

**LEGAL IMPLICATIONS OF COASTAL STRUCTURES**  
**DR ROGER MADDRELL, Halcrow, Burderop Park, Swindon**  
**DANNY GOWAN, Solicitor, Davies Arnold Cooper, Bouverie Street, London**

**1. INTRODUCTION**

It is apparent that we are living in an era where people are conscious of their legal rights and will take legal action to obtain recompense of real or apparent losses. Indeed, this tendency is such that in a construction context some employers appear to regard arrangements with their professionals as entailing a contract for a result, rather than a contract to provide professional skill and judgment.

The design and construction of coastal structures is certainly not immune from this. With the best will in the world when a coastal structure is built it can have an adverse impact on environment, which can lead to litigation. Difficulties in predicting the size of the next storm, when it might appear in relation to the next spring tide and what the beach level might be, all combine to create a design situation requiring the exercise of significant skill and care. Even when considerable care is taken, it is often difficult to distinguish between natural coastal changes and those which are caused by coastal structures (Maddrell et al, 2001).

Faced with these kinds of issues, what is needed is a level playing field between the Employer and the Designer and appropriate allocation of risk. The fundamental rule on allocation of risk is that it should be assumed where it can best be handled. There is a little point in allocating risk in an inappropriate way. In the first instance it will probably not be handled properly and secondly it will undoubtedly increase the cost of carrying out the work as the party assuming the risk will pass on the cost.

“Who” has taken responsibility for “What” under a contract is a common area of dispute. It is highly desirable that any project should start with a clear and comprehensive contract between the Employer and his Designer or Contractor. The scope of the works and the services to be provided should be spelled out and the client must understand that scope and nature of the services being provided. The Contract should also spell out what the anticipated risks are and which party is accepting them. If risk is properly identified and appropriately allocated on a basis which all parties understand, then the scope for a dispute is significantly reduced.

It is not only important that the Consultant complies with the terms of the Contract in carrying out design work, but also follows any relevant design codes relating to the work being carried out. Examples of these are BS6349 Part VII 1991, the CIRIA/CUR Manual (1991) or the PIANC publication in relation to site investigation requirements for dredging works. Self-evidently current legislation with regard to health and safety and managing construction risks (eg Construction (Design and Management) Regulations, 1994) need to be followed.

There is also the issue of the appropriate price for the job. For whilst it is entirely right that public bodies should look at “best value” in considering various options, there is a proper price for any project. One can point to numerous examples where cost rather than value has been emphasised at the initial stages leading to a far more costly outcome in the long term. Best value does not mean cheapest and, from a Designer’s point of view in designing with best value in mind, it is essential to have a good technical understanding of what is involved and to resist the pressure to cut corners in the necessary design process for the sake of cost.

Ideally all projects should work as a partnership between the parties involved. Where this happy state has been achieved there have been a number of notable successes. Partnering by definition requires a high level of reasonable behaviour by the parties together with the creation of a co-operative attitude focussed on creating an atmosphere that promotes successful achievement of the contract. The concept of partnering applies particularly in claim situations where it is essential that all parties appreciate and understand the genuine problems which have been encountered.

Generally, claims that cannot be resolved between the parties proceed to arbitration or litigation. Under the terms of the Housing Grants Construction and Regeneration Act 1996 a new process of adjudication is available. This latter process was intended for, and is most appropriately used, in relation to claims for payment. Its very short timescales (28 days from the date of referral to the date of decision) does not lend itself to creating an environment which is suitable for the resolution of detailed and difficult design arguments. The Government is considering improving the Legislation in the next two years, while still ensuring it is kept quick, simple and cheap. These changes include better guidance and training for adjudicators and of the Parties concerning their rights and amending the Scheme and the Act, for example outlawing the practice of making the referring party pay for the adjudication.

The recent reforms to the Civil Procedure in Courts in the UK introduced by Lord Woolf have lead to an environment in which the Courts encourage other forms of alternative dispute resolution such as mediation. If the litigation course is followed then claims relating to engineering disputes tend to come before the Technology and Construction Court, which is a specialist Court for the construction and engineering industry. Disputes arising from the design and construction of coastal structures are not limited, however, to this division. Depending on the nature of the dispute it is possible that proceedings can take place before the Lands Tribunal or another division of the Courts. Experts must also fully appreciate their responsibilities (Maddrell, 1999).

