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CONSTRUCTION DISPUTE REDUCTION THROUGH AN IMPROVED CONTRACTING PROCESS IN THE CANADIAN CONTEXT

By

Francis T. Hartman

A doctoral thesis submitted in partial fulfillment of the requirements for the award of Doctor of Philosophy of Loughborough University of Technology

May 1993

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DEDICATION

To my family: Margaret, Tamsin, Richard, Christopher and Kirsten. Also to my parents who always promoted the importance of continued learning.
DECLARATION

No portion of the research referred to in this thesis has been submitted in support of an application for another degree or qualification at this or any other university or other institution of learning.
This thesis has been completed within the subject area of Construction Technology and Management in the Civil Engineering Department at Loughborough University of Technology.

The Author wishes to extend his gratitude to the following individuals and organizations:

- All the professional and technical specialists and managers who gave their time and expertise to the evaluation of the proposed approach to risk management in construction, and to the many construction industry managers who contributed to the thesis by responding to surveys.

- Dr. Andrew Baldwin who supervised this work, and Dr. Ron McCaffer who acted as Director of Research.

- Dr. George Jergeas who reviewed the thesis and provided suggestions for improvement and advice.

- The professional and technical associations who contributed their expertise and time to read or hear about the New Canadian Contracting Method, and to criticize, comment and add to the method.

- My family, who gave up so much to make this possible.
ABSTRACT

This thesis presents a new approach to construction contracting in North America. This new approach is referred to as the New Canadian Contracting Method (NCCM). It has been developed as a result of research into the existing contracting process used in North America generally and in Canada specifically. The NCCM addresses four main issues that were identified in the research, namely:

- Confrontational construction;
- Dispute resolution problems and costs;
- The project execution team selection process;
- Completion of contracts.

The NCCM addresses these issues without being prescriptive or by attempting to address one party's agenda over another. This is because these two approaches have been common to previous and unsuccessful attempts at addressing these issues. The new contracting method proposes the following four elements.

First the designer and contractor are selected on a qualification basis. The designer and the contractor may be brought on to the project team at a time when the contractor can add to constructability by having input into production of the working drawings.

Second, a commercial risk evaluation process is introduced as a part of the negotiation or tendering stage. This approach is innovative, and allows both the owner and the contractors to have input to the identification and allocation of risk in the contract.

Third the administration of the contract involves a Proactive Mediation Process that is designed to reduce the incidence of conflict and lower or eliminate conflict resolution costs.

Fourth the close-out of contracts is formalized with a process for realigning the completion of the contract. This is done by reassigning outstanding obligations to the best advantage of all parties.

The draft process was tested for validity. The consensus was that, with some modifications (included in the thesis), the NCCM could be useful to the Canadian construction industry.
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ALLEN'S LAW:
Almost anything is easier to get into than to get out of.
CHAPTER A1

INTRODUCTION

A1.1 Introduction

The American Society of Civil Engineers published an article in 1992 that suggested that as much as 20% of the cost of construction was attributable to the effect of litigation in the 1980's! [Rose, 1991] In essence, this is a reflection of the concerns raised by the industry about the contracting process and the litigation and consequent protectionism that it has attracted [Business Roundtable, 1983] [CII, 1986].

Articles, papers and discussions in the industry have hinted, and in some instances stated, that the existing practices of contracting in the construction industry need significant review. When the extent of the changes in technology, complexity, regulatory requirements and other factors over the past few years is considered, the virtual absence of change in the approach to contracting is remarkable. This point should be explored a bit further.

The most common form of contract is still the stipulated price contract. Award by competitive tender is still the most common method of final contractor selection. This has not changed significantly since (arbitrarily) the second world war. (See also Chapter A3.) This lack of movement in the way most construction contracts are written, tendered and administered is showing signs of loosening with the advent of Partnering and other contracting philosophies.

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3 Construction Industry Institute, "Contractor Planning for Fixed-Price Construction". A Report to the Construction Industry Institute, Publication 6-4, August 1986.
This change is slow and does little to recognize the growing risks that are part of today's construction environment.

Research and consultation with industry on the subject of construction risk and its management in the United States and in the United Kingdom has led to three publications of particular note. In the United States, the Construction Industry Institute has produced a study on contract risk allocation and cost effectiveness [CII, 1988]. Also in the U.S. the Consulting Engineers of America and the Associated General Contractors of America have jointly produced a booklet on saving money by risk allocation [Consulting Engineers Council of America and The Associated General Contractors of America Inc., 1990]. Perhaps the more significant work is that edited by Thompson and Perry that addresses risk on engineering projects from a broader perspective [Thompson and Perry, 1992].

Albert J. Kelley [Kelley, 1990] identifies a number of factors that have changed over the past few decades. These include the current uncertain economic environment, inflation, increased concern by regulatory agencies, special interest groups, and the general public, and runaway costs. The technology used in industrial and commercial projects has evolved considerably with the introduction of new materials, improved design processes, innovative mechanical and electrical systems, computer controls and more effective life safety features. Environmental regulations are being added at an exponential rate. Building and other codes are continuously under review, and are becoming more complex. As a result of these changes, the risks in proceeding with a capital construction project have

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Increased substantially.

Initially the risks in proceeding with a project lie with the owner of the project, together with the owner's investors and financiers. If the project fails, they are the ones who have to cover the cost of that failure. These risks on a project are subsequently distributed amongst different players through financing arrangements, contracts and insurance policies.

Financing of major projects in the private sector is often syndicated through partnerships amongst equity owners or through multi-source financing. For example, one bank will lend money for the project, but such a loan will be dependent on other lenders' participation. Lenders are risk averse and may impose contracting restrictions or conditions on the project as part of the terms of the loan.

