

DESIGN & CONSTRUCT CONTRACTS AND FINAL DESIGN COST RISK

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1. INTRODUCTION

Design-construct (or 'turnkey') has become a popular method of project delivery in Australia over recent years. From the principal's perspective, it has the advantage of a single contract to deliver the entire project thereby transferring substantial risks to the contractor, whereas the traditional method of project delivery provided for contractual separation of design responsibility from construction. In the traditional mode, the principal separately engaged the design consultants who were and remained responsible to the principal, and subsequently called tenders from contractors on essentially complete design documentation prepared by the principal's designers. The risks of increased construction costs arising from design changes or late delivery of final design documentation was typically carried by the principal, unless negligence of the designer could be proved.

The essence of a design-construct contract is that the contractor undertakes the responsibility and liability for the final design, as well as the construction.¹ The extent of tender documentation for such a contract varies considerably from one contract to another. At one extreme, the client specifies only the functional and performance requirements and leaves the form of the design to be determined by the tenderers. In these cases, a tenderer has to undertake substantial conceptual and preliminary design work in order to have sufficient information to cost and prepare a tender. In other cases the principal's design is substantially complete, leaving little scope for tenderers to make significant changes. In all of these cases, the common feature is that the design is not fully detailed, leaving scope for the tenderers, to a greater or lesser degree, to input their own design ideas, materials

and construction methods in an endeavour to reduce costs in a competitive environment. As a design prepared for a design-construct tender is 'preliminary' and not complete, it is almost inevitable that there will be items not shown on the tender drawings, either in terms of extent, quality or complexity. It is only when the drawings have been completed for a project that the design is fully detailed, showing all items comprehensively. The skill in tendering design-construct contracts is in the extrapolation from incomplete documentation to cost the entire project, including the undocumented components, and judging what allowances must be made to cover the cost of the undocumented and unknown components, and any design changes which might ultimately be necessary in developing the preliminary tender design into the final 'for construction' design. As Australian contractors do not have any substantial 'in house' design capacity, they normally engage consulting engineers, architects and other consultants to prepare preliminary designs sufficient for the contractor to price a major design-construct contract tender. The cost of preparing this preliminary design is additional to the normal contractor's/subcontractor's costs to price the work to be constructed, thus the total costs of tendering are significantly greater for a design-construct tender than for a tender to construct the same project to a principal supplied design. Irrespective of the contractual relationship between the designers and the contractor during the tender, and who is taking the cost risk of the design if the tender is unsuccessful, there are significant commercial pressures to minimise the extent of preliminary design and hence tender costs. However, the less design that is done at this preliminary stage, the

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greater the pricing risk that the tender will have inadequate cost provision for construction of those design elements that were incompletely considered during tender design. There is also the risk that if inadequate design and investigation is carried out during the tender stage, the concept design on which the tender is based may not be appropriate for the project, and will have to be changed during final design with consequent substantial unforeseen cost increases.

Given the significant risk that the contractor's cost of the final constructed design could be substantially greater than the tendered price based on the preliminary design, the question arises as to whether the contractual arrangements commonly used for design and construct satisfy the Abrahamson principal, that is, are the risks borne by the party best able to manage them? Most of this contractor's risk of increased cost, referred to herein as 'final design cost risk', is specific to design-construct contracts, as the most significant component arises from the incompleteness of the design which is priced for tender, and this aspect does not usually exist in construct only contracts. Any excess cost of construction arising from eventuation of final design cost risk will be referred to herein as 'unforeseen final cost'. Whilst final design cost risk would exist even if the designers were in-house, the contractor needs to manage this risk more carefully where the designers are consultants with their own commercial imperatives. This paper considers the critical issues in final design cost risk in design-construct contracts where there is a single independent design subcontractor with responsibility for tender and final design. The factors that influence final design cost risk are identified from several cases that have been before Australian

courts, and the difficulties usually faced by a contractor in passing risk to a designer assessed by considerations of tender and final design contracts. Suggestions are made as to what actions a contractor could take to manage the identified risks better.

2. POTENTIAL FACTORS IN FINAL DESIGN COST RISK

One of the features of design-construct contracts is that, as the contract is almost invariably made before the design is completed, the principal knows precisely the cost, but neither the principal nor the contractor know with any precision what will be provided for that price.² This can be seen in an acute form in one reported case where, in a contract for \$2 million for the sale of land and design and construction of a transport depot, there was no specification, and only five basic plans of which the judge commented that 'a stranger to the transaction would be unlikely to be able to envisage the completed project'.³

Although project delivery via design-construct projects is not new, it has only recently been widely used in Australia. Accordingly, relevant case law that has directly considered disputes specific to design-construct is somewhat limited, and the issue of unforeseen final cost does not appear to have been judicially adjudicated. In one significant case, the contractor's claims for unforeseen final cost from their design subcontractor were central to the dispute, and are discussed in the case report,⁴ but ultimately the claims were not judicially decided.

