at through consensus, mutual trust and respect, new attitudes and behaviour, new means of communication and commitment from top to bottom. Weston's [5] view is reinforced by Larson [7], who states that 'Whether the contract is awarded on a competitive basis or not, does not appear to affect the success of partnering efforts and is not a serious impediment to success'. Schmader [8] carried out a major study of over 200 contracts awarded by the US Naval Facilities Engineering Command (NVAFEC), and again the results reinforce the general advantages of partnering. The paper by Rankin [9] confirms that pre-qualification remains a key mechanism, and this should provide an initial source of variables for any partnering selection process.

Although long-term partnering is likely to produce the largest benefits, there are a considerable number of projects where this approach is not possible. This is particularly true of either 'one-off' civil engineering contracts or where the client is a public body. Although recent government legislation has led to a large reduction in the amount of government-funded work, from about 90% to about 60% [10], the figures are still large. The new

enlarged private sector is more able to adopt new procurement methods and contract strategies and hence take advantage of the potential savings from partnering, but probity in the public sector means that they have considerably less freedom to do this. EC law can also prohibit long-term partnering. Thus a very large amount of construction work will still be awarded by competition. Latham[2] does little to address this problem.

A key document, The Royal Academy of Engineering *A statement on the construction industry*,[11] urges the construction industry to address several factors including the following.

- Focus on customer satisfaction—it cannot be assumed they will know precisely what is wanted at the outset.
- Attention to process as well as to product—research must focus on user-friendly guides for clients.
- Meaningful involvement of the client requires mutual co-operation, recognition of objectives, willingness to be open and free agreement to share risks and rewards to produce a successful project.
- Alignment to a common goal to create a win–win environment.

The many advantages of partnering are accepted, but there are still fundamental key problem areas—such as partnering in the public sector—that have received little attention. An analysis of a public sector project on which partnering developed spontaneously has thus been undertaken to assess the benefits of project-specific partnering and to determine a methodology for procuring partnering contractors in a publicly accountable way.

Case study

Hurst Spit is a shingle spit formed at the end of the Pleistocene period and located at the eastern end of Christchurch bay on the south coast of England (Fig. 2). It is approximately 2 km long and at its seaward end reaches a point approximately 1250 m from the Isle of Wight. The spit protects the coastal areas of the Solent to the east, both on the mainland and the Isle of Wight from Atlantic storms. The spit also protects the salt marshes in its lee, a Site of Special Scientific Interest.

Historically, the spit was nourished by littoral drift from the west. However, as early as 1609 repairs became necessary due to storm damage. Coastal protection works to its west, which began some 100 years ago, severely reduced the shingle supply for re-nourishment of the spit. In 1974 New Forest District Council took over responsibility for coastal protection from the Borough of Lymington and in 1981 started a programme of annual re-nourishment.

Due to the threat of extensive damage to property and the salt marshes that would occur as a result of the spit being breached, a more permanent stabilization scheme was developed (Fig. 3). New Forest District Council was the client for the stabilization works and the engineer was the assistant director of the council's engineering services department. The resident engineer was also a member of the same department.