Insurance coverage is invariably obtained for standard risks such as third party liability, builder's risks, and often (through bonds) performance of the construction contractor. Both financing and insurance risks carry premiums that have long been recognized as such. Everyone is familiar with the concept of "the greater the risk, the greater the reward" and most people routinely pay insurance premiums. The concept of premiums should also be extended to contracts where the contract is used as a vehicle for assigning risks to another party. That other party is assuming - or underwriting - that risk. Such a risk will carry a premium.

Recognition that a contract in the construction industry is used to pass risks on from the owner to others is not apparent in the process usually adopted in selection of a contracting strategy. Furthermore, the fact that such risks must carry a premium, does not appear to be well recognized by the professionals who write the contracts.

The methods used for apportioning the risks have not changed as the risks in capital projects have increased. For example, the typical stipulated price construction contract
will not only have a fixed price but will usually also stipulate a completion date. The reason for this is obvious when the time value of money is considered. Once money has been spent on a project, there is pressure to achieve some return on the investment. In North America, that pressure is high because of the heavy emphasis placed on quarterly corporate financial results. The risks associated with timely completion of a project increase with the complexity of the technology involved. This is true also of the number of different specialist trades required, the approvals and regulatory controls to be addressed and the myriad of other factors that can, and often do, interfere with the planned execution of the project as originally scheduled. Many of the causes of delays are, for practical purposes, beyond the direct control of the contractor who is effectively underwriting the risk of delay. This is because of the wording in the contract with the owner. Such a contractual arrangement must result in additional cost to the owner.

The new contracting method that has been developed by the writer, and is presented in this thesis considers the contracting process from the perspective that a contract is, in essence, a vehicle for assigning risk. The risks that are assigned through a contract may be grouped in the traditional four headings used in project management, namely: scope, quality, cost and time. Through apportioning scope risks, contracts define who is responsible for what. Quality risks are addressed by technical specifications and drawings. Samples, shop drawings and other criteria may also be included. Cost risks are apportioned by the type of contract used and by the terms of payment. Finally the time risks are covered by specific clauses that relate to schedule compliance, and may include liquidated damages and bonus-_penalty clauses.

The Business Roundtable Summary Report on Cost Effectiveness in the Construction Industry\footnote{Summary Report of the Construction Industry Cost Effectiveness Project; Business Roundtable, New York, NY, 1983.} suggests cost savings of "at least 5%" are achievable from the use of more astute contracts. In this thesis, the interpretation of a more astute contract is one that
provides the same product at a lower price and with a lower risk of litigation or substantial dispute at the end of the contract. This is achievable if the risk apportionment for the contract is appropriate to the circumstances of the project generally and the contract specifically. This hypothesis is expanded upon in section B.2.5.

### A1.2 The North American Construction Industry

The North American Construction Industry is very fragmented. It has an approximate value of $1,100 billion (1990). Wastage has been identified by many authorities, and is estimated to be in the range of 14% to 40%. A significant portion of this wastage is attributed to inappropriate contracts.

Many of the contracting processes in the United States and Canada are similar, though details vary from state to state and from province to province. Each regulatory authority will typically have its own construction lien law. This will also apply to contractor licensing requirements, building codes, engineering and architect licensing or permit laws, specific building code requirements, environmental laws and many other legal and regulatory requirements that are unique or specific to that region. The business sectors also operate differently. For example, in the heavy industrial and resource industries, the

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9. The Canadian Construction Research Board reported in an internal document in March 1993 that the Canadian construction industry had 140,000 active firms and over 700 technical and trade associations.


EPC or EPCM (Engineer, Procure and Construct or Engineer, Procure and Construction Manage) approach to contracting is common on major projects. The commercial construction sector (offices, shopping malls, etc.) has the equivalent in Design/Build contracts. The word "equivalent" is used deliberately, as there are some interesting differences in the style and emphasis between the two approaches. Cost plus contracts are seen more frequently in the first of the two sectors just mentioned, than in the second, and are very infrequently used in the government sector. Thus practices vary from location to location and from sector to sector of the industry.

Many, if not most, construction companies have specialized in one sector. Over the years, as the complexity of construction has increased, the trend has been towards specialty trades doing the work. As a result, the role of the general contractor has become largely reduced to that of a broker and manager.

Design for a project is often awarded to one firm (architect or engineer) that in turn may subcontract design elements to specialty consultants. In a commercial development an architectural practice will typically be awarded the design, and will then subcontract to different companies, engineering for the foundations (geotechnical), the structure, mechanical elements, electrical elements, landscaping, interior design and so on. Even these specialists may not be enough, and the sprinkler and life safety systems may be further sub-contracted. Lighting and acoustic design is often broken out and awarded to more specialized consultants where these elements are sensitive or important.

Two other aspects of the construction industry are worth noting. The industry has the second highest incidence of legal action, preceded only by personal injury cases [Fail Corporation, 1990]. It also has the second highest failure (bankruptcy) rate, preceded only by the restaurant business [ibid.]. These are not statistics to be proud of, but they are a good indication that the industry could do with some reform. Both statistics point to the contracting process as a likely cause. Contracts will never be able to compensate for bad management, but the incidence of legal action and bankruptcy should be reviewed briefly.
First, legal action is normally brought under contract rather than in tort. This means that the contracting process is not working as well as it should. A contract dispute that finds its way to court is an indication that the contract failed to deal with a specific issue or was unclear on some important matter. Setting aside subjective disputes (see section A5) such contract failures can be defined in terms of disputed risk apportionment. In turn, this means that the risk has been inadequately dealt with in the contract. Alternatively the risk in dispute is one that has been inappropriately assigned and is in dispute for that reason.

Second, business failures in construction companies have been related to ten prime causes by Schliefer\textsuperscript{15}. These are:

- Increase in project size (most common cause of contractor failure);\textsuperscript{*}
- Unfamiliarity with new geographic areas;\textsuperscript{*}
- Moving into new types of construction;\textsuperscript{*}
- Changes of key personnel;\textsuperscript{*}
- Lack of managerial maturity in expanding organizations;\textsuperscript{*}
- Poor accounting systems;
- Failure to evaluate project profitability;
- Lack of equipment cost controls;
- Poor billing procedures;
- Transition to or problems with computerized accounting.