The following table summarises the potential factors in unforeseen final design cost risk from a distillation of the reported cases and the author's experience as an engineer and lawyer, and consideration of the responsibilities of and relationships between the parties associated

Table 1. Potential Factors in Final Design Cost Risk

DESIGN PHASE	CAUSALLY RESPONSIBLE PARTY	
	DESIGNER	CONTRACTOR
Tender Design	<p>TD1. Tender design does not identify full extent of final design (insufficient precision on which to base an accurate tender):</p> <ul style="list-style-type: none"> ● required elements not shown in tender design (scope) ● underestimate of sizes, quality or quantity of elements in final design (extent) ● underestimate of complexity (concept) <p>TD2. Designer did not warn contractor of design risk</p> <p>TD3. Designer did not warn contractor of pricing risk</p> <p>TD4. Misstatements as to accuracy or suitability of tender design</p> <p>TD5. Misstatements on designer's procedures, skill, expertise, resources & experience</p>	<p>TC1. Work shown on preliminary drawings underpriced by contractor/trade subcontractors</p> <p>TC2. Inadequate contingency allowance for finalising design</p> <p>TC3. Errors in preparing bid by contractor/trade subcontractors</p>
Final Design	<p>FD1. Design changes from tender design:</p> <ul style="list-style-type: none"> ● additional elements not shown in tender design (scope) ● increased sizes, quality or quantity of elements from tender design (extent) ● additional complexity from tender design (change of concept) <p>FD2. Design not suitable for contractor's project strategy</p> <p>FD3. Final design exceeds contractual performance requirements</p> <p>FD4. Final design does not satisfy contractual performance requirements</p> <p>FD5. Design changes that impacted procurement or construction</p> <p>FD6. Late delivery of design information</p>	<p>FC1. Contractor's/ trade subcontractor's inefficiencies in procurement or construction resulted in constructed costs being greater than priced for at tender stage</p> <p>FC2. Inefficient contract administration</p> <p>FC3. Non-recoverable costs arising from principal's acts</p>

with a contractor preparing a design-construct tender.

The reference to 'causally responsible party' in the above table does not necessarily import legal responsibility, and this is discussed below. Although the factors listed under 'contractor' include those caused by trade subcontractors, they can be all managed and resolved by the contractor using the normal techniques and procedures of the construction industry. Attention is focussed herein on those factors listed under 'designer', as these are specific to design-construct contracts and are the most difficult for a contractor to manage.

3. RELEVANT CASES

3.1 Leighton Contractors Pty Ltd v Kinhill Engineers Pty Ltd ⁵

One of the rationales behind design-construct is that, as the designers are contractually liable to the builder/contractor, the resulting design will be more appropriate to the contractor's requirements regarding proposed methods of construction, schedule, preferred materials etc. and a contractor is likely to take the view that a designer who did not deliver a design to those requirements would be in breach of their obligations. This issue arose in a design-construct project for a Melbourne office building, where the contractor claimed that the structural engineer's negligence had increased the cost of the project. In this case, the engineers were contracted to the contractor after work on site had commenced, so there was no issue of any cost differences between the tender and final design. However, the contractor's final project cost was greater than the contract price, and they claimed that the engineer breached their structural engineering contract in that they 'failed to design a car park layout that satisfied the requirements of

a suitable project design strategy' and should have adopted another design.⁶ The contractor asserted that the engineer's breach was the negligent failure to provide an efficient, effective and economical design, and one which would permit adherence to the contractor's work program.⁷

The whole dispute was referred to a referee who opined that there was no negligence in the design as alleged, and there was no causal connection with any loss, even though a better engineering solution was now recognised.⁸ Giles J accepted that a failure to offer a design could be a negligent breach of contract, even if the design offered was not negligently executed, however, on the facts of this case, there was no proven duty of the engineer to offer alternatives.⁹ It appears that the engineer's performance was assessed against the usual implied duty of a professional to exercise reasonable care and skill in the provision of their services. Apparently, neither the referee nor Giles J was convinced that, absent specific contractual terms, there was any higher duty on the engineer that their design should be fit for the contractor's purpose, particularly as none of the issues subsequently complained of was drawn to the engineer's attention.¹⁰

The case highlights one of the practical difficulties confronting a design-construct contractor who has suffered a loss arising from building a design prepared by an independent consultant. It is more difficult to prove breach of contract where the standard of performance is based on the provision of reasonable care and skill rather than the production of a design to suit the contractor's requirements, particularly where the contractor does not communicate those requirements. Furthermore there is the additional substantial hurdle of proving

that the loss suffered is causally related to the designer's breach of contract or duty of care.

