

# **CRC** Construction Innovation

# Report Capital Works Procurement: The Selection of a Building Procurement Method

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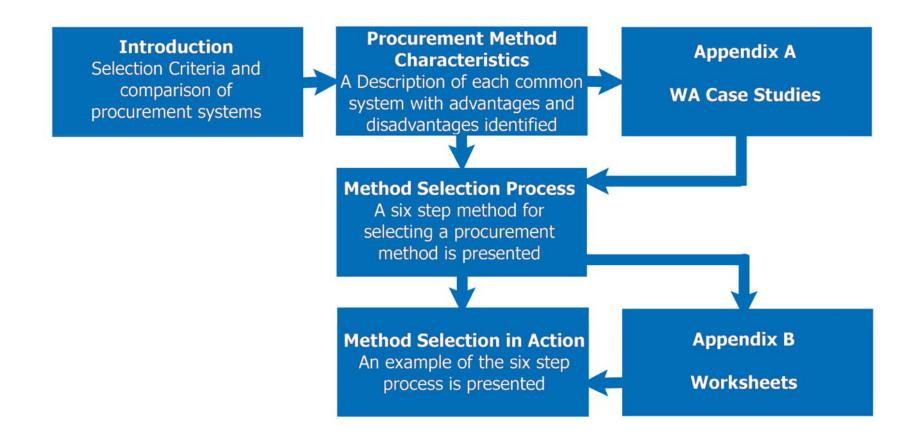
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### **EXECUTIVE SUMMARY**

The determination of the most appropriate procurement method for capital works projects is a challenging task for the Department of Housing and Works (DHW) and other Western Australian State Government Agencies because of the array of assessment criteria that are considered and the procurement methods that are available. A number of different procurement systems can be used to deliver capital works projects such a traditional, design and construct and management. Sub-classifications of these systems have proliferated and continue to emerge in response to market demands. The selection of an inappropriate procurement method may lead to undesirable project outcomes. To facilitate DHW in selecting an appropriate procurement method for its capital works projects, a six step procurement method selection process is presented. The characteristics of the most common forms of procurement method used in Australia are presented. Case studies where procurement methods have been used for specific types of capital works in Western Australia are offered to provide a reference point and learning opportunity for procurement method selection.

# **Procurement Selection Process Map**



# **Procurement of Capital Works Projects**

### **1.0 INTRODUCTION**

The Western Australian (WA) Department of Treasury and Finance's 'Strategic Asset Management Framework for Western Australian Public Sector Agencies' describes a process for the procurement of capital works projects. The initial stages involve the identification of a service need and the consideration of an array of options to meet that need. If the preferred option is the construction of a capital works project then a procurement approach that meets the needs of the Department of Housing and Works (DHW) (or otherwise denoted as client) should be identified. This procurement guide has been developed to assist DHW with the selection of a procurement method for capital works. The selection of an appropriate procurement method will assist in obtaining value for money and should make effective use of both State Government and private sector resources. It is suggested that reference is also made to 'The Department of Housing and Works' 'Local Government Works Procurement Guide' (2006). A number of different procurement systems can be used to deliver capital works projects which include:

- traditional (*separated*);
- design and construct (*integrated*);
- management (*packaged*); and
- collaborative (*relational*)

Sub-classifications of these systems have proliferated in response to market demands. There are variations to each of these commonly adopted procurement systems. For example, the NSW Government (2005) in their procurement guidelines identifies more than eight variants of the design and construct (D&C). However, there is a range of commonly adopted procurement methods in Australia and each is described in detail in Section 2.

This document excludes consideration of Public Private Partnerships (PPP) and Private Finance Initiative (PFI) because they are of a different nature to the procurement methods covered within this document. These approaches funding and operational issues are dependent on the underlying political agenda of the Government. Detailed guidance on assessing whether a PPP or PFI is a suitable option can be found in:

Working with Government: Guidelines for Privately Financed Projects at http://www.nsw.gov.au/wwg Collaborative procurement methods such alliancing and partnering are *not* part of the scope of this document, as they are typically used for highly complex or large infrastructure projects. A detailed description of their characteristics and the conditions for using such forms of collaborative arrangement can be found in:

☞ I Victorian State Government (2006). *Project Alliance Practitioners Guide*. Department of Treasury and Finance at http://www.dtf.vic.gov.au/projectalliancing

#### 1.1 PROCUREMENT STRATEGY

A capital works project is one way of delivering a solution to the particular business needs of an Agency. When a new capital works project is selected, there is usually the need for a bespoke solution that aims to meet particular objectives. Identifying these objectives and prioritising them can be a difficult task considering the array of stakeholders who are typically involved. Thus, adequate consultation and dialogue between stakeholders needs to have been undertaken before project objectives are prioritised.

New capital works projects are invariably unique one-off designs and built on sites that are also unique in nature. When considering a procurement strategy to deliver a project, an Agency should be made aware of the complex array of processes that are involved with the procurement process so that they can be appropriately managed. A procurement strategy outlines the key means by which the objectives of the capital works project are to be achieved.

From the outset of a project, an *in-house* executive or project manager needs to be selected as soon as possible so that a full and balanced understanding of client objectives and priorities can be developed as a pre-requisite for selecting a procurement method for a capital works project. A primary issue that is often raised relates to what clients want in order to be satisfied with their buildings and the means by which those buildings have been procured. Consequently, it is important to evaluate the clients' criteria, their importance and then to select a procurement method to match the criteria.

#### 1.2 PROCUREMENT SELECTION CRITERIA

Conventional procurement selection criteria are based around the concepts of *time*, *cost* and *quality*. While the use of such criteria can be used as a guide to assist decision-makers with an initial understanding of the basic attributes of a particular procurement method they should not be used as the sole basis for selecting the procurement method. This is because of the underlying complexity associated with matching client needs and priorities with a particular procurement method.

The decision as to what procurement method to use should be made as early as possible and underpinned by the client's business case for the project. An array of variables can influence the choice of a procurement method. The following factors should be borne in mind when determining the most appropriate procurement method are (Morledge *et al.*, 2006):

- *External factors* consideration should be given to economic, commercial, technological, political, social and legal factors when selecting a procurement method
- *Client characteristics* a client's knowledge and experience with procuring building projects will influence the procurement method adopted. Procurement selection is influenced by the culture of the organisation and the degree of desired client involvement
- *Project characteristics* The size, complexity, location and uniqueness of the project should be considered as this will influence time, cost and risk.
- *Ability to make changes* –Changes in projects are inevitable. The desired level of flexibility for the client to make changes during the project will influence the selection of a procurement method
- *Cost* An assessment for the need for price certainty prior to commencement of construction by the client should be undertaken. If price certainty is required, then design must be complete before construction commences and design changes minimised.
- *Time* Most capital works project are required within a specific time frame. If early completion is a critical factor then a procurement method that supports speedy completion may be favoured.

The selection of a procurement method should be viewed as an iterative process whereby project objectives and constraints are constantly compared with possible procurement solutions. To assist with marrying project objectives and constraints with a procurement method, specific criteria can be used to assist clients with determining their priorities (NEDO, 1985):

- 1. *Time*: is early completion required?
- 2. *Certainty of time*: is certainty of project completion of time important?
- 3. *Certainty of cost*: is a firm price needed before any commitment to construction given?
- 4. *Price competition*: is the selection of consultants and contractors by price competition important?
- 5. *Flexibility*: are variations necessary after work has begun on-site?
- 6. *Complexity*: does the building need to be highly specialised, technologically advanced or highly serviced?
- 7. *Quality*: is high quality of the product, in terms of material and workmanship and design concept important?
- 8. *Responsibility*: is single point of responsibility the client's after the briefing stage or is direct responsibility to the client from the designers and cost consultants desired?
- 9. *Risk*: is the transfer of the risk from the client important?

Table 1.1 compares the procurement methods identified with the NEDO criteria.

Criteria	<b>Traditional</b> (Separated)	<b>Design and Construct</b> (Integrated)	<b>Management</b> (Packaged)	<b>Collaborative</b> ( <i>Relational</i> )
Time/Certainty of Time	Not the fastest of methods. Desirable to have all information at the tender stage. Consider two stages or negotiated tendering.	Relatively fast. Pre-tender time largely depends on the amount of detail in the client's requirements. Construction time reduced because design and building proceed in parallel.	Early start on site is possible, long before tenders have been invited for some of the works packages.	High level of dependence on relationships, teamwork, and the adaptability and performance of individuals.
Complexity	Basically straightforward but complications can arise if client requires that certain subcontractors are used.	An efficient single-point contractual arrangement integrating design and construction expertise with just one accountable organisation.	Design and construction skills integrated at an early stage. Complex management operation requiring sophisticated techniques.	Considerable complexity involved. Collaboration and mutual scope needed.
Quality	Comprehensive design sets out quality standards Contractor is wholly responsible for achieving quality on site.	Client has less control over design details. Contractor's design expertise may be limited. The client has little say in the choice of specialist sub-contractors.	Client requires certain standards to be shown or described. Management contractor responsible for quality of work and materials on site.	Some potential for quality to be comprised to meet cost targets, mitigated by cost targets and client involvement

Flexibility	Client controls design and variations to a large extent.	Limited without cost penalties once the contract is signed. Flexibility in developing details or making substitutions is to the contractor's advantage.	Client can modify or develop design requirements during construction. Management contractor can adjust programme and costs.	Project scope is developed collaboratively albeit unclear or uncertain in the concept phase. Effort is required to properly define in the time available. Requires a high degree of flexibility but fixed within a Target Outturn Cost (TOC) constraint.
Certainty of cost	Certainty in cost before commitment to build. Clear accountability and cost monitoring at all stages.	Guaranteed cost and completion date.	Client is committed to start building on a cost plan, project drawings and specification only.	Once the TOC is determined history of alliance projects has shown that few exceed cost.
Price Competition	Competitive tenders are possible. Negotiated tenders reduce competitive element.	Difficult for the client to compare proposals which include both price and design. No benefit passes to client if the contractor seeks greater competitiveness for specialist work and materials.	Management contractor is appointed because of management expertise rather than because their fee is competitive. However, competition can be retained for the works packages'.	Selection is based on non-cost criteria. Alternative models of cost competition at the time of tender.
Responsibility	Can be clear-cut division of design and construction. Confusion possible where there is some design input from the contractor or specialist subcontractors and suppliers.	Can be clear division, but confused where the client's requirements are detailed as this reduces reliance on the contractor for design or performance. Limited role for the client's representative during construction.	Success depends on the management contractor's skill. An element of trust is essential. The professional team must be well coordinated through all the stages.	Heavy focus on collaboration. Developing and maintaining relationships with the use of expert facilitation is the key.

Risk	Generally fair and balanced	Can lie almost wholly with the	Lies mainly with the client	Project risks shared and
	between the parties.	contractor.	– almost wholly in the case	collaboratively managed.
			of construction	Model available for
			management.	financial risk and reward
Summary	Benefits of <b>cost</b> and <b>quality</b>	Benefits of <b>cost</b> and <b>time</b> but at the	Benefits of <b>time</b> and	Alliances instil a no
	but at the expense of <b>time</b> .	expense of quality	quality but at the expense	blame culture of
			of cost	collaboration and trust.
				Fiscal transparency is at
				the fore. Selection on the
				basis of best for project
				generates commitment
				and alignment of mutual
				goals.

(Adapted from Cox and Clamp, 1990)

### 1.3 SUMMARY

A sound understanding of the project objectives and constraints are need before an appropriate procurement method can be determined. In addition to this, the criteria for determining a procurement method also need to be identified. In this report, it has been suggested that the nine criteria provided by NEDO are the most fitting for evaluating a procurement method. In the next section of this document the underlying characteristics of popular procurement options are described.