From this list it can quickly be seen that five of the causes relate to the company's business strategies or practical considerations (marked "\textsuperscript{*}") and five relate to fiscal or accounting considerations. What does this mean? Essentially, it is bad management, of

the risks inherent in the construction process or built in to the contract that causes contractor failure. Both the contractor and the owner need to be concerned with this issue: the contractor for the obvious reason of survival and the owner because ultimately it is the owner that pays for the contractor's business failure.

Both bankruptcies and contract disputes end up costing the owner money. The owner has some control over bankruptcies, through selection of contractors for reasons other than picking the lowest bidder. The owner does, however, have considerable control over the matter of contract disputes. These disputes usually fall into one of four categories:

- Changes;
- Impact;
- Performance Quality;
- Bad faith.

In a bankruptcy the owner must cover the cost of replacing the contractor. Alternatively, the owner pays a premium under the construction contract for the contractor to pay for a performance bond or a labour and materials payment bond. (Sometimes other methods of insuring against this risk are used, but these also carry premiums.) In a contract dispute, the owner must pay, at the very least, part of the legal bill for defending against a lawsuit. At worst this could be the whole cost of defense plus the awarded damages plus a large portion of the contractor's legal costs.

Contractors who stay in business do so because, overall, they make a profit. This means that, overall, they are able to defray the cost of dispute resolution, even if they lose a lawsuit, or have a sub-contractor go bankrupt. As the revenue to defray these costs comes from being paid for construction work (by definition), the owner ultimately pays for this cost.

In many cases, the contractor is selected based on a competitive tendering process. Because of mistrust between sub-contractors and general contractors, much of the tender information upon which a bid is based is not made available to the general contractor until shortly before the tender closing time for a particular contract. This has come about because some general contractors have, in the past, "shopped" prices, by calling subcontractors to see if they can obtain a better quotation than the lowest received to that point.

This means that most sub-contractor prices, which often represent 60% to 90% of the bid amount are received in the hour before tender closing. On a typical high-rise office building, this can mean that the general contractor will receive 200 to 400 telephone and facsimile quotations in that last hour. This means, in turn, that the contractor will have to make a large number of high-impact decisions in selection of its sub-contractors for that bid in that hour. The opportunity for error is very high!

The mistrust mentioned earlier works also in the opposite direction. Many general contractors mistrust the sub-contractors and will therefore not release information that may be key to obtaining the lowest quote from the subcontractor. An example of this type of information is the sequence of construction, another is any innovative (e.g., time or cost-saving) methodology that has been planned. The concern by the general contractor is that such information, if passed on to sub-contractors, will end up in the hands of their competitors. The ramifications of this mistrust are discussed in more detail in section B.

A1.3 Definition of the Problem

We are working in an industry that is fragmented. It is full of participants who are distrustful of other players in the industry. Construction is growing in technical complexity. And the regulatory processes governing the industry are becoming steadily more complex, demanding and time consuming.
Information on the number and nature of disputes, their causes and the cost of their resolution is hard to obtain. Interviews with industry specialists who consult in the (large, and growing) area of construction claims have revealed that even these specialists are often not advised by their clients of the outcome of a dispute in which they were consulted, and for which they prepared a claim or a defense to a claim and acted as an expert witness.

On the basis of discussions with lawyers, it would appear that less than one in ten cases for which court proceedings are commenced eventually end up completing the litigation process. The majority of such cases are settled out of court. No reliable figures have been identified for the number of claims that are resolved without a legal action being commenced. However, based on discussions with practicing project managers and executives of consulting and contracting firms, it is likely that the ratio of claims to court actions filed is at least 3:1. On this basis, there are likely at least 30 claims for every court decision. Thus, clearly, the number of construction claims is very high indeed.

The litigation process in North America's litigious environment is both costly and slow. The courts are busy. They have a large backlog of pending cases. This leads to delays that make litigation, from filing of a suit to final settlement, a long process that is not uncommonly in the four- to eight-year range.

The cost of construction is directly and adversely affected by litigation costs and by construction business failures. Further, it is negatively affected by the way in which contracts are put together, and the way in which contracts are awarded. Contracts are a vehicle by which risks are passed from one party to another. The party passing on the risk is usually the one that drafts the contract and is therefore effectively in control of the process, from inception to contract award. After contract award, changes to the contract are common. The management of these changes is also part of the risk management process.
The additional costs associated with contract failures, business failures and the contract award process can be reduced or eliminated if their cause can be identified and eliminated.

The cause of a contract failure (defined as a claim or lawsuit) is commonly a difference in expectation between two parties to a contract. One party expected a risk, service or other benefit to be covered by the terms of the contract and the other party did not. Claims usually arise over items where one party believes it provided a benefit to the other party that was not covered under the terms of the contract. Consequently, the provider expects additional compensation (or a credit, if it is the owner making the claim) for that additional benefit. This difference of interpretation will be due to one of three types of cause.

1. The risk associated with the dispute was not allocated clearly to one or other of the contracting parties.
2. The item at issue is not covered by the terms of the contract, and is therefore an unallocated item or risk in the scope category.
3. The contract is interpreted differently by the two parties, resulting in a misunderstanding of the work to be done, the quality standards to be met, the cost to be included - or not - in the contract, or the schedule constraints.

These are the risk categories identified earlier, and examined in more detail in section B.

Contract costs can be reduced if a method for improving the contracting process through the effective allocation of risk can be developed. The improved process should be easy to understand and follow. It also needs to be relatively easy to adopt if it is to be implemented.

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A1.4 Aims of the Research

The objective of the research was to develop and assess the feasibility of a new approach to the contracting process that achieved the prime objective of reducing or eliminating additional costs attributable to misallocation of risk.