3.2 John Holland Construction & Engineering Pty Ltd v Kvaerner RJ Brown Pty Ltd ¹¹

This case involved a claim for damages by a design-construct contractor, against their design consulting engineer in relation to the lump sum turnkey contract for the process skids for Woodside's floating production storage offloading facilities. For preparation of their tender, the contractor entered into a Consultancy Agreement with the principal, and the engineer entered into a 'Pre-Bid Agreement' with the contractor and agreed to carry out the specialist design and engineering services that the contractor was contracted to provide to the principal. The tender deliverables prepared by the engineer were said to be most of the documents used by the contractor in preparing their lump sum bid. After the contractor had been awarded the contract, the engineer entered into a 'Design Agreement' in which it undertook to complete the engineering and detailed design for the project.¹² Following project completion, the contractor instituted proceedings, claiming extra costs from the engineer that the contractor alleged it had incurred in executing its contract, above the cost estimates on which it had based its tender. The contractor claimed damages for breach of contract in either or both the Pre-Bid and Design Agreements, alternatively for breaches of duty of care under both Agreements, as well as claims under the Trade Practices Act and for negligent misstatement that, during the bid preparation and during final design, the engineer made representations to the contractor that were misleading and deceptive.¹³ These alleged

representations included that the engineer would provide the information necessary for the preparation of an accurate tender, and if the tender were accepted, the engineer would deliver design engineering that would not increase the cost of the project to the contractor from the tender price.¹⁴

The case reported was an application by the engineer to strike out substantial parts of the contractor's statement of claim. One of the main objections was that the claims were pleaded as global claims, in that there was no attempt to attribute any specific loss to a specific breach of contract, but a composite loss was claimed as a result of all the alleged breaches. Byrne J concluded that the form of a number of the global claims made was bad, as the causal nexus between the alleged wrongful acts and omissions of the engineer and the damages for extra costs incurred and claimed by the contractor was not apparent. The contractor was required to make substantial changes to their pleading, not only to establish the nexus between alleged wrongful acts and omissions and the losses claimed, but also in the form of pleading for breaches of duty of care which were required to show in what respect there was a departure from the duty of care, what loss was suffered and how that loss was caused by the breach.¹⁵

The fundamental questions in this case, whether the designer had any liability and if so on what basis and to what extent, for the contractor's cost overrun, were ultimately not publicly argued or considered judicially. The case does however highlight some of the pleading difficulties faced by a contractor who wishes to recover unforeseen final cost. Byrne J suggested that it is easier to prove that a contract has not

been performed than that it was done so negligently, and that where the claims for damage for negligence are based on the same acts or omissions as for breach of contract, it is unlikely that there will be any benefits from pursuing those claims in tort.¹⁶ However, the most significant issue is that of proving the causation of losses suffered from any contractual or other breaches. Thus, even where the contractor has suffered a financial loss and could prove breach of contract or breach of a relevant duty of care, putting the claim forward as a global claim may not be acceptable and may be risky for the contractor. It must be able to prove how those losses flow directly from the relevant breaches.

The issues raised in these cases are considered below in the context of contracts for preliminary and final design in design-construct contracts.

4. DESIGN SUBCONTRACTS

There are several aspects of design, particularly preliminary tender design, that have a significant influence on the contractual relationship between contractor and designer. Most obviously, the designer's role is to prepare the design for the whole project, which takes the form of intellectual property in drawings, specifications etc. and relevant subsets of these are required prior to procurement or construction. Secondly, a design subcontractor is required to start the task of design during the tender period and, if the tender is successful, the preliminary design will form the basis on which the final contract design will be prepared. Thus, during the tender period a designer must carry out a proportion of the work of final design that will only be required if the contractor is successful in his/her tender. In principle, the extent of this work must not only determine the

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appropriate conceptual design, but must develop that design to a sufficient extent to define the scope and quality of the final design in enough detail to provide the contractor with adequate drawings, specifications etc. that will enable the contractor to prepare an accurate price to deliver the entire project.

In addition, the extent of preliminary design, and the related matters of its cost and who bears that cost, are critically important elements in the relationship between the designer and contractor during the tender period. In the usual situation where the principal pays no or token fees for tender design, the significance of this cost is that one or both of contractor and designer takes the risk of paying for the preliminary design if the contractor's tender is unsuccessful. At one extreme, the contractor could pay normal full design fees and thereby assume the risk, or at the other extreme, the designer could prepare the tender design 'on spec' with no remuneration unless the tender was ultimately successful. There is also the common compromise whereby both designer and contractor assume some cost risk, in which the contractor pays the designer reduced fees for the tender design work, and the designer only makes up the shortfall from its full design fees if the tender is successful.