# **Procurement Method Characteristics**

#### 2.0 INTRODUCTION

A plethora of methods for procuring building projects are available to meet the needs of the clients. Deciding what method to use for a given project is a challenging task as a client's objectives and priorities need to marry with the selected method so as to improve the likelihood of the project being successful. The decision as to what procurement method to use should be made as early as possible and underpinned by the client's business case for the project.

Once a client has established a business case for a project, appointed a principal advisor, determined their requirements and brief, then consideration as to which procurement method to be adopted should be made. An understanding of the characteristics of various procurement methods is required before a recommendation can be made to procure a capital works project.

As noted in Section 1, procurement methods can be categorised as traditional, design and construct, management and collaborative. The characteristics of these systems along with the procurement methods commonly used are described in this section. The main advantages and disadvantages, and circumstances under which a system could be considered applicable for a given project are also identified.

☞ In conjunction with this section refer to PowerPoint Slides on CD-ROM entitled: Procurement Methods

For *collaborative* procurement refer to:

☞ I Victorian State Government (2006). *Project Alliance Practitioners Guide*. Department of Treasury and Finance at http://www.dtf.vic.gov.au/projectalliancing

#### 2.1 TRADITIONAL PROCUREMENT

In the traditional approach, the client accepts that design will be generally separate from construction. Consultants are appointed for design and cost control, and the contractor is responsible for carrying out the works and includes all work by subcontractors and suppliers. The contractor is usually appointed by competitive tendering on complete information, but may if necessary, be appointed earlier by negotiation on the basis of partial or notional information.

There are three types of pricing arrangements under the traditional procurement method:

- 1. *Lump sum contracts* where the contract sum is determined before construction starts, and the amount is entered in the final contractual agreement.
- 2. *Measurement contracts* where the contract sum is accurately known on completion and after re-measurement in accordance with a predetermined method.
- 3. *Cost reimbursement* where the contract sum is arrived at on the basis of the actual costs of labour, plant and materials, to which is added a fee to cover overheads and profit.

#### 2.1.1 Traditional - Lump Sum

The contractor undertakes to carry out a defined amount of work in return for an agreed sum. This can be a fixed amount not subject to recalculation, in which case there would be no opportunity for the employer to make changes. In actuality, the sum is likely to be subject to limited variation. The sum may also be subject to fluctuations in the cost of labour, plant and materials – the so called fluctuations [rise and fall] provision. Recovery of this may be with the use of a predetermined formula, or by checking actual invoices against a predetermined basic price list.

Lump sum contracts 'with quantities' are priced on the basis of drawings and a firm bill of quantities (BoQ). Items which cannot be accurately quantified can be recovered by an approximate quantity or a provisional sum, but these should be kept to a minimum. Tenders can be prepared on the basis of notional quantities, but they should be replaced by firm quantities if it is intended to enter into a 'with quantities' lump sum contract.

Lump sum contracts 'without quantities' are priced on the basis of drawings and specification. The lump sum may not be itemised, then a supporting 'Schedule of Rates' will be required. An itemised breakdown of the lump sum will be a useful basis for valuing additional work.

Lump Sum - Requirements

- A well-defined scope of work
- Stable market conditions and absence of major economic or political uncertainty
- Minimal scope changes
- Effective competition is essential
- Time for scope definition and bidding process

#### 2.1.2 Traditional - Measurement

Measurement contracts are also referred to as 're-measurement contracts'. This is where the work the contractor undertakes to do cannot for some good reason be accurately measured before tendering. The presumption is that a reasonably accurate picture of the amount and quality of what is required is given to Tenderers. Probably the most effective measurement contracts are those based on drawings and approximate quantities. Measurement contracts can also be based on drawings and a 'Schedule of Rates' or prices prepared by the employer for the Tenderers to complete. This type of contract might be appropriate where there is not enough time to prepare even approximate quantities or where the quantity of work is particularly uncertain. Obviously the employer has to accept the risk involved in starting work with no accurate idea of the total cost, and generally this type of contract is best confined to small jobs.

#### Measurement – Requirements

- The scope of the work is generally well defined but the amount of work is indefinite
- Sufficiently detailed scope of work to allow contractor to calculate unit rates
- Sensitivity analysis of unit prices to evaluate effect on final cost for different quantity variations
- All work must be covered by the unit rates quoted

#### 2.1.3 Traditional - Cost Reimbursement (Cost Plus)

The contractor undertakes to carry out an indeterminate amount of work on the basis that they are paid the actual cost of labour, plant, and materials. In addition, the contractor receives an agreed fee to cover management, overheads and profit. Hybrids of the cost reimbursement contracts include:

- *Cost-plus percentage fee* the fee charged is directly related to the prime cost. It is usually a flat rate percentage, but it can also be on a sliding scale. However, the contractor has no real incentive to work at maximum efficiency, and this variant is only likely to be considered where the requirements are particularly indeterminate pre-contract.
- *Cost-plus fixed fee* The fee to be charged is tendered by the contractor. This is appropriate provided that the amount and type of work is largely foreseeable. The contractor has an incentive to work efficiently so as to remain within the agreed fee.
- *Cost-plus fluctuating fee* The fee varies in proportion to the difference between the estimated cost and the actual prime cost. The assumption is that as the latter cost increases, the contractor's supposed inefficiency will result in a fee which decreases. This approach depends upon there being a realistic chance of ascertaining the amount and type of work at tender stage.

Cost Reimbursable – Requirements

- Minimal pre-determined scope definition
- Clearly and explicit definition of what constitutes reimbursement costs
- Co-operative atmosphere, demonstrable competence and trust
- Close audit and quality supervision and direction by buyer
- If fixed fee, sufficient scope definition for control and estimating the extent of services required

#### 2.1.4 Key Points to Consider with Traditional Procurement

- Traditional procurement requires the production of a complete set of documents before tenders are invited. Adequate time must be allowed for this.
- Traditional procurement assumes that design will be produced by consultants, and it does not generally imply that the contractor has any design obligations. If this is to be the case, express terms should be included in the contract.
- As the client appoints consultants to provide advice on all matters of design and cost, they thereby retain total control over the design and quality required.
- The contractor depends heavily upon the necessary information and instructions from the architect being issued on time. There is a risk of claims if they are delayed.
- The client may decide which specialist firms the contractor is to use, although the contractor may require certain safeguards relating to performance.
- All matters of valuation and payment are the responsibility of the client's consultants.
- If it is impossible to define precisely the quantity or nature of some of the work, it is still possible to adopt a traditional method on the basis of approximate quantities, provisional sums, or cost reimbursement. However, this is less than a perfect solution: the more comprehensive accurate the information, the nearer to the relative safety of the lump sum approach.

#### 2.1.5 Advantages and Disadvantages of Traditional Procurement

The main *advantages* of using a traditional approach to procurement are:

- accountability due to a competitive selection of consultants and contractor;
- competitive equity as all tendering contractors bid on the same basis;
- client has a direct influence on design which can facilitate a high level of functionality and \ quality
- price certainty at the award of the contract;
- variations (changes) to the contract are relatively easy to manage; and
- a tried and test method of procurement which the market is very familiar with.

The main disadvantages of using a traditional approach to procurement are:

- can be a timely process to produce the full contract documentation prior to tendering. Tender documents from an incomplete design can be produced but can lead to less cost and time certainty, and may lead to disputes;
- overall project duration may be longer than other procurement methods as the strategy is sequential and construction cannot be commenced prior to the completion of the design; and
- no input into the design or planning of the project by the contractor as they are not appointed during the design stage.

#### 2.2 DESIGN AND CONSTRUCT (D&C) PROCUREMENT

With D&C procurement a contractor accepts responsibility for a portion or all of the design. There should be express reference to this in the contract, and the extent of design liability should always be set out as clearly as possible. Unless the contract states otherwise, it seems that the liability for design is an absolute liability under which the contractor warrants fitness for the purpose intended.

Some D&C forms limit the design liability of the contractor to the normal professional duty to exercise reasonable care and skill. Independent consultants engaged by the contractor are therefore under a liability no greater than normal. An indemnity or acceptance of liability is likely to be worthless unless backed by adequate indemnity insurance, and this is something that should be checked before a contractor is appointed. If the contractor does not have in-house designers, which are often the case, and the contractor uses external consultants, their identity should be established before a tender is accepted.

The client's requirements might be stated briefly or may be a document of several hundred pages with precise specifications. The contractor's input might be restricted to taking a scheme design supplied by the client and developing details and production information. It is recommended to specify in terms of performance requirements rather than technical requirements, because this leaves the responsibility for design and selection firmly with the contractor.

D&C methods offer certainty of the contract sum and bring cost benefits. The close integration of design and construction methods and the relative freedom of the contractor to use their purchasing power and market knowledge most effectively can provide a client with a competitive price.

With a D&C method, it is possible ensure a quicker start on site, and the close integration of design and construction can result in more effective programming. Time, however, is needed by the client's consultants to prepare an adequate set of requirements, and time is needed to compare and evaluate the schemes from competing Tenderers. Once a contract is signed, any changes by the client can prove costly.

A number of variations of D&C exist, which include:

- *Direct* in this case no competition is obtained from tender submission. Some appraisal of the possible competitors may be made before tendering but only one tender is obtained.
- *Competitive* tenders are obtained from documents that are prepared to enable several contractors to offer competition in designs and in prices.
- *Develop and construct* consultants design the building required to a partial stage, often referred to as 'scope design', then competitive tenders are obtained from a select list of contractors to develop and complete the design and construct the building. The amount of consultant design can vary depending on the client's needs.
- *Package deal* this method is often used where the contractors competing will use a significant part of their own or another proprietary building system or they will be constructing variations of a repetitive theme. There is limited scope for innovation when this method is used. Some contractors may offer to find a site, to sell, mortgage or lease their product, obtain approvals etc at a risk to themselves or at a charge to the client.
- *Novation* sometimes referred to a *design, novate and construct.* This is where the contractor takes over from the client a previous contract for the design work, completes the design and constructs the work.

#### 2.2.1 Key Points to Consider with D&C Procurement

- In D&C contracts there is usually a single point of responsibility. The employer therefore has the advantage of only on firm to deal with and one firm to blame if things go wrong. In practice, the employer's requirements are detailed to the extent that the contractor's design contribution, and liability, is diminished.
- The employer lacks control over the detailed design; however, this might be acceptable where broad lines of the scheme are satisfactory and the detail relatively less important.
- Construction work can be started early as a great deal of detailed design can proceed in parallel. However, it is mainly the contractor who benefits from this operational flexibility.
- Responsibility for completing on time rests wholly with the contractor. There should be no risk of claims because of the allegations that information from the employer is late. This obligation on the contractor to be responsible for the flow of their necessary information is one of the most attractive features of design and construct.
- There is greater certainty of cost, even to the extent that, if required, responsibility for investigating site and subsoil conditions can be made entirely the contractor's. Any changes in the employer's requirements can affect the contract sum, however, and are likely to prove costly.
- It is always advisable to ask for information about who the contractor intends using as a designer. Adequate professional indemnity insurance should always be a requirement.
- The employer should appoint consultants to provide advice on the preparation of scope; it is important that adequate time is allowed for this to be undertaken thoroughly.

- The requirements might include specific items or provisional sums, but generally it is prudent to prescribe performance criteria, so that a high degree of reliance is placed on the contractor.
- In the absence of any stipulations to the contrary, the contractor's design obligations are absolute. However, they are usually reduced in standard forms of contract to those the professional's duty of using reasonable skill and care.
- It is difficult to evaluate competitive tenders realistically. Tenderers should be informed of the criteria to be used, and whether price is likely to be the prime consideration.
- Benefits can arise from designers and estimators having to work closely together. The contractor's awareness of current market conditions and delivery times can ensure that a project runs smoothly, economically and expeditiously.

#### 2.2.2 Advantages and Disadvantages of D&C Procurement

The main *advantages* of using a design and construct approach to procurement are:

- client has to deal with one firm and reduces the need to commit resources and time to contracting designers and contractors separately;
- price certainty is obtained before construction commences as client's requirements are specified and changes are not introduced;
- use of a guaranteed maximum price with a savings option split can stimulate innovation and reduce time and cost;
- overlap of design and construction activities can reduce project time; and
- improved constructability due to contractor's input into the design.