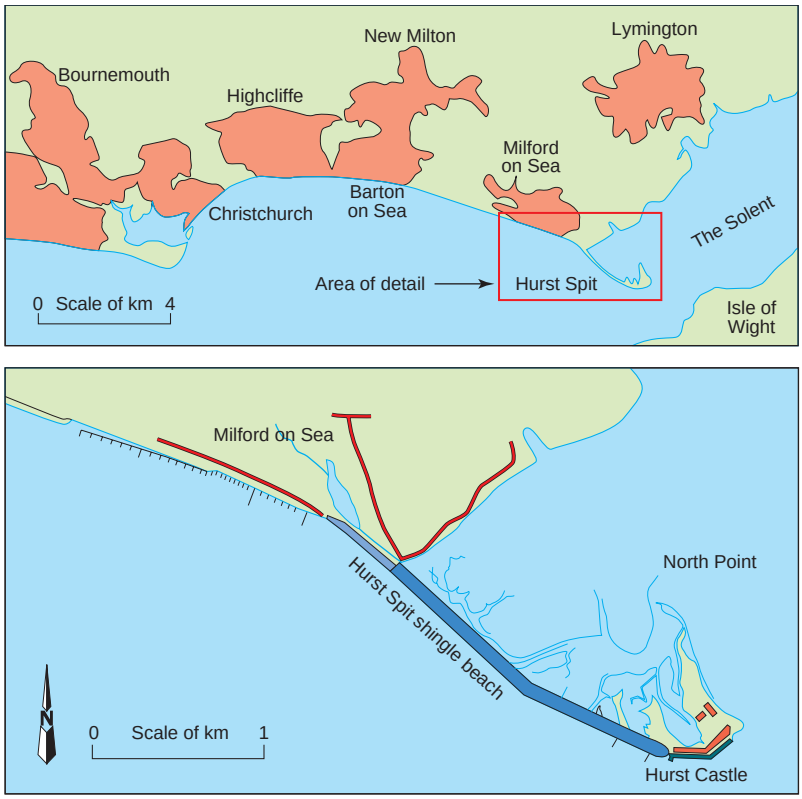

Fig. 2. Location and plan of Hurst Spit

The main contractor appointed to undertake the works was Westminster Dredging Company Limited of Fareham in Hampshire. The contract was let under the ICE *Conditions of Contract* 5th edition with amendments. The contract tender price was £5 million with a contract duration of 30 weeks.

The project was expected to take the form of a traditional civil engineering contract, which often results in adversarial confrontations arising between the contractor, engineer and client. The project was both land-based and maritime, involving marine dredging for gravel and placing it both on and offshore (Fig. 4). It was thus anticipated by the engineer that the main contractor would be either a marine contractor with a land-based sub-contractor or vice versa. In either case the sub-contract value was to be in the order of 50% of the tender sum. In order to give the engineer greater control over the selection of sub-contractors, the ICE *Conditions of contract* 5th edition was adopted, rather than the current 6th edition.

The project was further complicated as a result of being a new and untried design and it was not possible accurately to predict the standards of

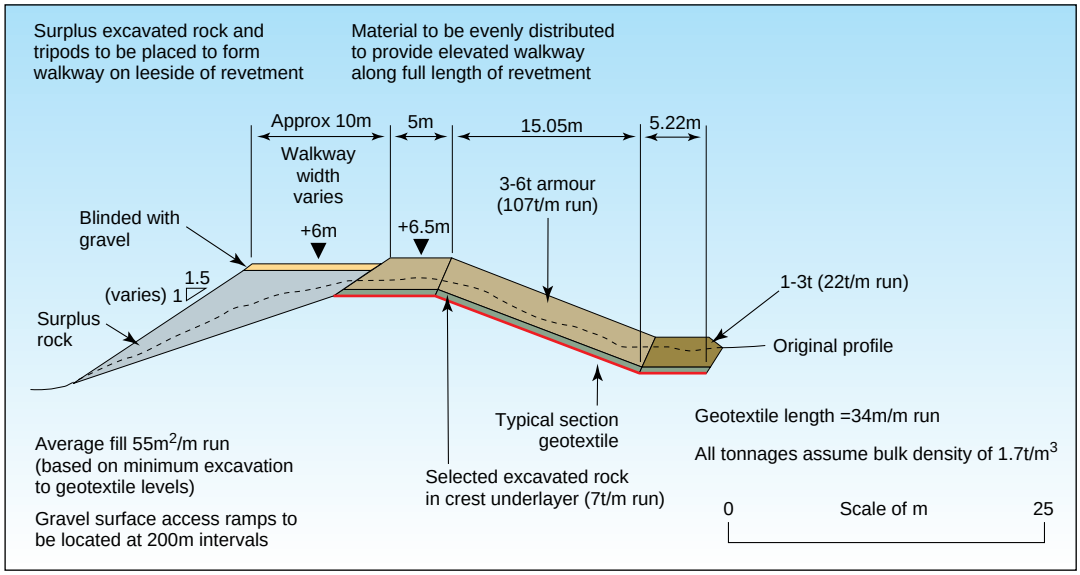

Fig. 3. Typical section through stabilized spit

work which could be reasonably expected from certain parts of the works. In addition, the project was in an environmentally sensitive area with a high public profile. Delays in completion before the onset of winter storms could have resulted in a serious breach of the spit and hence catastrophic consequences both to commerce and the environment. A breach in the spit would have led to flooding of the nearby low-lying areas with consequent disruption to agriculture and business as well as damage to residential property.

The client was concerned with the outcome of the project and therefore asked for a pre-qualification statement from the contractors interested in tendering. Surprisingly, several large contractors failed to respond correctly to the request and were removed from the tender list.