It is suggested that this extent of payment and consequent tender design cost risk assumption will have a fundamental influence on the informal, as well as the formal contractual relationship between designer and contractor for the tender design period. If the contractor pays full design fees, the tender design subcontract may be no different to the normal style of contract for design between a designer and a principal, in which the designer is commissioned to carry out a defined scope of

work under defined contractual terms, with no further obligations on either side whether or not the contractor is successful in winning the design-construct contract. However, if the designer has prepared the tender design on spec, they will only recover their tender design costs if the contractor wins the contract and then pays the designer.

In considering a designer's obligations with regard to final design cost risk, the contractual arrangements between contractor and designer need to be considered separately for the two phases of the work: tender design and final design. There may be two separate contracts covering these phases, or alternatively a single contract with two phases, the commission for the final design phase being contingent on the fulfilment of the condition precedent of the contractor being awarded the design-construct contract.

Even where both phases are covered by one contract, the nature of the designer's work required by the contractor in the tender design phase is different to that for the final design phase. The tender design ideally requires preparation of the appropriate concept design and documentation of the project defined by the tender documents, to an extent just sufficient for the contractor to be able to prepare an accurate price for construction of the complete project, with the extent and quality of work defined to within an accuracy acceptable to the contractor. Final design on the other hand, requires complete documentation of the project whose requirements are defined in the head contract documents, to an extent sufficient for the contractor to procure the materials and construct the project. In both design phases, the designer must have due regard to construction in the most expeditious way

appropriate to the contractor's preferred methods of working, and the most suitable economical materials that satisfy the specified requirements.

5. DESIGN FOR TENDER

It is trite to observe that final design cost risk arises because the tender design is incomplete, and this is a result of neither the contractor nor the designer normally being prepared to fund the significant costs of completing the design and documentation during the tender period. Even if adequate time was available during the tender phase for preparation of a complete design (which is very unlikely), the costs of complete design are too high to risk in a competitive tendering situation. Furthermore, it is suggested that there is no necessary correlation between the extent of design carried out and likely success in winning the tender. The principal's selection of the winning tender for a design-construct project may be based on various factors, such as the price, quality, functionality, or the life cycle costs of the design offered. Lowest price could result from a contractor's keenness of pricing, natural efficiencies or an innovative concept design that permitted speedy construction or less construction resources. There are thus many potential reasons for success, some of which will not be related to the quantity of tender design work carried out. Whilst the quality of the tender design may be crucial to success, it is not cost-effective for a contractor to commission any more tender design than is necessary for the purposes of the tender. The contractor's aims for the tender design include winning the tender at minimum cost, whilst maintaining the final design cost risk at an acceptable level.

During the tender stage, issues that are relevant to final design cost risk that the contractor has

some control over or choice of, include selection of the designer, the designer's scope of work during the tender period, and the terms of the designer's subcontract for both tender and final design phases. One way in which the contractor may endeavour to minimise final design cost risk is to have it assumed by the designer under the terms of the design subcontract. In any tender design subcontract, the designer's liability in preparing the preliminary design will prima facie be governed by the terms of that contract, although there may also be potential liability in tort and under the Trade Practices Act. Due to space limitations, this paper is confined to consideration of contractual issues, notwithstanding the importance of negligence and misleading and deceptive conduct in assessing liability for losses arising from the eventuation of final design cost risk.

There are two aspects of any design contract that are relevant to the extent of the designer's liability. The first of these is the scope of the work to be carried out by the designer, and the second is the contract terms, express or implied, that govern the performance of the work.

5.1 Scope of Work

There is a tension between the formal nature of a written contract (assuming one has been prepared and executed), including the procedures to amend it, and the dynamic nature of the relationship between contractor and designer during the tender period. At the start of the design, particularly if conceptual design is required, neither party will necessarily have any clear idea of what form the project will take, and how much preliminary design will be necessary for the contractor to cost it. There is thus likely to be substantial interaction between contractor and designer as the

tender design is developed, and this is typically at a professional level between project personnel, rather than on a formal contractual basis.

It can therefore be very difficult to define with any precision in the design subcontract what the exact scope of work is or will be, as it may change as the tender design develops. The actual scope of work is also likely to be influenced by the agreed remuneration to the designer. If it is a fixed sum, there is an inevitable internal pressure on the designer to minimise the amount of design work executed (consistent with their contractual obligations) to minimise their cost risk if their contractor client does not win the tender. Conversely, the contractor's interest is in maximising the amount of design work done to minimise their final design cost risk if the contract is won. If, however, full fees are to be paid, it is in the designer's interest to maximise the scope of tender design as much as possible to minimise any final design cost risk that they might bear, whilst the contractor's interest is in minimising the cost of tender design (consistent with an acceptable final design cost risk) to minimise their costs in the event that the tender is unsuccessful.