The main *disadvantages* of using a design and construct approach to procurement are:

- difficulties can be experienced by clients in preparing an adequate and sufficiently comprehensive brief;
- client changes to project scope can be expensive;
- difficulty in comparing bids since each design will be different, project programme will vary between bidders, and prices for the project will be different for each design;
- client is required to commit to a concept design at an early stage and often before the detailed designs are complete; and
- design liability is limited to the standard contracts that are available.

#### 2.3 MANAGEMENT PROCUREMENT

Several variants of management procurement forms exist, which include; *management* contracting, construction management and design and manage. There are some subtle differences between these procurement methods. In the case of management contracting, the contractor has direct contractual links with all the works contractors and is responsible for all construction work.

In construction management, a contractor is paid a fee to professionally manage, develop a programme and coordinate the design and construction activities, and to facilitate collaboration to improve the project's constructability.

#### 2.3.1 Management Contracting

The client appoints an independent professional team, and also a management contractor. Their involvement at pre-construction stages will be as adviser to the team, and during construction they will be responsible for executing the works using direct works contracts. With this type of contract it is possible to make an early start on-site and achieve early completion. Because of its flexibility, it allows the client to change the design during construction because drawings and matters of detail can be adjusted and finalised as work proceeds.

For a management contract to be successful there must be trust and good teamwork on the part of the client, the design consultants and contractor. The contractor should preferably be appointed no later than the outline design stage. The contractor can advise on design programme, tender action, delivery of materials and goods, and construction programmes.

The management contractor will normally make a written submission which includes a proposed management fee, and will be appointed after interviews with the client and the design team. The fee will include for a total management service, expressed as a percentage of the total project cost, and for a service to cover pre-construction should the project not proceed past design.

The management contractor undertakes the work on the basis of a contract cost plan prepared by a quantity surveyor, project drawings, and a project specification. The client accepts most of the risk because there is no certainty about costs and programme. Competitive tenders for works packages follow later and they will usually, though not always be lump sum contracts with BoQ.

#### 2.3.2 Construction Management

The management contractor is chosen after a careful selection process and is paid a management fee. The basic difference is that contractual relationships, although arranged and administered by the management contractor, are direct between the client and a particular works contractor. Although in a sense this gives the client a greater measure of control, it also means that the client accepts a considerable amount of risk. The management contractor is simply an agent, and usually cannot guarantee that the project will be finished to time and cost.

#### 2.3.3 Design and Manage

A design and manage strategy is similar to management contracting. Under a design and manage contract, the contractor is paid a fee and assumes responsibility, not only for works contractors, but also for the design team. The common variations of design and manage are (Turner, 1990):

- *Contractor* a project design and management organisation designs and manages the work, generally for a fee and delivers the project by employing works contractors as its subcontractors to design/or construct.
- *Consultant* a project designer/manager is the client's agent, who designs and manages the work, obtains subcontract tenders from works contractors who then each enter into a direct contract with the client.

#### 2.3.4 Advantages and Disadvantages of Management Procurement

The main *advantages* of using a management approach to procurement are:

- the client deals with only one firm, which enables improved coordination and collaboration between designers and constructors;
- potential time savings for the overall project as design and construction activities are overlapped;
- under a *design and manage* form, the contractor assumes risk and responsibility for the integration of the design with construction;
- works packages can be let competitively at prices that are current;
- improved constructability through constructor input into the design;
- roles, risks and responsibilities for all parties are clear; and
- flexibility for changes in design.

The main *disadvantages* of using a management approach to procurement are:

- price certainty is not achieved until the final works package has been let
- an informed and proactive client is required.
- poor price certainty
- accurate time and information control required
- client must provide a comprehensive brief to the design team as the design will not be complete until resources have been committed to the project (Construction management and management contracting); and
- client loses direct control of design quality which is influenced by the constructors (Design and manage).

#### 2.3.5 Key Points to Consider with Management Procurement

- Management procurement methods are best suited to large, complex, fast moving projects where early completion is desirable.
- This method of procurement depends upon a high degree of confidence and trust. There is no firm contract price before the work starts on site, and the decision to go ahead usually has to be taken on the basis of an estimate.

- The management contractor is the agent of the client, and should therefore put their interests first throughout the project.
- It is an advantage to appoint the management contractor at early stage, so that their knowledge and expertise are available to the design team throughout the pre-construction period.
- Much of the detailed design work can be left to proceed in parallel with the site operations for some work packages, thus reducing the time needed before the project starts on-site.
- The client has a considerable degree of flexibility on design matters. The design can be adjusted as construction proceeds, without cost penalties. This would not be possible with traditional methods.
- The management contractor can select specialists and order materials with long lead-in times for delivery in good time without any of the uncertainties and complexities which are inherent with traditional nomination procedures.
- The project proceeds on the basis of a contract cost plan, but an independent quantity surveyor is required for effective cost control.
- A competitive tendering element is retained for all works contracts, which usually account for most of the overall prime cost. Tenders for works packages will normally be on a lump sum basis.

Appendix A provides an analysis of seven capital works projects procured by the Department of Housing and Works (DHW). Within each of the cases presented the key procurement selection criteria, the selection process undertaken, the advantages and disadvantages of the chosen method in its project context. Lessons learned from the procurement selection process are identified.

### 2.4 SUMMARY

In this section the underlying characteristics of the most common forms of procurement method used are described. Hybrid versions do prevail but these have to be judged based on their specific merits and the nature of the project to be undertaken.

Traditional should be used when:

- a programme allows sufficient time;
- consultant design is warranted;
- a client wishes to appoint designers and constructors separately;
- price certainty is wanted before the start of construction;
- product quality is wanted; and
- a balance of risk is to be placed between the client and constructor.

*Design and construct* should be used when:

- a building is functional rather than prestigious;
- a building is simple rather than complex, is not highly serviced and does not require technical innovation;
- a brief for scope design is unlikely to change;
- a firm price is needed in advance of construction;
- a programme can be accelerated by overlapping design and construction; and
- a single organisation is required to take responsibility and risk for design and construction.

Management should be used when:

- an early start to construction and early programme of completion, requiring design and construction to proceed in parallel, is wanted;
- flexibility in design is wanted to allow for changes to be made as the process of design and construction are carried out;
- a project by its nature is organisationally complex, probably with a need to manage a multiplicity of client, consultant and contractor organisations;
- a project is technologically complex resulting from often differing requirements for future users;
- a client and his advisers have insufficient management resources; and
- maximum price competition for the works element is wanted.

# **Procurement Method Selection Process**

### 3.0 INTRODUCTION

The development of a procurement selection process for the implementation of a project will have a pivotal influence on the attainment of *best value* for the Department of Housing and Works (DHW) and the clients it represents. There is no one procurement method suitable for all circumstances. This section presents a process for selecting a procurement method for a project. The process aims to provide the DHW with a degree of transparency and objectivity for the justifying the recommendation of a procurement method.

It is important that the Section 2 'Procurement Options' and the case examples in Appendix A are revisited when considering a procurement option for a project.

#### 3.1 PRE-CONTRACT PROCUREMENT STRATEGY

The procurement strategy adopted for a project outlines the key means by which the objectives of the project are to be achieved. An overarching procurement strategy is highlighted in Figure 3.1 and is based in principle on the 'Strategic Asset Management Framework.' This section is concerned with 'the selection of a procurement method'.

#### 3.2 PROCUREMENT METHOD SELECTION PROCESS

Refer to Section 2 for the characteristics of procurement methods and Appendix A for the type of procurement methods used for specific project types by the DHW and its clients.

A six step approach to the selection of a procurement method is presented in Figure 3.2. The identification of project objectives and constraints is pivotal to the selection process and as a result at the end of each step the actions undertaken should be compared with the project objectives and constraints to ensure that they are being considered appropriately. After each step is completed and key decisions are made, the justification for these decisions made should to be carefully documented so as to aid the process of transparency and provide a learning tool for future procurement related decisions (Refer to Appendix B).

### Refer to the **'Strategic Asset Management** Framework for Western Australian Public Sector Agencies' which relates to the

following steps prior procurement selection.

- 1. Identify and Quantify the need and demand for a new facility
- 2. Identify options meeting the needs of stakeholders and conduct preliminary risk analysis
- 3. Justify preferred option(s) and conduct financial and economical appraisal
- Select ideal project option/brief, conduct risk/benefits analysis, business case and obtian clients authority to proceed



Figure 3.1. Overarching procurement strategy

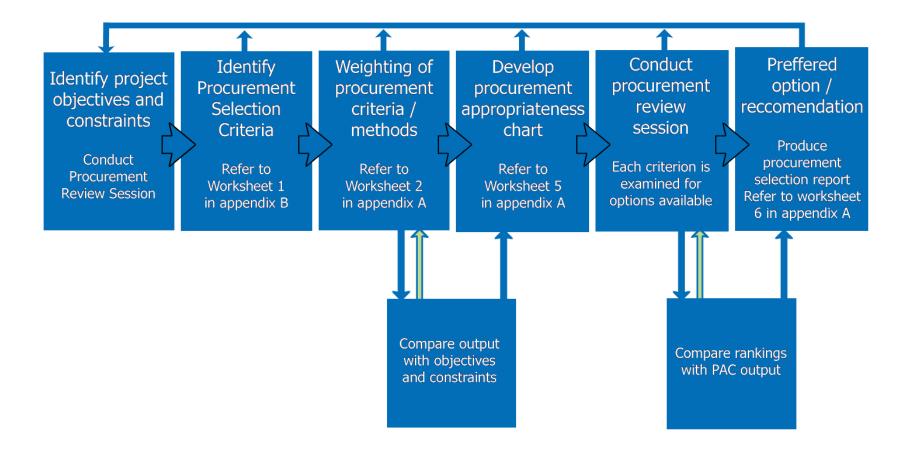


Figure 3.2 Procurement method selection process

Before the procurement method can be chosen all relevant project information should be reviewed and summarised by the project team members and stakeholders to assist with the choice of a suitable procurement method for a given project. Information derived from these documents should be used to inform the procurement method selection process.

There are *two* stages to the procurement selection process.

- Stage 1 encompasses Steps 1 to 4. During these steps the procurement methods are identified and evaluated during a 'Procurement Review Session' with project team members/stakeholders. Once this session has been completed a number of procurement options will be identified and evaluated using a quantitative weighting approach and a qualitative review process.
- Stage 2 should commence with a review of what has been undertaken and to re-examine the procurement choices made in the context of the project objectives and constraints.

The procurement criteria identified in the 'Procurement Assessment Charts' (PAC) are discussed for the various procurement options, and then a recommendation is made. The justification for the recommendation is formally documented using the worksheet in Appendix B so as to provide a point of reference and learning aid for future projects.

#### 3.2.1 Step 1: Identification of Project Objectives and Constraints

Once the decision-maker has become familiar with the different types of procurement methods available, the project objectives and constraints should be identified during a Procurement Review session (1).

Key project objectives should address inter-alia:

- *Programme and phasing* key milestone dates should be specified such as the target date for the facility to be operational
- *Design criteria* Is a whole life cycle solution required? Is an attractive architectural statement required reflecting the facility's status in the community? Is there sufficient space to meet the client's immediate and possible future space requirements'? Is the site potential being maximized?
- *Cost certainty* has the budget for the project been finalised? Would the final cost of the project expect to vary from the budget cost? Do all works have to be tendered?
- Other objectives in addition to the foregoing project specific objectives should be highlighted and addressed, for example, aspects of sustainability or indigenous engagement.