In order for the employer to obtain a dredging

Fig. 4. Marine gravel being pumped on to spit

licence from the UK government for the preferred source of gravel, the cost of two alternative sources of sea-dredged gravel had to be compared. Tenderers were therefore asked to submit prices for each of the alternate sources. The contractor which was ultimately successful submitted the lowest prices for each of the alternative gravel sources and, in all tenders received, the client's preferred source was the cheapest.

The contractors tendering for the project had, as is usual during the tendering process, asked the client for clarification of certain areas where it was thought that there was ambiguity or where errors or conflicting information occurred in the tender documents. The successful contractor had, however, sought clarification of substantially more points than the other tenderers.

The contractor was duly identified as being the preferred tenderer, with the tender price having a validity period of six months. The contractor was keen to commence the works but, due to delays in obtaining dredging licences, the start was delayed.

As a result, the contractor became involved with the design and advised the design team on changes which would improve buildability and reduce construction costs and duration all at no cost to the client, but purely due to the desire of the contractor to provide value engineering. The chance event of the delay led to a situation where a contractor had been selected by competitive tendering but was able to suggest changes to the design to enhance buildability.

When construction eventually started cautious optimism existed between the parties for a non-confrontational project which, over time, developed into a high degree of trust which all parties strove to maintain throughout the contract. Evidence of the success of the partnering which evolved can be found in the fact that during the entire project no contractual letters were written by any of the parties. Furthermore, site meetings were not used for resolution of problems, as these were routinely sorted out on site, but principally for maintaining contact between all parties. As a result, meetings rarely lasted more than one hour.

Setting the stage

The contract was prepared with the expectation that it would be a traditional adversarial contract, but the individuals named in the contract were keen to work in a non-confrontational manner. The main contractor was of similar mind and had already adopted the philosophy of treating others in the way they would wish to be treated themselves, and wished to tender on an equal basis. This philosophy was evident at tender stage when the main contractor raised 20 queries concerning the contract documents, a few being in connection with errors or matters of interpretation, but most were directed at ensuring that no tenderers made incorrect assumptions on key requirements, for use perhaps for claims later. The result of these points being raised was the responses being circulated to all tenderers thereby ensuring a 'level playing field', which was the original intention of raising the query.

One area in particular is worth mentioning is that the contract prohibited the use of local roads for delivery of materials, except for small quantities. The main contractor was concerned that some tenderers would price on the basis of significant quantities of rocks being delivered to site by road, likely to be a considerably less expensive option than delivery by sea. The response from the engineer to this query was circulation to all tenderers confirming the original specification. This example demonstrates two important points

- the tender price offered allowed for providing exactly what the client required
- the contractor, which wished to provide a genuine service to the client, wanted to tender on an equal basis.

The main contractor stated in comments relating to the project

'Our actions at tender stage, in respect of the queries raised, were to seek clarity in order to be able to price what the client actually wanted; to avoid disputes and misunderstandings should we win the contract; to create a 'level playing field'.'

One further point demonstrates the motives of the contractor in the project. Due to delays in obtaining dredging licences, the tender validity period expired and the main contractor was asked if the validity period of the tender price could be extended. The contractor agreed to do this even though the tender sum could have been increased while still providing the lowest tender.

Before the start of the contract the client, engineer and contractor had all displayed openness and integrity and all were confident of a successful outcome to the project. The relationship developed fully when all parties to the contract, including suppliers and sub-contractors, realized they could trust each other and work together. The fact that the main contractor's culture and policy was not to act as a 'traditional' main contractor may have accelerated the development of a partnering approach.

Building the team

The client and engineer had already established a good basis for the contract to work with the minimum confrontation and were keen to build on the approach demonstrated by the main contractor. The project had the benefit of well written amendments to the conditions of contract, which clearly expressed the degree of risk sharing. It had, for example, been recognized that a possible area for dispute could be sea conditions that pre-

Fig. 5. The client paid for rock revetment based on weight of rock delivered

vented working; however, inclement conditions were unambiguously defined by using wave height, leaving no grounds for misunderstanding.

The attitude of the main contractor to its own sub-contractors was also investigated. The most fundamental difference from traditional adversarial contracts was the policy adopted by the main contractor of paying its sub-contractors when payment was due instead of the commonly adopted 'pay when paid' policy.