It is suggested that the specific definition of the scope of work will be fundamental to the designer's liability. The following issues may be relevant to the designer's liability:

- whether the scope is defined in terms that import specific performance by the designer, such as the preparation of the preliminary design sufficient to cost the final design to within $\pm x\%$ accuracy;
- whether and to what degree the extent of preliminary design is directed by the contractor or is to be determined by the designer;
- whether the contractor

constrains the amount of design work by a cap on fees where these are to be paid on a reimbursable basis; and

- whether the contractor directs the designer to focus on specific areas of the design.

The significance of these matters can only be determined in the context of a specific case, and in the light of the other contractual terms.

5.2 Tender Design Subcontract Terms

Design subcontracts for design-construct contracts can be, and usually are, written specifically for the requirements of the particular project,¹⁷ or they may be based on a standard form contract such as those published by the Association of Consulting Engineers¹⁸ or the Standards Association.¹⁹ The subcontract between a design-construct contractor and designer is no different in principle to any other design contract between client and designer. In traditional design contracts, absent specific terms, there is an implied term that the design will be performed to a reasonable standard of professional competence by the exercise of due care, skill and diligence usual amongst designers,²⁰ which is the requirement defined in terms in both the ACEA and AS4122 standard form contracts.

The law does not usually imply a warranty that he will achieve the desired result, but only a term that he will use reasonable care and skill.²¹

It is submitted that this duty to exercise reasonable care in performing the tender design is a very different obligation from that which the contractor desires, namely the obligation to prepare a tender design fit for the contractor's purpose of using it as the basis of an accurate cost estimate to base the tender on.

If the designer's contractual obligation is explicitly or implicitly confined to the exercise of the degree of skill, care and diligence expected of a reasonable professional, then in claiming damages for breach of the tender design (phase) contract, the issue would be, not whether the final construction cost was greater than a reasonable costing of the tender design prepared by the designer, but whether, in preparing that tender design, the designer had breached his/her contractual obligations of exercising due skill, care and diligence. Whilst each case would turn on its own facts, it is submitted that there could be situations where, in the applicable circumstances, the designer had discharged their professional obligations, yet the contractor still lost money because the tender design did not reveal the full extent, complexity or quality of the final design. As an example of the distinction between the exercise of due skill, care and diligence and a fit for purpose design, in the case of *Manufacturers Mutual Insurance Limited v The Queensland Government Railways*,²² a railway bridge collapsed in an unprecedented flood because the piers had insufficient strength to withstand the forces they were subjected to. The High Court held that, although the design was not negligent, it was 'faulty' as the existing engineering knowledge was inadequate, and accordingly the insurance exclusion for faulty design operated to deny indemnity for the loss. It appears that this is a case in which the design was executed with professional skill, yet the owner suffered loss because the design was not fit for its purpose.

In tender design, the agreed scope of work for the preliminary design and a limited budget of hours will arguably shape the outcome that would be expected from a reasonably competent designer. In

this situation, the product of the designer's reasonable skill, care and diligence within the agreed parameters might not reveal the actual scope, extent or complexity of all the design elements. There is thus no necessary correlation between the exercise of the designer's professional obligations and the contractor's desired outcome, a fit for purpose tender design.

5.3 Fitness for Purpose

Notwithstanding the general implied professional responsibility referred to above, there have been some circumstances in which a court has imposed on a designer the more onerous duty of preparing a design fit for its purpose. In the limited number of design-construct cases where a fit for purpose obligation on the designer has been indicated, it is submitted that there have been special circumstances, such as reliance,²³ common intention²⁴ or joint venture²⁵ before such a term has been construed or implied. In the absence of such special circumstances or an explicit contractual obligation between designer and contractor, the normal obligation for a professional to use due skill and care applies, notwithstanding that a higher obligation of fitness for purpose may apply under the contractor's contract with the principal.²⁶

The presence of a fitness for purpose term in the head contract between principal and contractor, explicit or implicit,²⁷ may however, be directly relevant to the design subcontract. In managing their risks on a contract, a head contractor will frequently let contracts to their subcontractors, including design subcontractors, on a 'back-to-back' basis i.e. the terms of the subcontracts purport to import the terms of the head contract between the contractor and the principal. This is sometimes done

by including the head contract as a subcontract document, to be applied by replacing 'Principal' with 'Contractor' and 'Contractor' with 'Subcontractor', perhaps qualified by words to the effect of 'as appropriate to the circumstances'. Where such back to back provisions are effective, if there is an explicit or implied term of fitness for purpose in the head contract, prima facie that will apply also to the design subcontract, and the designer may then have a contractual obligation to prepare a design fit for the principal's purpose.