Misallocation of risk appeared to the author, based on many years of industrial experience, to be at least partially responsible for cost inefficiencies in the Construction Industry.

*The hypothesis tested in this work was: that a new approach to the contracting process will reduce or eliminate additional costs attributable to misallocation of risk.*

Misallocation of risk can occur in a number of ways.

- Risk can be inadequately defined.
- Risks are defined but simply not allocated to one or another party to the contract.
- Risks can be misrepresented.
- Risks may be hidden to one or all parties to the contract.
- Risks may be passed on to the wrong party, either deliberately or in error or ignorance.
- Risks may be overstated or understated, with consequent incorrect assessment of the premium.
- New risks may be created in the administration of a contract, or as a result of changes to the contract.

There are numerous situations and reasons why contracts in the construction industry attract risks. Some of these risks are avoidable. The rest need to be managed in a business-like way. The process for doing this is well understood, in that it has been
documented by several authorities\textsuperscript{18,19,20}. The challenge to the industry is now to manage this process effectively.

This research was designed to develop a process for achieving more effective and pragmatic management of risk.

Specific aims of the research were to do the following.

1. Determine through a literature search whether risk allocation was a recognized cause of construction disputes.

2. Evaluate the extent and impact of disputes on the cost of construction through an industry survey.

3. Determine potential causes of disputes as they relate to the contracting process rather than the contract documents (terms and conditions).

4. Develop a prototype new contracting process.

5. Verify, through industry involvement, that the prototype process is viable and acceptable.

\begin{itemize}
\item \textsuperscript{19} Biedelman, Carl R. and Veshoski, David; "Using project finance to help manage project risks"; \textit{Project Management Journal}, Vol XXII, No 2, June 1991, p33 - 38.
\item \textsuperscript{20} Brooks, Harry F.; "Contractor's risk management - Part VIII"; \textit{American Agent and Broker}, Vol 9, Iss 8, Aug 1990, p 6 and 8.
\end{itemize}
6. Determine industry paradigms on related issues that may assist in evaluation of comments and feedback on the prototype new contracting process.

7. Revise the process to address industry concerns, and incorporate constructive recommendations.

A1.5 Work Undertaken

The work undertaken was in three distinct phases.

The first phase was to verify the hypothesis that the apportionment of risk through contracts was a valid approach to reducing costs and producing a more astute contract. This was done in large part through a literature review, supplemented with a survey to obtain some additional information on the behaviour of contracts in practice.

Literature relating to the issues pertinent to the construction contracting process was reviewed and evaluated. Most of the literature available on the topic of construction contracts and contract administration is based in a conservative approach to the process. This is reflected in today's approach to contract documentation, in that the majority of contracts tend to reflect a risk-averse attitude. The results of the study clearly indicate that an approach that involves taking risks, not chances, is more appropriate to today's rapidly changing business environment.

The difference between taking risks and taking chances may be illustrated by adapting the description of risk management in the Project Management Institute's PMBK. Here an analogy is made to being shot at. Taking a

\[\text{\textsuperscript{21} Project Management Body of Knowledge (PMBOK)}\text{\textsuperscript{21}}\text{ Project Management Institute, Drexel Hill, PA, 1987.}\]
chance is to stay still and hope that the bullet was not aimed at you. Taking a risk, on the other hand involves recognizing the existence of the hazard, and assessing the chance of it affecting you. Managing that risk involves use of one of three risk management principles: Avoidance, Defense and Mitigation. Avoidance involves not taking the risk or assigning it to someone else - step away from the path of the bullet, or have someone else there instead. Defense involves taking necessary precautions (insurance) - use a shield to deflect the bullet. Mitigation is the process of planning for the eventuality of the risk and minimizing the impact if it occurs (contingency planning) - make sure you can get medical attention quickly, and can afford the bills.

The survey that was undertaken in the southern Ontario region over a three year period provided some interesting findings. One hundred and fifty five senior construction industry practitioners were interviewed representing owners, designers and contractors. The results showed that a subjective attitude towards claims and disputes prevailed. They also showed that information on the incidence of claims was not routinely kept in quantified form, and that there was a strong reluctance to admit to the existence of construction claims and disputes.

The second phase was the production of a new Canadian contracting method that laid out the steps that should be followed to obtain a more astute contract through effective risk management.

The process of developing the New Canadian Contracting Method was based on that currently in vogue for software development, namely "build a bit, test a bit". First, the main issues were identified from the literature search and the initial survey. Eight key findings were identified.
1. The construction industry as a whole is slow to accept change.

2. The predominant form of contract used in the industry is the Stipulated Price or Lump Sum contract.

3. Between 30% and 40% of construction billings are paid for as a result of changes, claims and litigation.

4. The process of tendering construction based on completed design documents puts the emphasis on minimizing contractor profits with no consideration for minimizing areas of larger potential savings, such as the cost of construction and the cost of contract administration.

5. Minimizing contractor's profits and assigning maximum risks to the contractor through competitive tendering and commonly used contract wording encourages a confrontational and non-cooperative work environment.

6. Risk is typically assigned through contracts with little or no assessment of the financial or commercial consequences of the assignment decision.

7. Traditional dispute resolution methods (Consultant acting as "arbiter in the first instance" and litigation) have been found to be less efficient than some of the newer alternative dispute resolution methods which are being tried in North America.
Close-out of contracts were normally confused, making it difficult to establish start (and hence end) dates for warranty periods, and end dates for obligations of insurers and sureties providing insurance and bond coverage for the project.

Discussion with selected industry representatives, combined with learnings from the literature study, led to identification of four important objectives for the New Canadian Contracting Method.

1. Select the Designer and Constructor at the same time to encourage teamwork and constructability.

2. Identify and price construction risks with subsequent rational apportionment of the risks.

3. Use a proactive mediation process to resolve, reduce or eliminate disputes.

4. Apply a contract close-out process which will clarify and simplify contract completion.

These objectives were again discussed with industry representatives to identify clear advantages to all stakeholders in the contracting process. The contracting method was then written to maximize these advantages to the Owner, Consultants, Contractors and Subcontractors.