It was further stated in an interview with the project manager that company policy at all times was to assist sub-contractors whenever possible, and such measures could include increasing the frequency of payments, the provision of a quick and easily agreeable method of assessing interim payments and helping with engineering services, plant and labour where required.

Two other factors were considered to be important for the success of the contract. Site meetings were held with all interested parties present, including sub-contractors and suppliers. Second, it was agreed that the resident engineer could work with the sub-contractors, thus avoiding any defective work being continued while instructions were relayed through the main contractor.

The client also demonstrated the ability readily to adopt different procedures, such as with regard to re-measurement. The difficulties of producing test panels of rock in order to re-measure rock placement was recognized, and this method was discarded in favour of measuring the weight of rock delivered to site (Fig. 5). This was possible because both contractor and client were prepared to agree the weight of rock delivered and the client was satisfied that the rock was placed in accordance with the contract. Interim valuations were agreed by considering the percentages of work complete.

The resident engineer stated during an interview that in his opinion the main contractor had always undervalued the amount of work done and, in one instance, the resident engineer suggested that the contractor should increase his application for payment. The overall result of this system was that valuations were agreed on the spot and because of the client's accounting procedures the contractor was paid early in every case.

The final observation made by both client and contractor concerns the issuing of instructions relating to unforeseen conditions and variations. There is often reluctance for engineers to issue instructions relating to unforeseeable conditions for fear of being thought of as negligent by the client. This frequently leads to disputes with attempts to cover the situation with variation orders. Where the situation is truly unforeseeable no stigma can be attached to an engineer treating it as such, since by definition it could not have been foreseeable. Where variations occur, instructions should be issued promptly so that the contractor is not left with the dilemma of whether or not to proceed with the works at its own risk.

Contract analysis

Analysis of this project suggests a framework for partnering working using traditional forms of contract, as follows.

- Contractors need to be prepared to tender for a project with no hidden agenda and clients need to produce comprehensive and fair documents for the contractors to work from.
- The client needs to be vigilant in ensuring that the tender prices received reflect the scope of the work expected and are not based on misunderstanding of the requirements of the contract, which may result in a claims situation.
- There must be commitment from client, engineer, contractor and sub-contractors to work together as a team, agree interim valuations and ensure prompt payment. The old approach of pay-when-paid has no place in the modern construction industry.
- Care must be exercised in preparation of tender documents to ensure that the works are buildable and any onerous conditions are

Fig. 6. Use of two rock delivery barges ensure completion before winter storms

highlighted at tender stage.
- All parties to the contract must be proactive and prepared to implement change for the benefit of the project.
- A project team must be built up based on mutual trust and elimination of the 'us and them' attitude.

The Hurst Spit project contained a large element of risk, which was increased by a delayed start. The contractor, at the start of the project, recognized the need for acceleration in order to complete the offshore works before winter.

Two barges were employed, rather than the planned one, to ship rocks at double the rate, which had two results (Fig. 6). First, the client may have incurred some re-handling charges and, second, the contractor's plant was utilized at a level not originally envisaged.

The acceleration was achieved with no additional costs to the client but with a large reduction in the risk associated with failing to complete the offshore works during the good weather. The final result was a project completed on time, with high quality workmanship and to budget (Fig. 7).

Conclusions

The Hurst Spit project shows the step-change improvement in efficiency which can be achieved when the vision for partnering working is applied with sincerity and trust. Political brinkmanship and mutual distrust were entirely absent from the project management team, making the beneficiaries the client, engineer and contractors.

All project team members have recognized the advantages of a partnering approach on the project and would actively attempt to emulate this type of working on future projects.

The motivation for a partnering way of working is a philosophy not an agreement. There is no need for special forms of contract or agreements, especially as these will not necessarily satisfy the requirements of public accountability. However, it is of absolute importance that the philosophy of co-operation be augmented by prompt and fair payment throughout the supply chain.

However, although the organizations involved provide support and a framework, it is not the organizations which set the agenda on site but the character and attitude of the individual members of the teams. Selecting the right people is the key.

Fig. 7. Hurst Castle at the end of the stabilized spit

Partnering can provide a step improvement in construction even in single projects. In order to provide maximum benefits it is necessary to involve the contractor at the design stage. Partnering is a mechanism specifically developed for the construction industry and as such will provide greater benefits than technology transfer from manufacturing.

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Discussion

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