Even where the design is required to be fit for the principal's purpose, this does not necessarily mean that a term can be implied that the design is to be fit for the contractor's purpose. In Australia, any implication of contractual terms must fulfil the criteria laid down by the Privy Council²⁸ and endorsed by the High Court.²⁹ It is submitted that implying a term in the design subcontract to the effect that the designer will produce a tender design fit for the contractor's purpose would not pass at least two of the required conditions. It is difficult to see that such a term is required for business efficacy, as many design contracts are performed without a fitness for purpose obligation. Secondly, such a term is not 'so obvious that it goes without saying'; it is extremely unlikely that the designer and the contractor, with their different risk reward considerations, would have both agreed the term was obvious at the time that the design subcontract was entered into. If the foregoing analysis is correct, then notwithstanding the possibility that the designer might be required to produce a final design fit for the principal's purpose (which is probably the contractor's contractual obligation), there would be no term of fitness for the contractor's purpose in a design

subcontract, unless it was explicitly stated. In the absence of such a term, any designer's liability for unforeseen final cost arising from the tender design would require proof of the designer's negligence in carrying out the tender design.

5.4 Explicit Subcontract Term for Fitness for Purpose

A fit for purpose tender design can be imposed as a contractual requirement on the designer by a specific term of the subcontract, and if such a clause is appropriately worded to define the contractor's purpose (e.g. preparation of a tender design which, when priced, would represent the construction cost achievable by a competent and diligent contractor within $\pm x\%$), it is submitted that this would be effective in passing at least some of the final design cost risk from the contractor to the designer.

There may be practical difficulties in finding a designer willing to enter into a contract with such a clause, because of the financial risks involved. It is usually a contractual requirement for designers on major projects to demonstrate professional indemnity insurance cover of at least \$5 million. This insurance cover typically indemnifies consultants up to the insured limit against claims above the value of their deductible arising from their negligence, and in Australia usually claims made under the Trade Practices Act. However, such insurance may not indemnify consultants for breach of a contractual condition of fitness for purpose in the absence of any negligence or breach of the Trade Practices Act. If professional indemnity insurance would not respond to a successful claim, any liability would have to be funded from the designer's own financial resources.

5.5 Summary for Tender Design Subcontract

The designer would assume liability for unforeseen final cost if there was a term in the design subcontract that explicitly stated this, although it is unlikely that a prudent designer would normally agree to it. The same result may be achieved by a 'fit for purpose' term, if the contractor clearly made known the purpose for which the tender design was required, including, it is submitted, the required accuracy of the tender design. However, this could be problematic if the defined scope of work was insufficient for the required accuracy.

In the absence of an explicit fit for purpose contractual term, it is unlikely, given the authorities of case law, that such a term would be implied in lieu of the normal term that the work be executed using the skill, care and diligence of the normally competent professional carrying out the scope of work defined in the subcontract. In this case, a designer would only be contractually liable for unforeseen final cost if they had been negligent in preparing the tender design, which in this context could include items TD1–TD5 in Table 1. To succeed against the designer, the contractor would have to prove breach of the implicit or explicit standard of care term of the subcontract, and that the breach caused the contractor's unforeseen final cost.

The nature of the designer's work during final design is significantly different to that during tender design, and accordingly there are different considerations relating to final design cost risk.

6. DESIGN FOR CONTRACT

For the subcontract terms applicable to the final design, the full extent of the designer's liability is determined by construction of those terms. As for the tender design, in the absence of express

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terms extending or diminishing the 'normal' design responsibility, it is likely that there is an implied term that the designer is to take all due care in preparing the final design. It may also extend to requiring that the final design be fit for the principal's purpose, if that can be discerned from the contractual performance specification.

The contractor has the full design-construct liability to the principal and will therefore have the contractual responsibility of delivering a project that satisfies the performance specifications by the time the contract reaches practical completion. The circumstances considered here are those in which the constructed project is in fact fit for the principal's purpose, and there is no loss suffered by the principal, whereas the contractor has suffered a financial loss that s/he perceives has arisen solely from unforeseen final cost. From the contractor's perspective, the final design is not fit for the contractor's purpose, since satisfaction of the principal's performance requirements is only part of the contractor's purpose. The contractor also has the aim or purpose of constructing the project for a cost that does not exceed that allowed for in preparing the tender.

In this postulated scenario, there may be a tension in endeavouring to hold the designer liable for unforeseen final cost arising from their work during the final design phase, where that final design is no more than required to satisfy the principal's performance requirements.

6.1 Scope Of Work

In contrast to preliminary design during the tender phase, the scope of the designer's final design is generally well defined. The starting point is the preliminary tender design, and the finishing point

is the design for construction by the contractor in accordance with the principal's performance specification.