The third phase was to test the proposed process. Because the cycle (from award to completion) of a significant enough number of construction contracts to produce a statistically significant population would take many years, another approach was adopted.
This alternate approach was to solicit the opinions of a number of industry specialists to comment on the new contracting method. A methodology was developed to maximize the value of this solicitation process. Through this process it was verified that the new contracting method was viable and that it would result in a lower incidence of claims and potentially lead to lower construction costs.

A new process for obtaining feedback from industry was developed. Initially two processes were considered in detail out of the many options reviewed. One option was to use the Delphi Method to obtain increasingly focussed opinion from a panel of up to about 10 specialists through an iterative process. The other option was to use a seminar to obtain feedback in a discussion format and from a larger group of industry representatives. Both options offered advantages. However the author had access to a decision support laboratory which offered the potential to gain not only the main advantages of the two processes first considered, but some additional ones. The process that was developed allowed participants anonymity. This was an advantage in that the comments of participants in the process would be made without any fear of being considered different, or of offending the author or others involved in the process. More candid comments could be expected as a result. Use of the computers in the laboratory to enter and share comments permitted all participants to have input and to see everyone else's input. This enabled all participants to say what they wanted, without losing out to the more dominant people in the room. Participants could also comment on others' observations, thus gaining some of the advantages of the Delphi Method. All coments were captured electronically, and so could be analysed carefully at a later date. Sixty two participants were involved in the process, split over four laboratory sessions. The group represented in about equal numbers: Owners, Consultants, Contractors (including Subcontractors) and support services (lawyers, claims specialists, insurers, sureties and so on). Representatives were drawn from heavy construction, resource and process project construction and from industrial/commercial/institutional construction sectors. Residential construction, because of its different practices, was specifically excluded from this study.
The testing process for the new contracting method was in two parts. A survey of participants' views on issues related to the new contracting method was performed. The survey was mailed to the participants who were asked to complete the questionnaire and return it when they came for their session in the laboratory. This session was the second part of the process. Groups of about fifteen participants in each session typed their comments into networked computers. At any time they could see others' comments on a particular part of the draft new contracting method, and could add to those comments. The participants generally came prepared, having read the documentation on the new contracting method before coming to the laboratory.

The comments of participants were analysed in the light of the survey results, allowing any apparent anomalies or differences of opinion to be resolved or interpreted more effectively. This analysis led to a re-drafted version of the prototype process, referred to as the New Canadian Contracting Method.

The first phase is documented in section A. The second and third phases are documented in sections B and C respectively.
Main Achievements

The primary achievement was the production of a process that may be used to reduce the incidence of construction claims and associated costs. The process is also expected, over time, to reduce the cost of construction where it is fully utilized.

Other achievements resulting from this work were the following.

1. The clear preference for price-based contracts was quantified. Only the most sophisticated owners and contractors recognized the advantages of cost-based contracts.

2. The absence of data on the subject of claims was partially addressed. The impact of changes, claims and litigation on construction costs was quantified as the basis of between 30% and 40% of the payments made to contractors for construction work.

3. Some significant relationships were established, including:
   - most construction participants are risk-averse;
   - the greater the volume of construction done by a participant, the more defensive its construction contracting strategy was likely to be;
   - defensiveness could be measured in terms of the type of contract used and preferred, the employment of in-house legal counsel, and the bidding process used;
   - the more defensive the contracting method, the greater was the incidence of disputes.
4. It was found that there was a very clear preference for one dispute resolution method over another. In order of preference they were:

- negotiate
- mediate
- arbitrate, and
- litigate.

This is significantly at variance with practice. The majority of disputes not resolved by negotiation are still litigated in North America.

5. There was a strong interest in the proposed Proactive Mediation process proposed in the New Canadian Contracting Method and its first draft.

6. There was a strong interest in the proposed rational risk apportionment method proposed in the New Canadian Contracting Method and its first draft.

7. The modified Delphi method developed to evaluate the viability and acceptability of the prototype new contracting method was well received by participants and yielded useful results.

8. Strong industry-wide and commonly shared opinions were held on specific issues. Attention to these opinions in the development of a new process for contracting will lead to higher acceptance of that method.

Finally, based on further review of available literature, and on the work done by one company in the oil industry, it appears that further development of the concepts identified
in the new procedure developed in this research, is possible. Such further development is in the application of knowledge based systems for generation of draft forms of contract, based on the specific circumstances of the project.

A1.7 Guide to the thesis

This thesis presents a new contracting method. The new method has been developed for the Canadian construction industry, with the purpose of addressing the changing risk environment. Canadian competitiveness is continuously being challenged by that of other countries. Part of the solution to improved competitiveness is to reduce the cost of expanding or maintaining the infrastructure that sustains North American businesses.

The thesis has been written in three sections that reflect the three phases of the development of the new contracting method. In section A, the preliminary industry survey is described, together with the results and findings. This was a major survey that formed the basis on which the first draft of the proposed new contracting method was developed. Section B describes the first draft of the new contracting method and the process used to test its validity in today's Canadian construction market. The results of this testing process were in two parts: a survey and commentary from reviewers. The survey was used in interpretation and resolution of differences in the comments made by reviewers. The process for review and the survey results are described in section B. The final part of the thesis - Section C - describes the comments made by reviewers of the draft contracting method, and explains how these were used in developing the final draft.

Figure A.1.1 - Research Flowchart and Summary, on the following page, illustrates the work in flowchart form.
SECTION A

This section describes the work undertaken as research in preparation for developing the first draft of the new contracting method.

Chapter A2 presents the general background to the North American construction industry, and how contracts are formed, administered and completed. The present practices are reviewed and evaluated. Trends in the industry are identified, and the future potential for developments in contract practices is briefly discussed.