Identification of key project constraints should address:

- *Programme constraints* a master programme should be developed for the whole project to review the achievability of the key milestones.
- *Planning* Is the design sympathetic to the needs of the planning authority and local stakeholders?
- *Site condition* What type of site? How will contractors price for any risks associated with the site conditions? Have extensive reviews of the site been undertaken as part of the design development process? Is the client willing to retain full control of the design and accept the risk of potential unknown risks?
- *State Government procurement procedures* Ensure procurement strategy complies with Western Australian procurement regulations? How will the project be tendered?
- *Risk allocation* Is the Client risk averse? What degree of risk are they prepared to accept?
- Degree of client involvement What degree of involvement would the client like to have?
- *Flexibility for change during design and construction* Is cost certainty required? How early in the project will cost certainty need to be fixed? Does the procurement strategy need to be responsive to change?
- *Market interest* Will the procurement method solicit a good response from contractors?
- *Other constraints* in addition to the foregoing project specific constraints should be highlighted and addressed, for example remote location of work.

Once the objectives and constraints are identified it should become apparent which principle procurement methods *could* be considered appropriate. At this point a list of possible procurement options that could be used is identified.

In examining the suitability of the procurement options identified during the procurement review session the key decision-makers involved should be in a position to determine possible procurement options.

The advantages and disadvantages of procurement options identified in the *context of the specific project* should be listed. If more than *four* options have been identified then this listed should be reduced prior to commencing Step 3 by ranking the options in order of preference.

#### 3.2.2 Step 2. Identify Procurement Assessment Criteria

The key criteria that should be used to evaluate the attributes of a procurement method are (NEDO, 1985). :

- 1. *Time*: is early completion required?
- 2. *Certainty of time*: is project completion of time important?
- 3. *Certainty of cost*: is a firm price needed before any commitment to construction given?
- 4. *Price competition*: is the selection of the construction team by price competition important?

- 5. *Flexibility*: are variations necessary after work has begun on-site?
- 6. *Complexity*: does the building need to be highly specialised, technologically advanced or highly serviced?
- 7. *Quality*: is high quality of the product, in terms of material and workmanship and design concept important?
- 8. *Responsibility*: is single point of responsibility the client's after the briefing stage or is direct responsibility to the client from the designers and cost consultants desired?
- 9. *Risk*: is the transfer of the risk of cost and time slippage from the client important?

If this list of procurement assessment criteria is *not* deemed to be appropriate for the specific project or they do not specifically marry with the project objectives and constraints they can be amended accordingly.

#### 3.2.3 Step 3: Weighting of Client Criteria and Procurement Methods

The importance of each criterion for the client should be determined (weighted). The procurement methods identified should be listed and then evaluated according to their suitability using the 'procurement ranking method', which is described below. This ranking method enables an objective assessment to be made against pre-defined procurement assessment criteria. The output of this ranking process should not be treated as final, but rather as an indicative guide for the project team to make informed decisions.

A weighted score method is used to evaluate the procurement options that have been initially identified from Step 2. Each criterion for the client is weighted depending upon their relative importance, and the *most* important is awarded the highest weighting (*Refer to Worksheet 2 in Appendix B*). A score is also assigned to each procurement method under consideration (*Refer to Worksheet 3 in Appendix B*). The product of client criterion weightings and procurement method scores is calculated for each procurement method. The method with the highest final score is considered as possibility the most suitable method (*Refer to Worksheet 4 in Appendix B*).

The first stage considers the relative importance of identified criteria impacting upon the project. A score for each criterion is weighted (W) using a scale of 1 (low) to 5 (extreme) to reflect their importance to the project. In addition, each criterion is weighted according to its degree of importance and related to the score (P) of each procurement method using a scale of 1 (poor) to 5 (excellent). The process used to determine the overall weighting for procurement methods is as follows:

- 1. The procurement assessment criteria shown in Table 3.1 are weighted according to their *degree of importance* for the specific project to be undertaken on a scale of 1 to 5 (*low, moderate, high, very high, extreme*).
- 2. The score, on, a scale 1 to 5 (*poor, acceptable, good, very good, excellent*) is awarded to each criterion for each of the available procurement methods in Table 3.2.

- The product of the client criterion weightings and scores are calculated (shown in column 3) in Table 3.3
- 4. The sum of the products for each of the procurement methods is calculated (shown in the total score row) in Table 3.3
- 5. The preferred procurement method is that with the highest total score.

Time:   is early completion required?   Sertainty of time:   is project completion of time   inportant?   Certainty of cost:   is a firm price needed before any   commitment to construction given   Price competition:   is the selection of the construction   is the selection of the construction		Using scale 1 to 5, weight the criteria for the project Importance Scale: 1 = low 2 = moderate 3 = high 4 = very high 5 = extremely This value is
Searly completion required? Certainty of time: Seproject completion of time mportant? Certainty of cost: Sea firm price needed before any commitment to construction given Crice competition: Sea the selection of the construction		weight the criteria for the project Importance Scale: 1 = low 2 = moderate 3 = high 4 = very high 5 = extremely
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Sertainty of cost: s a firm price needed before any commitment to construction given Price competition: s the selection of the construction		1 = low 2 = moderate 3 = high 4 = very high 5 = extremely
s a firm price needed before any commitment to construction given <i>Price competition:</i> s the selection of the construction		2 = moderate 3 = high 4 = very high 5 = extremely
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<i>Price competition:</i> Is the selection of the construction		4 = very high 5 = extremely
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om hy miss compatition important?		This value is
eam by price competition important?	•	This value is
lexibility:	•	
re variations necessary after work		inserted in Table
as begun on-site?		3.3 in column 2
Complexity:		
Does the building need to be highly		
pecialised, technologically advanced		
r highly serviced?	•	This is Worksheet 2 in Appendix B
Quality: Is high quality of the		2 in Appendix D
roduct, in terms of material and		
vorkmanship and design concept		
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irect responsibility to the client from		
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f this list of procurement assessment criteria is not deemed	d to be	
ppropriate for the specific project or they do not specifically	marry	
vith the project objectives and constraints they can be a	mended	
ccordingly.		

Table 3.1. Determination of the importance of client criteria for the project

Procurement Assessment Criteria	Col. 2	Col.2	Col.2
	Procurement Option 1	Procurement Option 2	Procurement Option3
Time:	Р		
Is early completion required?	This value is used in Table 4.3 and inserted into column 3	Procurement Performant 1 = poor	ce Scale:
Certainty of time:	•	2 = acceptable	
Is project completion of time important?		3 = good	
Certainty of cost:		$4 = very \ good$	
Is a firm price needed before any commitment to construction given		5 = excellent	
Price competition:			
Is the selection of the construction team by price competition important?		This is Worksheet 3 in Ap	
Flexibility:	<b>←</b>	B. The ratings (generic s	
Are variations necessary after work has begun on-site?		for each procurement op available is required	tion
Complexity:			
Does the building need to be highly specialised, technologically advanced or highly serviced?			
<i>Quality</i> : Is high quality of the product, in terms of material and workmanship and design concept important?			
Responsibility:			
Is single point of responsibility the client's after the briefing stage or is direct responsibility to the client from the designers and cost consultants desired?			
Risk:			
Is the transfer of the risk of cost and time slippage from the client important?			

Table 3.2. Scoring of criteria against procurement method

Table 3.3.	Weighted	procurement	method	scoring table

Procurement Assessment Criteria	Col.2	Col 3	Col 3	Col 3
	Clients' Weighting	Procurement Option 1	Procurement Option 2	Procurement Option 3
Time:	W	W x P	W x P	W x P
Is early completion required?				
Certainty of time:				
Is project completion of time important?				
Certainty of cost:				
Is a firm price needed before any commitment to construction given				
Price competition:				
Is the selection of the construction team by price competition important?				
Flexibility:				
Are variations necessary after work has begun on-site?				
<i>Complexity:</i> Does the building need to be highly specialised, technologically advanced or highly serviced?				
<i>Quality</i> : Is high quality of the product, in terms of material and workmanship and design concept important?				
Responsibility:				
Is single point of responsibility the client's after the briefing stage or is direct responsibility to the client from the designers and cost consultants desired?				
Risk:				
Is the transfer of the risk of cost and time slippage from the client important?				
Σ				

#### 3.2.4 Step 4: Procurement Appropriateness Chart

Each of the procurement methods identified in the 'Weighted Procurement Method Scoring' Table 3.4 should be examined in greater detail against more detailed factors within the context of *time*, *cost* and *quality* or factors that have not been previously identified so as to obtain a balanced view of selection using the 'Procurement Appropriateness Chart' identified in Table 3.4 (*Refer to Worksheet 5 in Appendix B*).

The following key is used to match the criteria with the procurement method in this stage.

Key 😳 Good	Average	Poor
------------	---------	------

Comments justifying each procurement method against the project criteria are required. This process not only improves transparency in decision-making, but also enables learning for future procurement method selection decisions.

Time	Procurement Option 1	Procurement Option 2	Procurement Option 3	Procurement Option 4
Completion date certainty (once let)	Comment:			
Ability to meet current programme	Comment:			
Facility to phase construction	Comment:			

#### Table 3.4 Procurement Appropriateness Chart

Cost	Procurement	Procurement	Procurement	Procurement	
	Option 1	Option 2	Option 3	Option 4	
Cost certainty prior to major commitment.	Comment:				
Transfer of cost risk	Comment:				
Competitive					
tendering in current market conditions	Comment:				

Quality	Procurement Option 1	Procurement Option 2	Procurement Option 3	Procurement Option 4
Ability for				
contractor to add value in design development	Comment:			
Flexible to				
accommodate change orders	Comment:			
Single point				
responsibility for design & construction	Comment:			
Ability to control /				
respond to unknowns site conditions	Comment:			
Client retains				
control over development of design	Comment:			

#### 3.2.5 Step 5: Procurement Review Session

The second procurement review session should take place a day or more later to allow the project manager and advisors to reflect about the possible procurement solutions that have been identified. During this session a detailed case addressing advantages and disadvantages of using the identified procurement methods is made and documented.

#### 3.2.6 Step 6: Procurement Option(s)

The consensual preferred option is identified at this stage. The key considerations in reaching this conclusion are the potential overall advantages of this procurement method with regard to the key project objectives and constraints.

#### 3.3 SUMMARY

A systematic process for identifying and justifying the selection of a procurement method for capital works projects has been presented. The selection process involves six steps. At the end of the process a Procurement Selection Worksheet is to be completed that can be used as a point of reference for procurement selection in future capital works projects.

# **Procurement Method Selection in Action**

#### 4.0 INTRODUCTION

The procurement method assessment process is demonstrated using a *case* project. The project is hypothetical and the criteria used based upon typical criteria that the Department of Housing and Works have used on previous projects. In this example, the client is the Department of Education and they require a New School for children with disabilities.

#### 4.1 IDENTIFY PROJECT OBJECTIVES AND CONSTRAINTS

The achievement of these criteria does not necessarily require the Department of Education to retain design control and risk throughout the design and construction process. Achieving the desired quality on the development is not anticipated to be onerous and can be delivered via the Client's professional team setting the design parameters for a contractor to achieve.

The budget for the project has not yet been finally established. However, the final cost of the project will be expected not to vary significantly from the budget cost. Cost certainty will be required prior to commencement of construction. All works must be competitively tendered.

#### 4.1.1 Project Constraints/Key Issues

#### Programme Constraints

Key programme dates as noted above. A master programme should be developed for the whole project, to review the achievability of the key milestone dates.

#### Planning

The design proposals should be sympathetic to the needs of the planning authorities and local stakeholders in the development.

#### Site Availability

The site should become available in line with the date to be defined on the master programme.

#### Site Condition

The site is a Greenfield site that will require standard site investigations at an early stage. Contractors will price for the risk of any residual unknown site conditions. The following options are available:

- Undertake extensive surveys as part of design development prior to entering into the construction contract.
- Retain full design control and accept the risk of potential unknown risks.

#### State Government Procurement Procedures

The procurement strategy must comply with State Government procurement regulations. The construction works will have to be advertised through the GEM Website with competitive tenders invited on a restricted basis (i.e. prequalification), unless an alternative suitable and compliant framework is available to the Department of Education.