This scope of work differs from the designer's traditional scope for an owner principal in one important respect. In an owner-designer relationship, the designer, within the parameters of their brief and their design contract, will have due regard to the owner's long-term interests, and will endeavour to fulfil the owners perceived (even if unstated) criteria as comprehensively as possible, even if this involves convincing the owner client to spend more money to achieve a higher quality or functionality than originally specified. In contrast, in design-construct, the designer can best fulfil their contractor client's requirements by providing a final design that just satisfies the contractually specified performance requirements and no more. Any enhanced quality or functionality over that contractually specified may be desired and appreciated by the principal owner, but unless the contractor is interested in and prepared to negotiate a variation with the principal for the additional cost, it will not be consistent with the contractor's objectives of constructing the project for the minimum cost. A designer who ignores the difference between an owner's long term interests and their contractor client's more limited contractual obligations does so at their financial peril.

This scope of final design as required by the contractor may be explicitly and unequivocally defined in the design subcontract, or it may be a term that could reasonably be implied in all the circumstances of the design-construct project, and the reliance of the contractor on the designer to carry out all of the design work required under the head contract.

Construction of the general terms of the design subcontract may also be relevant in defining the scope of the final design.

6.2 Final Design Subcontract Terms

As with the tender design stage, the most significant subcontract term relevant to liability for unforeseen final cost is whether, explicitly or implicitly, the designer is required to carry out the design with reasonable skill, care and diligence, or whether there is an obligation that the design be fit for purpose. Some of the factors identified in Table 1 for the designer being causally responsible for unforeseen final cost could be the result of a lack of the designer's required skill, care and diligence. Specifically, preparing a final design that did not meet the contractual requirements (FD4), design changes that impacted on procurement or construction (FD5) or late delivery of design information (FD6) may result from a breach of the required professional standard and thus lead to legal liability for breach of the subcontract. It is suggested that factors FD1–FD3 in Table 1 would normally only result in the designer being liable if the design was required to be fit for the contractor's purpose.

The combination of the known principal's requirements, the contractor having contractual fit for purpose liability to the principal, the contractor's reliance on the designer and the accepted inter-relationships between contractors and subcontractors in the building industry, would provide arguments to imply a term of fitness for the principal's purpose in the design subcontract. The same reasons against implying a term that the final design be fit for the contractor's purpose apply as discussed above in the context of the tender design. In addition there is the further reason that, if

changes resulting in increased cost are found necessary to the tender design to satisfy the contractual performance requirements, the express term of the design subcontract that the final design satisfy the performance requirements may also be inconsistent with an implied term that the final design be fit for the contractor's purpose by not exceeding the contractor's tender pricing.

It would of course be possible to have an explicit contractual term that required the designer to accept liability for any unforeseen final cost, and as discussed under tender design, such a term could be effective if the designer agreed to it.

6.3 Summary For Final Design Subcontract

Where a designer made changes in scope, extent or complexity to the tender design arising from its incomplete nature, and to no greater extent than required by the contractual scope of work, it is difficult to see how this alone could be viewed as a breach of the required skill, care and diligence. It is submitted that, in the absence of an explicit term that the design be fit for the contractor's purpose or that the designer accept liability for unforeseen final cost, the contractor would need to prove that the designer had been negligent for the designer to be liable for unforeseen final cost.

In addition to an action for breach of the design subcontract, a contractor could seek to recover unforeseen final cost from a designer by an action in tort for negligence or negligent misstatement, or for misleading and deceptive conduct under the Trade Practices Act.

7. POSSIBLE MECHANISMS FOR CONTRACTOR TO MINIMISE FINAL DESIGN COST RISK

Whilst a contractor may have a better chance of winning a design-construct tender on the basis of a preliminary design that seriously underestimated the complexity and cost of the final project, such a contract is doomed to lose money from its inception. It is unlikely that any remedy the contractor may have against their designer to recover the resulting unforeseen final costs would provide adequate recompense for all the costs of the inevitable dispute and inadequate cash flow arising. Accordingly, it is suggested that the contractor's real interests lie in minimising the final design cost risk, rather than maximising the recovery of unforeseen final cost if it occurs.

The distinctly different role traditionally undertaken, and limited responsibility assumed by designers compared with trade subcontractors in the Australian building industry has made it difficult for a contractor to pass on final design cost risk to their designers. It is suggested that the single most compelling reason for this difficulty is that the rational self-interest of designers militates against their acceptance of a significantly greater risk reward ratio in design-construct projects than they have traditionally accepted. When combined with the likelihood that the professional indemnity insurance normally carried by designers may not cover claims made for breach of contract in the absence of negligence, it is understandable that designers may be reluctant to undertake commissions where their liability goes further than the traditional exercise of due skill, care and diligence and extends to the provision of fit for purpose design. Notwithstanding these practical difficulties, the following actions are suggested as possible

ways in which contractors could reduce their final design cost risk, and maximise their opportunities for passing at least some risk to the designer. To the extent that these actions are achievable, their effectiveness may ultimately lie in changing designer's behaviour so that the risk and magnitude of unforeseen final cost is reduced to a manageable and acceptable level.