Chapter A3 is used to define the current problems, dealing with wastage, disputes and dispute resolution as currently practiced.

Chapter A4 deals with current industry solutions to the construction dispute issue. Alternate Dispute Resolution (ADR) options are reviewed, as are contract terms, the process of contractor selection, contract administration and legislation relating to this process.

Chapter A5 presents a summary of the industry survey performed as part of the development of the procedures described in section B.
SECTION B

This section describes the development of the first draft of the New Contracting Method, and how it was validated as a viable process for the Canadian construction market.

Chapter B1 describes how the new contracting method was developed based on the principal findings of the survey described in Section A.

Chapter B2 explains the process used to test the validity of the new contracting method. This process involved two closely linked elements: a survey of participants attitudes towards specific issues related to the evaluation and an electronic process based on the Delphi Method for obtaining commentary and input from industry experts.

Chapter B3 presents the results of the survey that was conducted as an integral part of the evaluation process described in Chapter B2.
SECTION C

This section includes the results of expert evaluations of the PROPOSED NEW CANADIAN CONTRACTING METHOD, and the conclusions drawn from the research and review undertaken.

Chapter C1 presents the results of reviews of the proposed new contracting method by industry specialists. Their recommendations for change and improvement are listed. These recommendations are annotated with the action taken in adjusting the text of the New Canadian Contracting Method (NCCM).

Chapter C2 presents the revised NCCM that resulted from an analysis of the industry comments.

Chapter C3 presents conclusions drawn from the research process, and recommends further research and development of the concepts identified through the process of preparing this thesis.
CHAPTER A2.

LITERATURE REVIEW

A2.1 Construction Contracting in North America
A2.2 Construction sectors and industry fragmentation
A2.3 Participants in the construction process
A2.4 Construction contracts: scope and type
A2.5 Construction disputes: current practices
A2.6 Research and trends in contracting practices
A2.7 Future potential

**BLAAUW'S LAW:**

Established technology tends to persist in spite of new technology.
CHAPTER A2.

LITERATURE REVIEW

A2.1 Construction Contracting in North America

The construction industry in North America is worth about $1,100 billion\(^{22}\). Most of the practices, in terms of contracting, are similar in the United States and Canada\(^{23}\). It is in the general context of these countries that the issue of developing a more astute contract\(^{24}\) through risk management is discussed.

It has already been mentioned that the industry is fragmented (see section A1.2 above). The types of contract used, the methods for selecting contractors and the organizations set up for projects also vary widely\(^{25,26}\). There are merits to the myriad of approaches used. To understand those different methods, they must first be categorized and assessed.

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\(^{22}\)Statistics Canada Catalogue 64-201, 1990-1992, p10 for Canadian construction volume. The construction volume in the U.S. measured on the same basis is typically 10 times that in Canada.


Fisk commented that "in recent years, a great deal of lip service has been paid to the concept of risk allocation and liability sharing". Many of the risks that are recognized today by owners and consultants have always been there. Their recognition is the result of contractors' increased attempts to recover costs stemming from these risks. Exculpatory clauses have traditionally been used to pass on to contractors the risks that were essentially beyond the reasonable or immediate control of the contractor. Fisk goes further, to comment that risks are rightfully the owner's unless transferred to another for party for fair compensation.

The North American construction industry uses many different types of contract and a myriad of different forms of contract. There have been many attempts to develop

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33 MacEwing, J. Mark; "Remote and foreseeable damages arising from design professionals' errors and omissions"; Construction Canada, November 1989. p53 - 54.

34 Fisk, Edward R., "Risk Management and Liability Sharing"; a technical paper presented at the May 1 - 3, 1995 Annual State Conference of the Arizona Water and Pollution Control Association (AWPCA) held at Lake Havasu, AZ.

standard forms of contract. In the United States, for example, the Engineer's Joint Contract Documents Committee (American Consulting Engineers Council, American Society of Civil Engineers, Construction Specification Institute and National Society of Professional Engineers) have developed Standard Forms of Agreement for Engineer, Owner and Construction Related Documents. In Canada, the Construction Contract Document Committee (CCDC) has produced a number of standard contract agreements (e.g., CCDC 2 - Stipulated Price Contract). These standard documents are widely used in the industry. However, many are modified by Supplementary Conditions that can make such profound changes that the original intent of a standard contract agreement with equitable risk apportionment is essentially lost. In many cases these standard documents are not used, the owner preferring to use its own "standard" contract document. Many large corporations and government agencies opt for this alternative. Regardless of the alternative used in contract type, there is still a growing amount of litigation. This growth has fuelled interest in alternative methods for resolving disputes as well as in alternative methods of contracting to reduce the potential for dispute. The growing


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use of Partnering, or Strategic Alliances are a good example of this trend.

Alternative Dispute Resolution (ADR) is sometimes written into contracts that specify one or more of a number of ADR options, the most popular of which are Arbitration and Mediation. There is also a growing interest in the use of Dispute Resolution Boards\textsuperscript{45}.

Arbitration can be written into a contract as mandatory or optional (at the behest of one or both parties to the contract). It can be binding or non-binding arbitration. In several jurisdictions the Arbitration process is governed by legislation\textsuperscript{46}. This legislation and the evolution of the arbitration process have made arbitration virtually as costly as litigation\textsuperscript{47}. Thus the only advantage left is that the process is sometimes faster, and the decision is made by someone who is familiar with the industry. This latter "advantage" is not necessarily a practical advantage to all parties in a dispute!

Mediation is growing in popularity. One of the preferred models for construction mediation is fact-based mediation as described by Marcus and Marcus (1987). Like arbitration, mediation can be written into a contract. Mediation, by definition, is not binding. The process involves a third party who works with the disputants towards a compromise solution that is subsequently formalized. The process, according to Marcus and Marcus, has had a high success rate.