In an engineering context it is not possible to prevent difficulties from arising. It is, however, possible to limit the scope and consequent expense of legal proceedings if the contractual rights and obligations of all parties are spelled out and contractual risk appropriately allocated. If this is accomplished then, even if things do not go exactly to plan, sensible alternative strategies for dealing with the difficulties as they arise will be in place.

The importance of this is amply demonstrated by the fact that where claims are made against Consultants arising from a breach of their obligations, costs which are involved are in most cases far in excess of their original fee for the work. The cost in terms of time and money is significant and such situations are to be avoided if at all possible.

## **2. CODES OF PRACTICE**

It is important that the designer follows all the current Codes of Practice such as BS6349, Part VII 1991, the CIRIA/CUR Manual, the US Corps of Engineers Shore Protection Manual, the PIANC Report of working group number 23, Site Investigation Requirements for Dredging Works etc etc. While the use of such codes and guidelines do assist in protecting the designer from subsequent claims, it is also important for him to carry out his own investigations and to be aware of, and consider other relevant material, which is generally available. The fact that a

designer followed the required codes is not a guarantee that he will not be sued successfully. A designer is obliged to provide a design which reflects an appropriate solution based on the accepted “state of the art” at the time of design. These comments apply to the design of temporary works as well as permanent works.

Independent checks carried out by the Coastal Structures Designer would normally include mathematical models to establish the design conditions for different return periods. Such models must be based on real data and, if possible, combined with the occurrence of water level, allowing a joint probability prediction of wave and water level to be made. It is unfortunate that at the present time there is a lack of actual measurements and designers have to rely on local wind measurements and/or global models, which are themselves wind driven. It is also important to look at the impact of the proposed structure on the coastal regime, again by using say, beach plan shape models. As with all projects, a number of designs and layouts should be examined and costed and their likely impacts assessed before arriving at, what should be, the most cost-effective design. As part of this process it is also necessary to consult with the Client and the Statutory Authorities as well as local residents and landowners.

It goes without saying that the designer must have a comprehensive Quality Plan. This will cover correspondence, drawings etc as well as, importantly, design calculations. There are, surprisingly, a number of examples of cases where the design calculations have not been available for examination when problems arise. This makes it very difficult to either check whether the design was appropriate or to compare it with possible alternatives which might have had a lesser or greater impact on the coastal regime.

Under the present legislation it is also essential to ensure that the design is constructable and, in doing so, imposes minimum risk on the Contractor (i.e the 1994 Regulations).

In planning for construction and once on site it is important to follow all relevant legislation. This may include the Control of Pollution Act 1974, the Water Act 1989, BS 5228 (Code of Practice for noise control for the construction and demolition sites), and local disposal regulations etc.

### **3. CLAIMS**

The complete avoidance of claims, while a worthy target, is rarely likely to be achieved. Even with the best will in the world on all sides, things seldom turn out exactly as planned. Parties must therefore realise when circumstances have changed and assist each other to find the best and most cost-effective solution. It is not to the benefit of the project or Client for the Contractor to encounter a problem, ask the Engineer for an instruction and for the reply to be “its your problem”. It is also to no ones advantage for the Contractor to look at claims as a way of increasing his margins. Disputes of this kind are expensive and time consuming to sort out.

Claims can be caused by a number of factors including:-

- Inadequate soils investigation
- Late start to the design and/or undue limits on design costs
- Inviting bids with incomplete drawings
- Attempting to complete the design through a review of the contractor’s drawings of his proposed construction methods

- Untimely design revisions, without proper provision for the extra time and cost included
- Interference with the timing and sequence of construction

Claims can also arise from simple misunderstandings or from the unpredictability of the work. They can include factors such as changes in scope, delay, disruption, acceleration and termination or can involve arguments over contract terms, payments, variations, extensions of time and availability of information. The scope for claims arising is considerable.

A study of almost 500 cases in the UK (Conlin et al, 1996) found six broad categories of dispute, namely, payment and budget, performance, delay and time, negligence, quality and administration. In the Development of Disputes, Jones (1994) found ten factors which tend to cause claims. These were poor management, adversarial culture, poor communications, inadequate design, difficult economic environment, unrealistic tendering, influence of lawyers, unrealistic client expectations, inadequate contract drafting and poor workmanship.

In the USA a study of over 400 claims by Diekmann and Nelson (1985) showed of the more common claims, 46% were related to “design errors” and 26% were due to “discretionary or mandatory changes”. Other specific issues included changed site conditions, weather, strikes and value engineering.