The first and possibly most important action a contractor can take is to select the most appropriate designer, using a process that considers the designer's relevant technical expertise, experience and competence, available resources, and the financial strength of the design firm. The terms of the agreement between designer and contractor for the preparation of the preliminary tender design are crucial to transfer of risk. As none of the standard form contracts for the engagement of designers are well suited to the specific needs of contractor clients in design-construct projects, it would be advisable for a contractor to prepare a project specific agreement, with particular attention to the following aspects:

- clear definition of the required scope of work for the preliminary and final design phases;
- statement of the way in which the contractor would use the preliminary design in the tender e.g. nomination of the percentage contingency that would be applied to the cost determined from a takeoff from the preliminary design;
- a requirement that the preliminary design be fit for the contractor's purpose of preparing the tender, and form the basis for preparation of the final design that will not exceed the cost allowed for in the tender; and
- a designer's warranty that the preliminary design was prepared

There may be substantial practical impediments that prevent a designer from accepting the full risk as a condition of their design subcontract, however, even a limited passing of risk to the designer may be effective in lowering the magnitude of final design cost risk.

in accordance with the specified design criteria and contractor's requirements.

Notwithstanding the time constraints built into all design and construct tenders, it is imperative that the contractor execute such an agreement before the end of the tender period. In the absence of agreement on specific terms, is unlikely that any court would construe the contract between contractor and designer to contain such terms.

The fee arrangements for both tender and final design are also important elements in striking the appropriate balance between carrot and stick. It is suggested that the contractor's aims of winning the tender and completing the project at a profit will be best protected by endeavouring to align the designer's interests with those of the contractor. This could be approached by a partnering or alliance arrangement, but could also be addressed within the normal contractor-subcontractor relationship. For the tender design phase, alignment of designer's and contractor's aims requires the magnitude of the design fee to be an appropriate balance between encouraging the designer to undertake the optimum amount of work to prepare a design to the required accuracy, and ensuring that sufficient financial reward for the tender design effort accrues only in the event that the contractor wins the tender. In straightforward projects where the required amount of tender design is not extensive, an appropriate tender design fee may be zero, in other cases where considerable work is required, payment of costs incurred may be more appropriate.

The appropriate fee for final design needs to consider not only any shortfall in design fees for the tender stage, but also the risk aspects inherent in any explicit or implicit passing or sharing of

final design cost risk. It is possible that a designer may accept the opportunity to earn higher fees than their normal fees as the quid pro quo for acceptance of some or all of the final design cost risk. It is suggested that appropriately structuring the final design fee may be the most effective practical way of managing final design cost risk once the designer has been selected. A fee arrangement that gives the designer an appropriate financial reward related to the extent to which unforeseen final costs are negative, or financial pain if the unforeseen final costs exceed the contingency allowance, could align the designer's and contractor's aims within the existing structural constraints of the construction industry. Pragmatic considerations might require acceptance of the reality that the designer may not have the financial resources to sustain the entire unforeseen final costs that could arise, and this could be achieved by capping the gain/pain aspects of the final design fee.

8. CONCLUSION

The existence of final design cost risk arises from the traditional separation of design and construction roles, and the limited responsibilities normally accepted by designers. Whilst actions for breach of contract or in negligence are available to a contractor to recover unforeseen final cost from a designer who has breached the reasonable standards of skill, care and diligence in the preparation of a tender design and the resulting final design, they may prove ineffective due to the difficulties of proving negligence or causation of damage resulting from the breaches. An explicit fit for purpose term of the design subcontract

would provide considerably greater scope for recovery. Actions for misleading and deceptive conduct under the Trade Practices Act may also offer the possibility of recovering unforeseen final cost in circumstances where there was no negligence.

A contractor can take steps to minimise final design cost risk by selection of an appropriate designer, by careful structuring of the scope and terms of the design subcontract, and by implementing a fee arrangement that aligns the designer's aims with those of the contractor. There may be substantial practical impediments that prevent a designer from accepting the full risk as a condition of their design subcontract, however, even a limited passing of risk to the designer may be effective in lowering the magnitude of final design cost risk.

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[A] contract where the essential design emanates from, or is supplied by, the contractor and not the owner, so that the legal responsibility for the design, suitability and performance of the work after completion will be made to rest ... with the contractor ... 'Turnkey' is treated as merely signifying the design responsibility as the contractor's.
(*'Contracts for Industrial Projects'* (1984) 1 *International Construction Law Review* 322, 324).
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