\textsuperscript{44} CII, "Partnering: Meeting the challenges of the future"; Partnering Taskforce Interim Report. A special CII publication. Texas, August 1989.

\textsuperscript{45} PMI Taskforce on Dispute Resolution; "The dispute resolution clause"; Project Management Journal 1992, p11 - 16.

\textsuperscript{46} For example, Alberta Arbitration Act 1992.

A review of a number of the models used by practicing mediators suggests that the principles identified in the Harvard Negotiation Project\textsuperscript{48-49} are used by many mediators.

Over the past few years there has been a growing interest in contracts that reduce the incidence of claims. The Construction Industry Institute, following up on the Business Roundtable\textsuperscript{50} has studied the concept of partnering\textsuperscript{51}. Partnering, or Strategic Alliances as they are referred to by some (because of the legal implications of the term "Partner"), is gaining a foothold in the resource sector. Partnering is a long term arrangement with a contractor or supplier to provide services in a close commercial arrangement. These arrangements can vary significantly in their terms, but the principles are essentially the same. The long term arrangement will be to provide specific services or goods over an agreed period, with either party being able to withdraw from the agreement if the relationship is not working. The objectives are to reduce costly duplication of effort in administration, quality assurance, accounting, tendering and other processes rendered redundant by this type of agreement. The contractor benefits from a degree of continuity of work, provided the owner remains satisfied with the service. The owner benefits from reduced overheads in procuring the service, and greater responsiveness from its "partner". Theoretically, and based on limited experience by companies such as Flour Daniel (partnering with duPont for over 15 years) and PetroCanada in a growing number of strategic alliances, the process can be made to work for both sides.

Recently, Shell Canada was able to compare the results of the normal tender process with a strategic alliance. A project near Edmonton, Alberta, was tendered in the conventional


\textsuperscript{51}CII Partnering Taskforce; "In search of partnering excellence"; Special Publication 17-1, Construction Industry Institute, Austin, Texas, July 1991.
way, and the low bidder was selected. Because of timing and labour union restrictions, however, it transpired that the selected contractor could not perform the work. Another contractor, with whom the Owner had already established a strategic alliance that had been working for well over one year, was asked to do the work. The final cost of the work, done under the terms of the preexisting partnering agreement was significantly lower than the low bid that could not be accepted.

The construction industry as a whole is changing very slowly. A recent survey on the procurement process, carried out on a sector-by-sector basis\textsuperscript{52} identified that some sectors had not even heard of the partnering concept. There are very big differences between the practices of different sectors of the construction industry in North America. This is exemplified by the books and articles published on the general subject of construction contracts: many are aimed at specific sectors\textsuperscript{53, 54, 55, 56, 57, 58, 59}. Schleifer comments on the risks associated in moving from one sector to another: "However, I do not suggest that

\textsuperscript{52} Unpublished reports prepared by graduate students on the Project Management Specialization programme at the University of Calgary, Alberta, as part of the requirements of the Procurement and Logistics course, 1992.

\textsuperscript{53} CII; "Model Planning and Controlling System for EPC of Industrial Projects"; Report to the Construction Industry Institute, Publication 6-3, CII, Austin, Texas, April, 1987.


\textsuperscript{55} Gerwick, Ben C. Jr., and Woolery, Jonh C.; 'Construction and Engineering Marketing for Major Project Services.'", John Wiley and Sons, 1983.


a contractor should never expand into other types of construction, merely that doing so carries with it certain risks great enough to have caused major problems to a large number of successful contractors.

A2.2 Construction sectors and industry fragmentation

The construction industry may be broken into a number of sectors. There are many ways in which the construction industry has been categorized. A sample of such a classification, using ownership, type of business or service and type of project is shown below. This is done to help illustrate how fragmented the industry is.

- Government Projects
  - Roadwork
  - Bridges
  - Dams and Hydroelectric Projects
- Utility Projects
  - Power stations
  - Peak shaving (natural Gas) facilities
  - Water treatment
  - Waste treatment
  - Sewerage systems
  - Power distribution
- Buildings
  - Major Facilities
  - Community centres

- Offices
- Warehousing and specialty buildings

- Major Industrial Projects
  - Resource Projects
    - Petrochemical
    - Mining
    - Pulp and paper
    - Pipelines
  - Manufacturing
    - Automotive
    - Pharmaceutical
    - Aerospace
    - Food processing

- Light Industrial Projects
  - Warehouses
  - Factories and assembly facilities
  - Industrial multiples

- Commercial Projects
  - Office Towers
    - High-rise
    - Low-rise
  - Shopping centres
    - Strip Plazas
    - Malls
  - Hotels
  - Parking structures
- Residential Construction
  - Housing subdivisions
  - Condominiums
  - Apartment Buildings

- Other Specialty Construction
  - Hospitals

- Transportation
  - Airports
  - Railway
  - Harbours and marine construction

Subgroups identified above are intended to be illustrative rather than comprehensive. What is noteworthy is that particular subgroups are dominated by specific types of owners. For example, in Canada, Airports have traditionally been owned and operated by the Federal Government, with smaller ones owned and operated by provincial or municipal governments. Only very recently (1990) was the first significant private airport development undertaken by a developer (Huang and Danczky) for terminal three of the Lester Pearson International airport in Toronto.

Just as each sub-group has its dominant owner type, so does it have its own traditions and construction contracting practices and terminology. If the fragmentation of the industry were based solely on these sectors, it would be difficult to span with a single solution to the current construction contracting challenges. The reality is worse than this, as may be illustrated by the number of organizations involved. In Canada alone, the construction industry has:

- 180,000 firms;
- 700 associations;
- 10 provinces and territories, each with their own Lien Acts,
Engineer's Act and Architect's Act, Environmental regulations and building codes;
- three levels of government.

Clearly this is a fragmented industry!