A study of claims in Hong Kong by Kumaraswamy and Yogeswaran (1998) indicated that, on average, variations were the most common cause of claims, followed by additional works. The highest rating they found both in terms of frequency and additional expense, were (not surprisingly) variations, which occurred on every project. While there were also many avoidable problems such as unclear and inadequate documentation, specification problems, and late instructions, their frequency and magnitude ratings were generally lower. The consequences of the avoidable problems in financial terms was, however, significant, with the greatest culprit being unclear documentation.

Most of the above can be directly applied to coastal and marine works. Unclear documentation can be a significant cause of claims. Most often, however, unforeseen ground conditions arise, especially when dredging is involved.

#### **4. CONTRACTS AND LEGISLATION**

Coastal works can be constructed using a variety of contract types, some of which might have to be modified or changed to reflect project requirements. In this paper we are looking at the Contract and not the detailed requirements of the Specification and Bills of Quantity. These latter two are most important, but essentially, are a matter of detailed engineering.

The most common contract form used for coastal works in the UK is the Institution of Civil Engineers’ (ICE) sixth edition, which has now evolved into the seventh edition, published in September 1999. This form of Contract is popular in that it has been used for many years and the parties involved understand it. There is also a considerable body of Case Law which has built up on it. The introduction of the seventh edition was not universally popular, but it is well understood and has a useful track record.

Another form of Contract currently in use is the New Engineering Contract (NEC), which is a risk based contract. It has a number of different forms depending on the type of construction being undertaken. For example, NEC A is a priced contract with activity

schedule, B is a priced contract with bills of quantity, C is a target contract with activity schedule, D is a target contract with bill of quantities, E is a cost reimbursable contract and F is a management contract. There are also a number of secondary options such as option J, Advance Payment to the Sub-Contractor or Option L, Sectional Completion, which can be included in order to customise the contract.

Clause 6 of the NEC contract sets out compensation events. Interestingly, in relation to unforeseen ground claims, the contract talks of the Contractor encountering physical conditions *which an experienced contractor would have judged at the Contract Date to have such a small chance of occurring that it would have been unreasonable of him to have allowed for them*. Its approach to the risk of unforeseen ground conditions is therefore different from that adopted in the ICE's sixth and seventh editions.

For overseas contracts the normal forms of contract are the FIDIC forms of contract. FIDIC has a long track record and is generally understood by parties involved. A new suite of contracts was brought out in September 1999 (Reilly and Tweedale, 2000). These cover a number of types of construction contract from that simply based on bills of quantities to design and build, commonly known as the Red, Orange, Yellow and Silver books. The Red book is the Traditional Civil Engineering form. The Orange book is the Design and Build form. The Yellow book is the Mechanical and Electrical form. The Silver book is the Engineering, Procurement and Construction (EPC) form for use with project finance arrangements. It should be noted that the new contract that relate to dredging works has been criticised by a number of Authorities. It would seem that the drafting was significantly influenced by the dredging contractors wishes and to that extent the contract is felt by some to be unbalanced.

In terms of legislation, the UK coastal works are covered by the Coast Protection Act, 1949 and other Acts, which cover noise, pollution and environmental issues. The Housing Grants, Construction and Regeneration Act 1996 applies to all construction contracts and provides the parties with the opportunity to go to Adjudication prior to Arbitration or Court proceedings.

## **5. RECENT CHANGES**

Partnering between all the parties involved in a Contract is becoming increasingly popular. Partnering involves an agreement in principle to share the risks involved in completing a project and to establish and nurture a partnering environment. Partnering lays the foundation for better working relations including better dispute resolution. However, it will only work if those involved are honest, are motivated by challenge, wish to do work which is valued and recognise the overriding importance of fairness in relationships in working together to get a project completed. Without this partnering will fail.

The original NEC Contracts were designed to stimulate collaborative working, but came in some years before the present concept of partnering. The latter was promoted and defined by the EGAN report (1998). The NEC panel has produced a consultation document on the use of partnering in the context of NEC contracts.

The new partnering document includes agreements for the joint pursuit of objectives, while working towards the achievement of key performance indicators, with the partners being monitored by a core group of managers. The project-specific requirements includes such things as the use of common information systems, sharing offices, attendance at core group

meetings, partnering workshops, joint design developments, value engineering and risk management. As with all the NEC documents, the agreement is intended for international use and to have a wide ranging application for projects of any technical composition.