#### Risk Allocation

The Department of Education is a publicly accountable body and is risk adverse. It is limited by the risks that it can accept. The procurement strategy must ensure that risk is placed with those best suited to managing those risks, whilst ensuring that no significant premium is unduly paid in attempting to pass risk to another party.

Early constructability and logistics advice would be beneficial in ensuring that the most appropriate construction forms are selected and site co-ordination activities are pre-planned.

The financial risk implications of alternative procurement methods, as a separate exercise, could be undertaken to assess whether this would affect the preferred procurement method identified by this 'Procurement Method Assessment' process.

#### Degree of Client Involvement

Department of Education wished to limit its direct involvement in the management of construction contracts.

#### Flexibility for Change during Design and Construction

Whilst the design of the finished facility will need to be capable of accommodating future changes in response to changing education needs and demand, in order to obtain cost certainty the design will need to be fixed at an early stage. It is therefore not anticipated that the procurement strategy will need to be responsive to changing client requirements during the detail design and construction phases.

#### Market Interest

A key consideration in the current construction market is the selection of a procurement method that will elicit a good response from contractors. This is essential to maximise the competitiveness of the tender process and to secure an appropriately experience and resourced contractor for the project.

From the *Objectives and Constraints* it is immediately apparent that management forms of procurement will not be appropriate for this project as these require extensive client input into the contract(s) and there is little cost certainty provided at the commencement of the works. For these reasons management forms of procurement have been discounted from further consideration.

The procurement options examined here can be classified as those where the client (via the design team) retains control (and therefore risk) of design development and those which transfer that control and risk to a contractor.

The options can further be sub-divided into *singe stage* and *two-stage*, where the latter option provides for an early appointment of a contractor to assist in the pre-planning of the project and some design. All options examined assume that a lump sum contract will be agreed (although with 2 Stage options the agreement of the lump sum is delayed until the end of the  $2^{nd}$  Stage).

The choice of an appropriate procurement strategy can therefore be identified based upon preliminary discussions:

- 1. Design and Construct (D&C) single stage
- 2. Design and Construct (D&C) two stage
- 3. Traditional lump sum (TLS) single stage
- 4. Traditional lump sum (TLS) two stage

#### 4.1.2 Identify Procurement Selection Criteria

The NEDO criteria for selecting a procurement method are used (Refer to Section 3)

#### 4.1.3 Weighting of Client Criteria and Procurement Methods

The procurement assessment criterion for the client's needs and for each procurement methods is determined. Refer to Tables 4.1 to 4.3. The process of weighting and ranking is described in Section 3 on page 30.

Procurement Assessment Criteria	Weighting
Time:	2
Is early completion required?	
Certainty of time:	4
Is project completion of time	
important?	
Certainty of cost:	4
Is a firm price needed before any	
commitment to construction given	
Price competition:	5
Is the selection of the construction	
team by price competition important?	
Flexibility:	4
Are variations necessary after work	
has begun on-site?	
Complexity:	1
Does the building need to be highly	
specialised, technologically advanced	
or highly serviced?	
Quality: Is high quality of the	3
product, in terms of material and	
workmanship and design concept	
important?	
Responsibility:	1
Is single point of responsibility the	
client's after the briefing stage or is	
direct responsibility to the client from	
the designers and cost consultants	
desired?	
Risk:	3
Is the transfer of the risk of cost and	
time slippage from the client	
important?	

Table 4.1. Determination of the importance of client criteria for the project

Procurement Assessment Criteria	TLS single stage ( <i>P</i> )	TLS two stage (P)	D&C single stage (P)	D&C two stage (P)
<i>Time</i> : Is early completion required?	2	2	3	5
<i>Certainty of time:</i> Is project completion of time important?	2	2	3	5
<i>Certainty of cost:</i> Is a firm price needed before any commitment to construction given	2	2	3	4
<i>Price competition:</i> Is the selection of the construction team by price competition important?	4	5	2	2
<i>Flexibility:</i> Are variations necessary after work has begun on-site?	2	2	2	2
<i>Complexity:</i> Does the building need to be highly specialised, technologically advanced or highly serviced?	2	2	2	2
<i>Quality</i> : Is high quality of the product, in terms of material and workmanship and design concept important?	4	3	2	3
<i>Responsibility:</i> Is single point of responsibility the client's after the briefing stage or is direct responsibility to the client from the designers and cost consultants desired?	2	2	5	5
<i>Risk</i> : Is the transfer of the risk of cost and time slippage from the client important?	2	2	5	5

Table 4.2. Scoring of criteria against procurement method

Procurement Assessment Criteria	Weighting	TLS single stage	TLS two stage	D&C single stage	D&C two stage
	(W)	$W \ge P =$	$W \ge P =$	$W \ge P =$	$W \ge P =$
Time:	2	4	4	6	10
Is early completion required?					
<i>Certainty of time:</i> Is project completion of time important?	5	10	10	15	25
Certainty of cost:					
Is a firm price needed before any commitment to construction given	5	10	10	15	20
Price competition:					
Is the selection of the construction team by price competition important?	5	20	25	10	10
Flexibility:					
Are variations necessary after work has begun on-site?	4	8	8	8	8
Complexity:					
Does the building need to be highly specialised, technologically advanced or highly serviced?	1	2	2	2	2
<i>Quality</i> : Is high quality of the product, in terms of material and workmanship and design concept important?	3	12	9	6	9
Responsibility:					
Is single point of responsibility the client's after the briefing stage or is direct responsibility to the client from the designers and cost consultants desired?	5	10	10	25	25
Risk:		1			
Is the transfer of the risk of cost and time slippage from the client important?	3	6	6	15	15
$\sum_{Rank} =$		82 (4)	84 (3)	103 (2)	124 (1)

Table 4.3. Weighted procurement method scoring table

#### Traditional Lump Sum Contracting/Bills of Quantities

This approach has been the most prevalent procurement method choice by State Government, although its popularity is waning within the industry due to the 'adversarial' approach it can engender. This route requires all Client/user decisions to be made and surveys/investigations and design to be fully completed and recorded prior to the award of any contract.

#### Two Stage Lump Sum Contracting

The two-stage approach maintains all of the principles for the traditional lump sum approach, but accelerates the process through overlapping the design and tendering period. Design is still completed prior to construction, but the contractor is appointed in two stages.

The 1<sup>st</sup> stage tender is typically awarded on the basis of tenders for preliminaries, management/site supervision staff, overheads & profit and approximate quantities or schedules of rates for the major sections of work that have been designed to outline or scheme design stage. Provisional sums are inserted for work not designed at the first stage. The 2<sup>nd</sup> Stage involves works packaging, tendering (by the Contractor using competitive sub-contract procedures) and formalising of costs of the works themselves based on the pre agreed schedule of rates or on an open book basis, for example. An updated risk analysis should be used to calculate the contingencies required.

#### Design and Construct

Design & Construct (D&C) is a procurement method that has been used before by the Department of Housing and Works/Department of Education for procuring schools. The overlap of design and construction phases can enable significant programme advantages to be taken, whilst transferring risk ownership to the Contractor in a measured and sustainable manner. Issues relating to the delivering of a quality product can be a disadvantage of this route; however a detailed Client's Requirement document will mitigate this risk to some extent.

#### Two Stage Design and Construct

A *Two-Stage* form of procurement is particularly suitable for fast track, large and complicated projects, whereby a Contractors practical construction expertise may be fully exploited and a single stage design and construct route would not be appropriate.

The *Two Stage* approach maintains all of the principles for the single design and build route, but creates a defined pre-construction period during which the design can be developed in conjunction with the contractor and the site can be fully surveyed and residual risks ascertained. Design is still completed prior to construction, but the contractor is appointed in two stages.

The 1<sup>st</sup> stage tender is awarded on the typical basis of tenders for preliminaries design fees, management/site supervision staff, overheads and profit. Works tenders (including robust schedules of rates) for the major sections of work that have been designed can also be produced.

The 2<sup>nd</sup> Stage involves works packaging, tendering (by the Contractor using competitive subcontract procedures) and formalising of costs of the works themselves based on the pre-agreed schedule of rates or on an open book basis, for example. An updated risk analysis should be used to calculate the contingencies required.

Lump sum cost certainty is achieved at the end of the  $2^{nd}$  Stage when all surveys/investigations are complete, the vast majority of sub-contract tenders are obtained and all risks quantified. The  $2^{nd}$  Stage appointment is concluded following ratification of the final price with contract documents executed as if under a single stage arrangement. The stage one / stage two arrangement acts as a break-clause. In the unlikely event of the parties failing to agree lump sum agreement at the  $2^{nd}$  Stage, the Client can tender the fully designed project in competition but will suffer programme consequences as a result.

#### 4.1.4 Procurement Appropriateness Chart

Table 4.4 provides an indication on the appropriateness of each option against the objectives and key criteria for the project.

#### 4.1.5 **Procurement Review Session (2)**

Each aspect from the Table 4.4 was discussed at the second *Procurement Review* session. The following points were reviewed in relation alternative procurement methods available:

- Client will be financially risk averse A D&C, particularly Two Stage D&C, would give greatest cost certainty at each key decision stage.
- Client will discourage late changes D&C is less flexible to late change and would therefore be preferred. A clear and thorough briefing process and Client's Requirements to an appropriate level of detail would be required.
- Programme is important; as early a finish as possible is sought D&C would offer the greatest programme advantages.
- Quality is important Traditional provides the best ongoing opportunity for design quality control, but at an increased cost risk compared to D&C. D&C can provide an adequate level of design quality control and that direct control of design quality passes to the Contractor under D&C at the novation date of the Design Team.
- Market conditions An early approach to and early involvement of the contractor would be beneficial in current market conditions. Two Stage would therefore be most appropriate in this respect.
- Partnering The Client favour's partnering arrangements, but it is unlikely that a suitable contractor framework would be available in time to support this project. Two Stage would bring early contractor involvement and therefore offer the best alternative to partnering that can be achieved through the GEM process.
- Potential for phased completion Given the overall programme pressures, the potential need for phased completion was discussed. Early involvement of the contractor would allow the most efficient and economical introduction of phased completion, if required.

#### Table 4.4. Procurement Appropriateness Charts

Key	© Good	Average	🙁 Poor

Time	Traditional Single	Traditional 2 Stage	D&C Single	D&C 2 Stage	
Completion date certainty (once let)	Ü		Û	$\odot$	
	Introducing a 2 <sup>nd</sup> s completion.	tage produces a pote	ential extra risk of d	elay to overall	
		$\odot$		$\odot$	
Ability to meet	In order to obtain full design prior to tendering, traditional routes require a significant lead in as no overlap occurs between design and construction, which may be difficult to achieve.				
current programme	Whilst the D&C contractor can overlap their design and construction the programme must reflect sufficient time for defining the Client's Requirements.				
	A Two-Stage form of procurement is particularly suitable for large and complicated projects, whereby a Contractor construction expertise may be fully exploited.				
Facility to phase		$\odot$		$\odot$	
construction	A 2 stage process provides an opportunity for contractor input into pre- planning for phased delivery.				