Following Lord Woolf's reforms and the overhaul of the Civil Justice System in April 1999, "pre-action protocols" have been operating in England and Wales. The protocols set out the way in which disputes should be dealt with prior to starting legal proceedings. The claimant is required to spell out his claim in detail. The defendant is required to reveal any defence and counter claim. The purpose of this is to eliminate "trial by ambush" and provide an opportunity for early settlement. Non-compliance with the protocol does not, however, debar a party from pursuing either a claim or defence through the Courts, though a failure to do so will in all probability be reflected in cost orders by the Court.

## **6. SOME RECENT CASES**

The following is a brief description of some recent cases which have involved coastal or harbour works and is not intended to be a complete list of relevant cases. Cases that go to Arbitration remain confidential. In Court cases the decisions of the Court are published. The following is therefore intended to give a flavour of some of the problems and the cases involved.

### **Scarborough**

This case related to a spectacular cliff failure which, while taking a number of hours to develop, caused severe damage to the Holbeck Hall hotel on the top of the cliffs to the south of Scarborough. The Local Council owned the sea defences and the land between them and the hotel and had done some work on that land some years before the failure occurred. The owners of the property sued the Council alleging that the Council, as landowners, owed them a duty of care and that they had not properly exercised this duty. The main case quoted regarding the duty of care was *Leakey v The National Trust*. The sea defences have subsequently been "beefed up" and the weight of material (rock) at the toe increased, in order to prevent further movement.

The Court found that the Council had basically failed to exercise a sufficient duty of care to the property owners living along the cliff line above the defences. The case went to the Court of Appeal who found that the Council did exercise a reasonable duty of care and dismissed the claim.

### **Sunderland**

The channel approaches to the Port of Sunderland were deepened in the late 1980's following studies and a brief site investigation in the winter. The successful tenderer elected to remove the horizontally bedded limestone using a large backhoe and this operation was successful. However, the contractor came across reef limestone within the main area of bedded limestone, which his backhoe could not remove. Subsequently he had to mobilise a drilling and blasting barge in order to break up the rock, before it was removed by the backhoe. The contractor claimed these latter conditions (reefs) were not foreseeable.

The arbitrator found in favour of the contractor and, as a result of this, there were subsequent actions by the client against his consultant and by the consultant against his sub-consultant, relating to the pre-contract studies and site investigations.

### **Mappleton**

Two groynes and short revetment at the toe of the cliffs was built at Mappleton on the Holderness coast in 1991 in order to protect the village and the main coastal road, which lay close to the rapidly eroding cliff line (see Maddrell et al, 2001). Property owners downdrift, to the south of the defences claimed that the construction of the coastal works had led to an increase in the already fast (2m year) rate of erosion. The case involved erosion at Grange Farm, which lay some 1 to 1.8km from the defences, but there were some 30 claims pending, dependent upon the outcome of the case.

The case was heard by the Lands Tribunal in 1999 who found that, even though the short term rate of erosion, following the construction of the defences, had been more than double the long term rate, this increase in erosion was due to natural causes and not to the defences.

### **Happisburgh to Winterton Defences**

A series of offshore breakwaters was built in two phases in order to protect the coastal dunes in this area. They were built in two phases. In the first phase, constructed between 1992/94, minor changes to the design in the post tender period and a series of problems, which had led to the very unfortunate loss of life, produced significant claims.

The dispute went to Arbitration in 2000 and was settled during the course of the arbitration.

For the second phase, constructed in 1996/97, there were no claims.

### **Sheerness**

Deepening of the approach channel to the Port of Sheerness in 1989/90 involved the removal of mainly medium to fine sand, but with some gravel and London Clay. Because the area had a known military presence and had been used in the past for gunnery practice, the contract required that no ordnance was allowed into the disposal/reclamation area to the south of the port. The contractor therefore had to install grids on the dragheads of his trailer dredgers and, while he was paid for additional downtime in relation to cleaning his grids, he claimed for his apparent loss of production (Maddrell, 2001).

The claim was significant in financial terms, even though project completion had been achieved within programme. The matter was eventually settled out of court for the sum originally certified by the Engineer.

In two subsequent dredging contracts, where grids were installed on the dragheads, there were no claims.

### **Sovereign Harbour**

For the construction of the outer harbour of Sovereign Harbour, rock was delivered by 20,000t barge, brought into a temporary unloading point offshore from where the breakwaters were constructed. Delivery took place during spring tides and, on the last delivery, the barge was delayed due to bad weather. When she did come alongside the temporary jetty, she settled on the bed on the falling tide and broke her back.

There were significant claims from the barge owner both in terms of cost of repair and in loss of profit. An analysis of the final delivery showed that, while on all previous occasions push tugs had been used to bring in the barge, for this delivery she had been pulled into position. The conclusion reached, which was accepted by all parties, was that the pull tug had created a hole in the sea bed beneath the stern of the barge and it was this hole that caused the barge to break her back.

### **A55 Road, North Wales**

Rock required for the protection of the coast road was to be brought by barge to an offshore point from a quarry in Norway, offloaded onto smaller barges, dumped on the beach at high water and subsequently collected at low water. The sub-contract agreement with the quarry owner required inspection of the rock both in the quarry and on the beach. The availability of large quantities of apparently suitable rock at the quarry however meant that it was loaded onto the 20,000t barge in a matter of hours. While staff were present in the quarry, proper inspection of every load was not possible. When inspected on the beach by the Engineer, some of the rock turned out to be too large and proved very expensive to break up. The claim against the quarry owner failed, but some of the larger rock was able to be used at the toe of the revetment.

A further problem arose with regard to the submersed tube tunnel in which the road passed under the Conwy estuary. The concrete tunnel units should have been placed in the dredged trench during the summer but, due to delays elsewhere, placing started in the late winter/early spring. As a result, significant rapid siltation took place beneath the units and the required sand bedding could not take place until the silt had been removed, which proved both difficult and time consuming. In addition, in the spring there was a significant algal bloom, the debris from which collected beneath the units, making removal particularly difficult and hazardous. The subsequent claims were sorted out in an overall agreement on the project, but the claims against the dredging sub-contractor went to arbitration.

## **7. CONCLUSIONS**

It is not possible to design a coastal structure and prepare Contract Documents in a way that will preclude claims and disputes. However, the likelihood of claims arising can be reduced by a number of means, namely:

- (i) By adopting a reasonable approach throughout. This involves performing adequate investigations, including site investigations, analysis of historic changes, carrying out necessary studies and modelling which examine alternatives, together with their likely environmental impacts. This process should allow the designer to not only satisfy the requirements of his Client, but to produce the most cost effective, best-value design, with the least environmental impact. It should be noted that where adverse impacts are identified, it is normally possible to incorporate environmental benefits into the scheme to off-set them.

- (ii) The Contract Documents must be clear and especially clear in describing where the risks lie and who should be responsible for them. Ideally risk should remain with the party best able to deal with it.
- (iii) Partnering is to be recommended, but it should be appreciated that this requires a great deal of trust, understanding and co-operation between the parties.
- (iv) It is important that the designer follows all the relevant Codes and Legislation. However, it is also important that he carries out his own independent analysis and produces a design which meets the current “state of art”. If the matter does go to Court, he must ensure all calculations and other pre-tender analyses are available for scrutiny. A good QA system is imperative.
- (v) Many disputes tend to arise from Unforeseen Ground Conditions. It cannot be stressed enough that adequate site investigation is essential and the up-front savings that may be gained by limiting site investigation, can prove very expensive once the project is underway. Such site investigations should also include an examination of the geomorphology so that reasonably accurate predictions can be made of say the likely future changes and the impact of the structures on them.
- (vi) While it may be difficult to judge, the design checks should, in so far as it is possible, include for the effects of likely climate change during the life of the structure.

## **8. REFERENCES**

- Conlin, JG, Langford, DA and Kennedy P. The relationship between construction procurement strategies and construction contract disputes, CIB W92, Symposium, South Africa, 1996.
- Dickmann, JE and Nelson, MC. Construction claims, frequency and severity, J of Construction Engineering and Management, Soc. of Civil Engineers, III, 1, 1985.
- Egan, J. Thinking Construction: The Report of Construction Task Force, DETR London, 1998
- Jones, R. How constructive is construction law, Construction Law Journal, 10, 1994
- Kumaraswamy, MM and Yogeswaran, K. Significant sources of construction claims, The Int. Construction Law Review, Pt 1, 1998.
- Latham, Sir Michael. Constructing the team, HMSO, London, 1994
- Maddrell, R J. The Case of the Expensive Expert, The Expert, Vol 4, No 2.
- Maddrell, RJ, Rennie, D and Spiller, K. The ‘legal’ impacts on coastal structures, MAFF Conference, 2001
- Maddrell, R J. Dredging Ordnance. WODCON Conference, Kuala Lumpur, April 2001.
- Reilly, F and Tweedale A. FIDIC’s new suite of contracts, Construction Law Journal, 2000.