Cost	Traditional Single	Traditional 2 Stage	D&C Single	D&C 2 Stage	
	$\odot$		$\odot$	Ċ	
Cost certainty prior to major commitment.	0	-	les a high degree roduced prior to ten	•	
	Requirements is f certainty is ach surveys/investigati tenders are obtain	fully defined up to nieved at the en tions are complete,	of cost certainty pro performance stage. nd of the 2 <sup>nd</sup> , the vast majority uantified. Two Stag certainty.	Lump sum cost stage when all y of sub-contract	
	$\odot$	$\odot$	$\odot$	©	
Transfer of cost risk	The transference of risk to the Contractor is an obvious benefit of the D&C procurement method however the passing on of these risks will have an effect on the contractor's price, which reduces the benefit of this transference. Design risk will however stay with the client via the design team. Under traditional systems risk of design is retained by the client.				
	procurement meth before entering Contractor. The o design responsibili	od to enable the Cl into any significa downside is the tra ity to the Contractor	risk to the Contrac lient to establish a nt financial comm ansference of own or; unless this is done of meet the design c	robust risk profile nitment with the ership of detailed in a measured and	
Competitive tendering in current market	3	:	$\odot$	Ċ	
conditions			be the most attract provide for competit		

Quality	Traditional Single	Traditional 2 Stage	D&C Single	D&C 2 Stage	
	3	:	$\odot$	©	
Ability for contractor to add value in design development	designers a greater means that the corr some problems in	tevel of design quantactor is not involvent terms of areas s	retained by the C ality may be anticipa ed with the design, uch as constructab and constructability	ated. However this which could cause ility. Two Stage	
	design. Because t team the Client lo production of co	he design responsit oses direct control omprehensive docu	n ability for contrac pility is transferred to over design develo mentation clearly ag procedures can m	to the Contractor's opment. However defining quality	
Flexible to accommodate change orders	$\odot$	$\odot$	$\overline{\mathbf{S}}$	$\overline{\mathbf{S}}$	
	Construction stage changes should be avoided when adopting D&C.				
Single point responsibility for design & construction	8	3	$\odot$	Ü	
	Under traditional t	he design and const	ruction responsibilit	ies are split.	
Ability to control / respond to unknowns site	$\odot$	$\odot$	$\overline{\mathbf{S}}$	©	
conditions	2 Stage process can provide the opportunity for contractors to investigate the site conditions fully, prior to site start.				
Client retains control over development of	$\odot$	$\odot$	$\overline{\mathbf{S}}$	÷	
design	Under 2 Stage D&C the client has greater influence on design development later in the process.				

#### 4.1.6 Preferred Option

The consensus preferred option at this stage is a **Two Stage Design and Construct** procurement method. The key considerations in reaching this conclusion were the potential overall advantages of this procurement method in respect of programme, cost risk/certainty and the potential for phasing.

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# Appendix A

# **Western Australian Case Studies**

- Kings Park Bali Memorial
- Fitzroy Hospital
- Fitzroy School
- Charles Gairdner Hospital's New Cancer Centre
- Australian Marine Complex
- Wogan Hills New Plant Breeding Shed
- Tapping Primary School

### KINGS PARK – BALI MEMORIAL

Project title	Kings Park – Bali Memorial Project
Procurement	Construction Management
method	
Project Value	\$900,000
Client	
Contractor	
Project	October 2004
completion date	
Project duration	20 weeks
Project photograph library	

#### **Project Overview**

Commissioned by the (then) Premier of Western Australia, Dr. Geoff Gallop, the \$900,000 sandstone, steel and granite memorial is a unique monument provided for the people of Perth as a place to remember and reflect upon the Bali tragedy that occurred on the 12<sup>th</sup> October 2003.

The nature of this project meant it was necessary for the Department of Housing and Works (DHW) to draw on their vast experience and engage a trusted and proven construction management team and commence the on-site operations in parallel with the design works. The most suitable procurement method to meet time certainty and flexibility objectives was the *Construction Management* (CM) procurement method.

Due to the time pressures, it was necessary to by-pass some processes and procedures that would

normally be considered by DHW before committing to a particular procurement method, such as open tendering or seeking formal expressions of interest. Justification of this fast-track option was explained by the Project Manager:

"It was pretty obvious that there was no time to document it, tender it and construct it. So it was a question of overlapping all of that, but still keeping some control of it because you're just driving it hard".

It was necessary for site operations to commence immediately, although detailed design work was still incomplete. By adopting a CM procurement method, not only were the design and construction processes run in parallel, but also sufficient flexibility remained to allow for minor changes in design and the project progressed.

#### **Project Procurement Selection Process**

This success of this project was conditional upon:

#### Time Certainty

This high profile project needed to be delivered on time to commemorate the 1<sup>st</sup> anniversary of the Bali bombings. To achieve this, the project needed to be constructed within a very tight 20 week schedule.

#### Flexibility

The project needed a procurement method that allowed for flexibility in terms of fast tracking both design and construction with both processes running in parallel. Furthermore, the tight time constraint led to a requirement that the selected procurement method provided DHW with optimum control to ensure the project met the project deadline.

#### **Alternative Procurement Methods Considered**

Two alternative procurement methods were considered by DHW – Design and Construct (D&C) and Traditional Lump Sum (TLS).

The TLS method is the preferred procurement method adopted by DHW due to its balance between risk and control characteristics. This view was espoused by the project manager as follows:

"I always try to go to the traditional lump sum method. I think that does give the best value, the best control of design issues and the best considered design from the user's point of view". However, due to the unique characteristics of this project in terms of time certainty and flexibility, the TLS method was dismissed as an option early in the process because "...*there simply wasn't enough time!*" explained the Project Manager who went on to say:

"If you were to look at it, there'd probably be at least eight weeks to complete design, then three weeks to tender and about two weeks, maybe, to accept, so you've got thirteen weeks there and then you've got to try and build it".

As the overall program was 20 weeks, the time restraints inherent within this method were not conducive to this project.

The D&C procurement method was also considered to be too time consuming to meet the objectives of this project. In addition, concerns were expressed about the perceived loss of control by DHW should a D&C method be adopted.

#### **Advantages**

- The potential of saving time in the early stages of the project by allowing site operations to commence in parallel with the design stage.
- Work packages were let competitively at prices that were current.
- Roles risks and responsibilities for all parties were clear.
- Flexibility for the client should design changes be deemed necessary

#### Disadvantages

- Price certainty was not achieved until the final works package was let.
- A quality brief could not be formulated for the client.
- Additional DHW resources were required than would typically be allocated to manage a more traditional approach

#### **Lessons Learned**

- The CM method allowed sufficient flexibility to run the detailed design and site operations phases in parallel, thus making the most of the scarce time available to complete the project.
- DHW was faced with delivering a high profile public project under very tight time restrictions. In order to achieve a satisfactory result, DHW needed to look beyond their default methods of procurement.

# FITZROY HOSPITAL

Project title	Fitzroy Hospital
i i oject titic	
Procurement	Traditional Lump Sum
method	
Project Value	\$15.7 million
Client	Western Australian Department of Health via the Department of Housing & Works
Contractor	Cooper & Oxley
Project	Early 2008
completion date	
Project duration	
Project	
photograph library	<image/>

#### **Project Overview**

This \$15.7 million project was part of a development scheme at Fitzroy Crossing. A single stage tendering process was conducted by DHW based on the hospital project's completed contract documentation. DHW contracted Cooper & Oxley under a Traditional Lump Sum (TLS) AS2124 contract.

#### **Project Procurement Selection Process**

Between the Western Australian Department of Health and DHW, it was determined that the key procurement selection criteria for the Fitzroy Hospital project were:

#### Stakeholder Input/Requirements

As the use of the land was negotiated with the native Aboriginal owners, the State intended for them to receive as much benefit the development could provide.

#### **Resource** Constraints

DHW were under pressure from the Fitzroy Crossing community to "...manage the development the right way" to avoid the risks of overstretching the available budget, schedule and "...resources in a fairly resource poor environment".

#### Socio-Demographic Considerations

In a relatively low socioeconomic area, DHW had a particularly strong desire to obtain "...as much aboriginal employment and local involvement as possible" for this project. DHW's project manager revealed that "...it was also a matter of utilising that local knowledge of geography and geology and people in town".

DHW were asked to "...*be a bit smarter*" in their approach toward the design and construction of the hospital project. Toward this end, it was decided to tender for a single builder based in the area to construct both the Fitzroy Hospital and the Fitzroy School, effectively combining two projects together. DHW's project manager commented that "...*there was a sense of synergy in having one firm work in the town*". Three relatively competitively close tenders were received from an area where they would normally struggle to receive one. The builder selected submitted the lowest tender for both projects and offered a further 3% discount for being selected to construct both projects.

#### **Alternative Procurement Methods Considered**

A number of procurement methods were considered by DHW – D&C, Novated Design & Construct, Construction Management (CM), and Traditional Cost Plus (TCP).

Based on DHW's experiences in the past, it would be easy for all involved in the Fitzroy Hospital project to forget the actual process of D&C and revert to traditional. The State have previously experience poor outcomes in projects procured under *Novated* D&C arrangement. DHW's project manager had never previously worked with an AS4904 Construction Management contract. Traditional Cost Plus was also discounted as unsuitable for this particular project. A hybrid Traditional –D&C arrangement under AS2124 a standard form of contract was adopted for this particular project as it was considered best for attracting sufficient competitive, good quality Tenderers, while minimising the impact of the project on the Fitzroy community's resources.

#### Advantages

- Suits a propensity to utilise traditional procurement of stakeholders.
- Enabled the State to work with designers to address ongoing project issues.
- Enabled the builder to work closely with design consultants to determine "...*the best way of doing things*" and incorporate this in the design documentation.
- The State were committing to a contract knowing such particulars as who the tendering builders were, where the land was, an indicative cost and the actual design being tendered on.
- Led toward significantly lower than previously experienced tender submissions for a relatively larger-scale school. The final tender was within 7% of the pre-tender estimate.
- Ability to determine from a bill of quantities whether or not the builder would provide value for money for the project.
- Enabled the selection of a good quality local contractor.

#### **Disadvantages**

- Expensive
- Less able to nominate suppliers and installers separately on the project.

#### Lessons Learned

- The TLS procurement method was considered best for attracting sufficient competitive, good quality Tenderers, while minimising the impact of the project on the Fitzroy community's resources.
- All involved in the Fitzroy Hospital project were comfortable with the TLS method as it easily fitted the operational 'status-quo' of DHW and the Western Australian industry in general.
- Expense and resistance to the separate nomination of suppliers and installers were the only pitfalls encountered on the Fitzroy Hospital project with the TLS procurement method.
- Procured under a TLS arrangement, the Fitzroy Hospital project was considered by DHW not to be of a traditional nature to their agency, primarily due to the project's remote location and the associated complexities of procuring a hospital.

## FITZROY SCHOOL

Project title	Fitzroy School
<b>D</b> (	
Procurement method	Construction Management
Project Value	\$34 million (anticipated at time of writing)
Client	Western Australian Department of Education & Training via the Department of Housing & Works (DHW)
Contractor	Cooper & Oxley
Project	Mid 2009
completion date	
<b>Project duration</b>	
Project	
photograph	
library	
	the second s
	Aerial approach to Fitzroy Crossing

#### **Project Overview**

This \$34 million project is part of a development scheme at Fitzroy Crossing. The Department of Education and Training intended for the replacement school to be referred to as the Fitzroy Bay Learning Centre.

Once the funding for the project was determined, DHW were encouraged by the Department of Education and Training to commence the school project as soon as possible because "*there is a long history of successive ministers promising it and nothing happening*".

DHW contracted Cooper & Oxley, due to their vast experience in the construction capital works projects, under an AS4904 Construction Management (CM) contract. Under this agreement the contractor is required to publicly outsource each trade element through DHW, the tenders of which are vetted by the cost manager appointed by DHW. This project is due for completion by 2009.

#### **Project Procurement Selection Process**

DHW were asked to be innovative in their approach toward design and construction of the school project. DHW made two decisions in attempting to combine two projects together.

- 1. The same design firm responsible for Fitzroy Hospital was commissioned to design the Fitzroy School.
- 2. DHW requested tenders from one locally based builder to construct both projects. Each project would have a different procurement arrangement.

Between the Western Australian Department of Education & Training and the DHW, it was determined that the key procurement selection criteria for the Fitzroy School project were:

#### Time

The Department of Education and Training required DHW to reach project completion by 2009.

#### **Resource Specifics**

DHW were also under pressure from the Fitzroy Crossing community to manage the development avoiding risks of overstretching the available budget, schedule and resources.

#### Stakeholder Management

In a relatively low socioeconomic area, DHW had a strong desire to obtain as much aboriginal employment and local involvement as possible for this project. The DHW project manager revealed that:

# "...it was also a matter of utilising that local knowledge of geography and geology and people in town".

The selected contractor submitted the lowest tender for both projects. A 3% discount was offered by the contractor if selected to construct both projects. Due to the abovementioned procurement selection factors and to differentiate between the Fitzroy Hospital and Fitzroy School projects, the latter project was procured as a CM arrangement.

As the use of the land was negotiated with native aboriginal owners, the State intended that aboriginal owners should receive as much benefit the development could provide.

#### **Alternative Procurement Methods Considered**

Several alternative procurement methods were considered by DHW – D&C, Novated Design & Construct (D&C), Traditional Lump Sum (TLS) and Traditional Cost Plus (TCP).

Based on DHW's experiences in the past D&C focused on achieving a fixed set of project requirements without allowing scope for innovation. The Department of Education and Training had previously had bad experiences in projects procured under *Novated* D&C arrangement.

DHW contemplated the possibility of a PPP arrangement with local aboriginal, traditional owners of the land. DHW provided the Department of Education and Training with figures to show that procuring this project under a PPP arrangement would serve as a cost benefit to the State and benefit the local community economically. It was deemed too radical for the Department of Education and Training at the time.

TLS and TCP arrangements were also found unsuitable. The CM arrangement was eventually adopted as it was considered best for attracting sufficient competitive, good quality Tenderers while minimising the impact of the project on the Fitzroy community's resources.

#### **Advantages**

- AS4904 contract provided DHW with "...no time or performance risk".
- Compressed project timeframe enabled fast-tracking of critical activities, for example DHW's construction manager was able to commission subcontractors for site clearing, steelwork and service installations during the design stage "...where traditionally you'd be waiting for the documentation to finish to tender those".
- It provides accurate fixed prices from the construction manager and each trade package for the project, with the potential for significant cost savings.
- Flexibility as each trade package could be changed at any time during the project if any problems were encountered, for example the supply of concrete and steel were each tendered separately to ground slab laying and steel fabrication respectively. The local Fitzroy concrete and steel suppliers each required specialist people to adequately slab-lay and steel-fabricate the entire project.
- Ability to easily capture and target activities to achieve other outcomes.
- Opportunity to obtain a better social outcome apart from the building, as each trade package was tailored to suit the input from a community in a remote region. For example one local aboriginal organisation in Fitzroy was able to provide fences, landscaping and reticulation.

#### Disadvantages

- Required learning for all involved. A traditional contracting mindset of DHW and their construction manager made it easy for them to forget the actual procurement process under the construction management arrangement, for example tendencies existed both for DHW to treat their construction manager more like a builder than a partner and for the construction manager to regard their relationship with DHW as though they were under a traditional form of contract (AS2124).
- Because the State Government were committing to a contract without a completed design and approximate figure of the cost, it took a mature client to adopt the construction management arrangement.
- Difficult for the State to work with the designers to address ongoing project issues.

#### Lessons Learned

- DHW had hoped for the CM arrangement to provide some joint-venture arrangements with the locals, which never occurred. Furthermore, DHW have had limited success in involving locals in the government school project to date, despite providing them with additional regional preferences to those typical regional areas. This is largely due to the limited resources in Fitzroy Crossing.
- The costs provided by several trade packages were significantly, sometimes substantially below the pre-tender estimate as the quantity surveyor on the project boosted his estimates up whilst using the rates from the hospital project's bill of quantities as their benchmark for the pre-tender estimate.
- The CM arrangement called for greater commitment levels toward it. To obtain the most from the CM arrangement, the State and the contractor needed to be more experienced and attuned to the AS4904 contract so that they knew what they were doing in the project.

### CHARLES GAIRDNER HOSPITAL'S NEW CANCER CENTRE

Project title	Charles Gairdner Hospital's New Cancer Centre
Procurement method	Traditional Lump Sum
Project Value	\$5,000,000
Client	
Contractor	
Project completion date	
Project duration	
Project photograph library	

#### **Project Overview**

The decision to adopt a Traditional Lump Sum (TLS) procurement method on this project was heavily influenced by the fact that this project, albeit a relatively low value one was only stage one of a multi stage regeneration of the hospital. As such, sufficient time and resources were allocated to ensure detailed design and specifications were produced. Furthermore, it was a unique project, in that, the design and specification had to be done accurately and to very specific criteria. This combined with the familiarity of the TLS method of procurement at DHW and the proposed contractor who would be tendering for the project, meant the procurement selection process for this project was relatively straight-forward.

Planning for stage two of the cancer centre is currently underway, with construction scheduled to be completed by 2010 as part of the \$536 million redevelopment of Sir Charles Gairdner Hospital. The new state-of-the-art cancer centre will deliver the best cancer treatment available in the nation, and significantly reduce the waiting times for patients. The hospital currently treats

about 1,800 cancer patients using radiation therapy each year, which equates to 34,700 treatment visits, with the opening of the new centre, an additional 610 cancer patients will be treated each year.

#### **Project Procurement Selection Process**

#### Detailed Documentation

Being the first of a multi staged re-generation of Perth's leading health facility, attention to detail on the design and delivery was crucial. Projects involving health are often more complex than most projects undertaken by DHW, as espoused by the project manager

"Our experience, particularly in health, is probably the most complicated of all the public buildings, with perhaps the exception of one-off like an Art Gallery or Sports Stadium".

With plans in the pipeline for a substantial regeneration of the hospital, consideration for future works and its integration into existing structures was also of significant importance. In addition to the proposed future works, this hospital would remain fully operational during the regeneration phase. It follows that the procurement method adopted for this project would need sufficient avenues to support the input of suitable consultants who, in conjunction with experienced clinical staff at the hospital, would ensure the end product would deliver a high quality and suitably functional facility.

#### High Quality End Product

A consequence of investing sufficient time and resources to produce detailed documentation is a high-end level of plans and specification, this level of planning, is managed with a desire to produce a high quality end product. The importance of a high quality project was emphasised by the project manager by stating:

"I think from a health's point of view the main driver is to ensure that we get quality at the end of the project. These buildings often operate 24 hours a day, 7 days a week, and 365 days a year so they've got to have a high level of quality".

#### A Balance of Risk between Client and Contractor

Having invested significant time and resources into a detailed set of plans and specifications, parity between all tendering contractors' bids would ensure a more competitive selection process and price certainty at the award of the project. The TLS method, being a tried and tested method of procurement option by DHW and the market helped to facilitate a good balance of risk between the client and contractor.

#### **Alternative Procurement Methods Considered**

Design and Construct was the next favoured procurement method to the TLS for the project. This attraction of a design contract approach was the potential that this procurement method might result in certain cost savings not necessarily envisaged by the Traditional approach. However, the project manager succinctly explained the rational for sticking with the TLS as follows:

"We want to get the building at handover and know that it is going to last for at least 25 years when the next regeneration comes around. So sometimes it is not just the cheapest solution that we are looking for".

#### **Advantages**

- Ability of the design team and client to have a direct influence. This can result in a high level of functionality and improve the quality of the overall design.
- Client is confident of the project's price at the award stage of the contract.
- Variations to the project are relatively easy to administer.
- The traditional method of procurement is a tried and tested method of procurement within the industry.

#### Disadvantages

- Can be a timely process to produce a full set of documents. Incomplete documents and design can compromise price certainty and increase the chances of disputes.
- Limiting the input of design or planning expertise from the contractor may not be in the best interest of the project.

#### **Lessons Learned**

- Sufficient allocation of resources is required to ensure thorough design and documentation of the project is complete at the calling for tender stage of the project.
- For high quality projects, such as those associated with health, the traditional method of procurement gives the client the option to engage specialist consultants to assist with the design. However,
- This can also be a timely process and if the documentation is not compete or of a high standard, the benefits of cost certainty can be eroded.

# AUSTRALIAN MARINE COMPLEX

Project title	Australian Marine Complex
Procurement method	Traditional Lump Sum
Project Value	\$200,000,000
Client	Landcorp
Contractor	
Project completion date	
Project duration	
Project photograph	
library	

#### **Project overview**

This case study describes the procurement selection process employed by DHW for the Australian Marine Complex (AMC). Adopting a traditional method of procurement, this \$200 million State and Federal Government funded waterfront facility is considered the largest marine complex of its kind in Australia.

Initial procurement considerations were to pursue a Public Private Partnership (PPP) funding arrangement. However, after months of tendering negotiations and various state agency reviews, it was finally decided that the most commercially viable option for this project would be the use of a Traditional Lump Sum method. As a result of this change in procurement strategy, there was also a more conservative approach towards the design of the facility in order to better manage and invest State funds.

With an 18 month procurement process to reflect upon, DHW gained a lot of knowledge about the project. This knowledge was put to good use to fine turn the overall procurement process, for example. The original contract scope was tendered as one package, however, after a review of the process it was determined that a more economical approach would be to split the packages.

#### **Project Procurement Selection Process**

A clear objective of delivering a world class facility based on sound commercial and project principles meant there were two key procurement criteria driving the success of this project – sensible cost control and the adoption of solid project management principles.

#### Cost Control

Early planning stages of this project identified the potential for a public-private partnership. However, after months of negotiation the project committee we not satisfied that this approach would deliver the equitable commercial results that were touted at the commencement of the planning process. However, a late change to a traditional procurement method was not only bold move but a successful one.

#### **Project Performance**

The success of this project would also rely upon bringing together a multi-departmental team with a common objective. The late change of the procurement method also supported this criteria and based on feedback from the client's representative below appear to support this view:

"this project ended up coming in on time and on budget, so the approach, in a total tendering sense, was very successful".

#### **Alternative Procurement Methods Considered**

Initially established to be a PPP procurement method, concerns about costs and the ratio of private funding to overall project control did not appear equitable, as was succinctly described by the client's representative:

"the original approach wasn't what proved to be the best way forward"

There was little evidence given that other procurement methods were considered and based on the level of detail and planning that had already been conducted prior to the commencement of works a traditional procurement approach did stack-up to be the most suitable in this situation.

#### **Advantages**

- Provided a sound means of satisfying public accountability through a competitive tendering selection process;
- Greater control over cost and quality of the project can be expected. Price certainty once contracts awarded;
- Changes to the project scope are relatively simple to manage and administer;
- A well known and tested method of procurement.

#### Disadvantages

- May limit opportunities for innovative design and building practices as contributions from contractors are limited;
- A sequential procurement process can add valuable time to the overall project duration.

#### Lessons Learned

- This project's procurement process had travelled a significant path with a particular procurement method in mind, that is, a PPP. However, regardless of the significant resources consumed to reach this point, a change in procurement strategy was deemed to be the correct decision and as a result the overall project benefited.
- The procurement process took a considerably long time to finalize. The project did not waste this experience and as a result, the team was able to provide an outcome which achieved the overall objective a providing a world class facility on time and on budget.

# WOGAN HILLS NEW PLANT BREEDING SHED

Project title	Wongan Hills Agriculture Department – New Plant Breeding Shed
Procurement method	Design & Construct
Project Value	\$411,928 (tender)
Client	Western Australian Department of Agriculture & Food via the Department of Housing & Works (DHW)
Contractor	Densen Steel
Project completion date	
Project duration	
Project photograph library	<image/>
	Wongan Hills station sign

#### **Project Overview**

The project comprised of a large-scale shed that was converted into a machine room. The State Government contracted Densen Steel with a consultant engineer, both of whom are based in Northam to design and construct the plant breeding shed due to their ability to undertake regional work throughout WA and their extensive experience specialising in agricultural sheds for farmers, both small and large, in regional agricultural areas. The most suitable procurement approach to achieve the State Government's goals was a D&C arrangement. This project was successful as the plant breeding shed was completed on time, *under* budget and with all the minimum requirements met.

#### **Project Procurement Selection Process**

Between the Western Australian Department of Agriculture & Food and the DHW, it was determined that the key procurement selection criteria for the Wongan Hills Plant Breeding Shed project were:

#### Scope

The D&C arrangement was adopted for this project as this shed was larger than typical sheds the Department of Agriculture had previous experience with. In addition, the plant breeding shed had specific requirements with regard to necessary spaces, head heights for example and a floor slab that would later support plant equipment and machinery.

#### Cost

Essentially, DHW had budgetary constraints. They knew that if they engage a major builder, it would then subcontract the project to shed building specialists, which would result in a contract sum that included "...*margins on margins*". Accordingly only shed builders were invited to tender for the contract.

#### Preferred Contractor Status

DHW's prequalification list comprised of only relatively normal shed builders where the project called for a large-scale shed builder. Hence, adopting the D&C arrangement enabled them to select from large-scale shed builders outside DHW's prequalification list.

DHW had previous experience with shed projects on minor works contracts. It was determined that the Wongan Hills Plant Breeding Shed was not to be a minor works contract as it was considered "...*a large shed, bigger than they'd normally done*" and estimated to be \$1/2 million, costing more than any of their previous minor works shed projects. This warranted more thought, consideration and understanding of the project's viability. Eventually, several shed builders were

invited to tender for the contract under a D&C arrangement.

A project control group involving the Department of Agriculture, DHW and the shed builder discussed the project at Wongan Hills. The State solicitor amended AS4300 contract to demonstrate to the builder they could involve outside engineering firms in the project and still be liable for their design work under the contract. In the initial stages of the project implementation DHW and an engineering consultant provided their input into the shed design and provided preliminary designs.

#### **Alternative Procurement Methods Considered**

At least one other alternative procurement method was considered by DHW - Traditional Lump Sum (TLS)

As the large-scale plant breeding shed was to be located in an area prone to excessive wind loads, there was a need for a contract that shifted liability to the contractor and held DHW harmless in the event of adverse events. Although the TLS arrangement satisfies this need, an AS2124 contract was considered by DHW's Project Manager to be "...too big, too onerous for a shed builder". It was explained that the contract, with its many conditions, was intended for larger multi-million dollar projects. As such, it was believed that the AS2124 contract would "...scare a shed builder off". Furthermore, the AS2124 contract requires DHW to design the plant breeding shed. This was not part of the brief.

#### Advantages

- Design responsibility with the builder (who best knows how to properly design and construct a shed that is structurally adequate).
- Contract condition that the builder is financially capable of undertaking the job.
- Tender criteria broad enough to allow Tenderers introduce their design flexibility that was able to be subsequently checked by a structural engineer.
- Greater likelihood of a better tender result as it enabled the selection of a builder, on the basis of finance and previous experience, who met the minimum requirements of the shed and completed it on time, under budget and with no problems.
- The State Government solicitor was able to amend the AS4300 contract to demonstrate to the shed builder how they could involve outside engineering firms in the project and still be liable for their work under the contract.

#### **Disadvantages**

- The AS4300 contract requires builders to have their own professional indemnity insurance, which many of the shed builders invited to tender did not have.
- Involved discussions with the Tenderers about how they intended to involve their engineers in the same contract and obtain professional indemnity insurance.
- Acceptance of successful builder's tender involved negotiations with the builder's insurance company to amend the contract wording, as they refused to provide the consultant engineer with professional indemnity insurance straight away, so that it satisfied them, the builder on their behalf and the State Government as a risk.
- The plant breeding shed did not exactly match the size indicated on the drawings, but arguably, it was not essential that it did in this instance.

#### Lessons Learned

- The D&C arrangement was eventually "...believed to be the cheapest way for procuring the *job*". As such, it enabled the selection of "...the best people to be doing this job".
- The emphasis of the D&C procurement arrangement was on the capability of the contractor. If a shed builder with their own in-house engineers was the successful tenderer, the contract acceptance process would have been more straightforward.
- The field of builders with their own professional indemnity insurance remains limited "...but there are other ways around, by rewriting insurances and getting advice from the State Government solicitor". The selection of a builder with professional indemnity insurance would have potentially shortened the duration of the contract acceptance process by weeks.

### TAPPING PRIMARY SCHOOL

Project title	Tapping Primary School
r roject title	
Procurement	Traditional Lump Sum
method	
Project	
Value	
Client	Western Australian Department of Education & Training and the Department of Housing
	& Works (DHW)
Contractor	Universal Constructions Pty Ltd
Project	Early 2007
completion	
date	
Project	40 weeks
duration	
Project	Where is a
photograph library	N OONDALUP DR OONDALUP DR Tapping D 1400 m DALUP DR D 1400 m DALUP

#### **Project Overview**

The State Government contracted Universal Constructions Pty Ltd, because of their vast experience in completing primary schools, under a Traditional Lump Sum (TLS) AS2124 contract, in a timely manner. The scope was to construct a school comprising of seven buildings in a DHW standard 'H' pattern of four learning blocks, canteen, library, administration building, oval, playing courts, fences and landscaping. Subcontractors were engaged by the contractor under AS2545 contracts. The project was successfully completed on time in 40 weeks.

#### **Project Procurement Selection Process**

Between the Western Australian Department of Education & Training and the DHW, it was determined that the key procurement selection criteria for the Tapping School project were:

#### Procurement Familiarity

Almost all State Government capital works projects are procured using TLS. In particular, typical State Government primary school projects within the Perth metropolitan area have been procured under using a TLS for last 20 years. For the project manager at DHW, this procurement best suited this particular project

"because it can be done quickly and we have builders who know how to do it: I've never been involved with a design and build so how the builder would cope with the brief, I don't know".

#### Time

The primary school project had to be completed within a certain timeframe, before the start of the school year on the 4<sup>th</sup> of February. The difficulty of achieving this was the widespread lack of trade availability within WA

#### Scope

The TLS arrangement enabled the selection of an architect able to effectively address a detailed brief, reproduce a design from a similar previous government school project, make slight amendments to suit the site conditions in Tapping were important. This significantly reduced the duration of the design process and the project as a whole.

At the planning stage of the project, one or more representatives from the Department of Education and Training met with the planning manager at DHW to determine and agree upon the requirements for the primary school project, specifically, the completion time required. In following the 'status quo' for government school projects, DHW's planning manager, who looks at different ways of procuring schools, automatically favoured the TLS arrangement.

#### **Alternative Procurement Methods Considered**

One alternative procurement method may have been considered was D&C

D&C was previously adopted for a State Government school renovation project, which involved the design and construction of a shed by a specialist contractor, where a cost effective solution was the main requirement. In addition, DHW already had access to a few contractors that were capable of designing and constructing primary schools. Despite this, DHW's project manager doubted that there was any question of this primary school being procured under any procurement arrangement other than TLS.

#### **Advantages**

- Well proven to work for typical primary schools.
- Quick project completion.
- Access to builders who are competent in this procurement arrangement.
- Enables the selection an experienced architect and builder.
- Industry familiarity with the procurement arrangement, the AS2124 and AS2545 contracts.
- AS2124 and AS2545 contracts stipulate without referring to other standards.

#### Disadvantages

- Some builders do not work well with particular architects.
- AS2124 can be complicated for contractors to understand.

#### Lessons Learned

- Different people, each with different attitudes, give rise to "*I'm right, you're wrong type scenarios*" in projects.
- All involved in the Tapping Primary School project were comfortable with the traditional procurement approach as it easily fitted the operational 'status-quo' of DHW.
- AS2124 has been in existence for approximately 10 years and very little has changed with this standard form of contract during that time.
- Due to the 'tried-and-true' nature of the TLS arrangement for public school projects, no amendments were, nor needed to be made to the AS2124 standard form of contract as it already sufficiently suited the requirements of the Tapping Primary School project.

# **Appendix B**

# **Procurement Worksheets**

(All worksheets to be completed)

## **Procurement Review Session (Worksheet 1)**

PROJECT CHARACTERISTICS					
Project Name/ Location:		Project Type:			
Contract Duration:		Actual Contract Duration:			
Contract Value:	\$	Actual Contract Value	\$		
List Key Project Objectives: List Key Project Constraints:					
Identify Possible Procurement Options to be Considered:					

# Weighting of Procurement Criteria (Worksheet 2)

Procurement Assessment Criteria	Weighting	Comments			
Time:					
Is early completion required?					
Certainty of time:					
Is project completion of time					
important?					
Certainty of cost:					
Is a firm price needed before any					
commitment to construction					
given					
Price competition:					
Is the selection of the					
construction team by price					
competition important?					
Flexibility:					
Are variations necessary after					
work has begun on-site?					
Complexity:					
Does the building need to be highly specialised,					
technologically advanced or					
highly serviced?					
<i>Quality</i> : Is high quality of the					
product, in terms of material and					
workmanship and design concept					
important?					
Responsibility:					
Is single point of responsibility					
the client's after the briefing					
stage or is direct responsibility to					
the client from the designers and					
cost consultants desired?					
Risk:					
Is the transfer of the risk of cost					
and time slippage from the client					
important?					
If this list of procurement assessment criteria is not deemed to be appropriate for the					
specific project or they do not specifically marry with the project objectives and constraints					
they can be amended accordingly	<b>/</b> •				

### Scoring of Criteria against Procurement Method (Worksheet 3)

Procurement Assessment Criteria		
Trocurement Assessment ernerna		
Time:		
Is early completion required?		
Certainty of time:		
Is project completion of time important?		
Certainty of cost:		
Is a firm price needed before any commitment to construction given		
Price competition:		
Is the selection of the construction team by price competition important?		
Flexibility:		
Are variations necessary after work has begun on-site?		
Complexity:		
Does the building need to be highly specialised, technologically advanced or highly serviced?		
<i>Quality</i> : Is high quality of the product, in terms of material and workmanship and design concept important?		
Responsibility:		
Is single point of responsibility the client's after the briefing stage or is direct responsibility to the client from the designers and cost consultants desired?		
<i>Risk</i> : Is the transfer of the risk of cost and time slippage from the client important?		

## Procurement Method Scoring Table (Worksheet 4)

Procurement Assessment Criteria	Weighting		
Time:			
Is early completion required?			
Certainty of time:			
Is project completion of time important?			
Certainty of cost:			
Is a firm price needed before any commitment to construction given			
Price competition:			
Is the selection of the construction team by price competition important?			
Flexibility:			
Are variations necessary after work has begun on-site?			
Complexity:			
Does the building need to be highly specialised, technologically advanced or highly serviced?			
<i>Quality</i> : Is high quality of the product, in terms of material and workmanship and design concept important?			
Responsibility:			
Is single point of responsibility the client's after the briefing stage or is direct responsibility to the client from the designers and cost consultants desired?			
Risk:			
Is the transfer of the risk of cost and time slippage from the client important?			
$\sum_{\substack{n \in \mathbb{R} \\ Rank}} =$			

## Procurement Assessment Chart (Worksheet 5)

Key	© Good		) Av	⊖ Average		😕 Poor	
Time	Procurement Option 1		curement Option 2	Procurem Option		Procurement Option 4	
Completion date certainty (once let)	Comment:						
Ability to meet current programme	Comment:						
Facility to phase construction	Comment:						

Cost	Procurement Option 1	Procurement Option 2	Procurement Option 3	Procurement Option 4
Cost certainty prior to major commitment.	Comment:			
Transfer of cost risk	Comment:			
Competitive tendering in current market conditions	Comment:			

Quality	Procurement Option 1	Procurement Option 2	Procurement Option 3	Procurement Option 4
Ability for contractor to add value in design development	Comment:			
Flexible to accommodate change orders	Comment:			
Single point responsibility for design & construction	Comment:			
Ability to control / respond to unknowns site conditions	Comment:			

### Worksheet Procurement Review Session (Worksheet 6)

Justification for use of selected option in relation alternative procurement methods available is required. In particular, compare and contrast with the project objectives:

**Preferred Procurement Option:** 



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