One of the issues that was to be determined in the development of a contracting method that was acceptable to the majority of sectors in the construction industry was the preferences for particular types of contract and contractor selection that existed with owners. It is the owners who must ultimately accept a new method if it is to be used. Consultants who advise the owners must also be persuaded to the relative advantages of a new method, if they are to advise owners to try it. The initial survey investigated current preferences.

A2.3 Participants in the construction process

There are numerous stakeholders involved in the construction process. More than just the construction contract is required to instigate the construction process. A simplified diagram illustrating some of the direct and indirect relationships that may be set up in a construction contracting situation is illustrated in figure A2.3.

Owners are the sponsors of a construction project. It is the owner that will ultimately benefit from the finished product. (In the case of government, it is the general public that normally benefits.) Owners start with all the risk on a project. They subsequently attempt to divest themselves of as much of this risk as possible. This risk is passed on to Insurers, Sureties, Consultants and Contractors.

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Contractual and working relationships that affect a construction contract and its administration
Figure A2.3
Consultants perform a number of functions, advising the owner on the process of construction. The primary function fulfilled by consultants is the design of the facility to be built. Inherent in the design is the risk of technical failure. This could be structural failure, or the finished facility not doing what it was intended to do (e.g., it fails to produce the quality or quantity of product it was intended to, or it costs more to operate than was planned). The risks that flow directly from the quality of the design usually are passed on to the consultant in its contract with the owner. The litigious nature of the industry has raised concerns amongst insurance companies that third party and class-action claims may add to the growing number of suits filed against designers and constructors\textsuperscript{62}.

Contractors are retained to construct the facility. Depending on how the facility is to be built, one or more contractors will be used. The risks most commonly passed on to contractors are those which relate to the following:

- Cost of performing the work;
- Time in which the work must be completed;
- Availability of the necessary labour, equipment and materials for construction of the project;
- Meeting expected standards of quality in materials and workmanship;
- Site conditions;
- Impact of weather;
- Change impacts.

There is a growing concern over risks in construction, and a better understanding of them. Unfortunately, risks are often addressed too late. The auditing approach proposed by

Gilbreath\textsuperscript{63} does offer a useful checklist of items to consider in evaluating project risk. His list is presented as part of the process for establishing a contract auditing strategy. The author proposes its use in project planning. This list identifies the following headings:

- contract pricing structure;
- change order profile;
- claims;
- contract life span;
- upsets;
- pricing mixes;
- post bid negotiated terms;
- design revisions;
- personnel movement;
- dealing and trading;
- growth in owner scope;
- audit aging;
- extreme schedule pressure;
- long-term relationships;
- owner management and staffing;
- contract management skills.

Particularly interesting, given the current enthusiasm for partnering or strategic alliances, is Gilbreath's comment on long-term relationships between owner and contractor. He states: "Rank contracts high risk if you have been doing business with the contractor or its representative for a long time. Familiarity breeds laxity of control and potential for abuse." This is a reflection of the traditional confrontational and untrusting approach in North America.

Subcontractors typically provide specialist trade construction services. Examples of this would include Mechanical and Electrical installation, Curtain Wall supply and installation, Elevators and Piling. Because of the specialist nature of their work, they will likely have more experience and expertise in their trade than the general contractor, the designer or the owner.

Suppliers provide equipment and materials to a construction project, but do not provide installation services. One of the biggest challenges, particularly with the larger suppliers, is agreeing on purchase terms. Often the purchaser's Purchase Order is ignored by the vendor who prices and quotes on its own terms and conditions. Resolution of the differences has been a constant problem for purchasers over the years.

Bankers are involved directly in projects when they provide interim project financing. They often require verification of the value of work done before advancing progress payment funds. The contractor's banker is indirectly involved, as it is concerned with the contractor's cashflow and profitability. The banker's influence on construction projects manifests itself in two ways. First, the project lender normally requires a high degree of assurance that the project can be built for the proforma price. They do not wish to risk financing a project that may not be commercially viable. This tends to lead to one of the loan conditions being that the owner uses price-based contracts for construction. The second influence is from the contractor's, subcontractor's or supplier's banker. A concern about the viability of the business may cause loans to be called or lines of credit to be reduced. The impact of this is contractor business failure (worst case) or delays in construction resulting from spending limitations that lead to late ordering of materials and equipment or reduced construction crews in an effort to reduce cash requirements.

Insurers provide coverage of "pure risk". Pure risk is that type of risk that is latent in the

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64 Various Contributors; "Project Procurement and Logistics - Course Notes"; The University of Calgary, Project Management Specialization, Calgary, AB, 1992.
type of business or the circumstances, and which can be predictably valued. Examples of this are: fire, theft, flooding, third party damage and professional liability.

Sureties provide bonds as financial security against performance failures. The three common types of bond are: Bid bonds, Performance bonds and Labour and Material Payment bonds. The bid bond protects the owner by covering the price difference between the successful low bidder and the next highest in the event that the low bidder refuses to enter into a contract for the bid amount. The performance bond protects the owner from the risk of the contractor failing to complete the contracted work. Under this bond, the owner can recover the cost of completing the work that was left undone by the defaulting contractor. The labour and material payment bond is a response to the demands set up in part by constructor's lien legislation. The owner is protected, in part, from the risks of lien-based litigation associated with the contractor's inability to pay its suppliers or labour. These types of bonds may also be required of a subcontractor by a general contractor. Bonding is often used as a prequalification tool by owners: if the contractor can obtain a bond, it can probably do the work. Sureties are cautious risk takers!

A2.4 Construction contracts: scope and type

There are a wide variety of contracts in use in the construction industry today. This section is included only to provide an indication of this variety, and to indicate how risks are distributed using them. Figures A2.4.1 to A2.4.3 show this distribution graphically.

The scope of work which may be assigned to a contractor could include one or more of the following.

- Design
- Construction
- Trade construction (e.g. formwork, earthmoving, electrical installation)
- Design/Build
- EPC
- EPCM
- Project Management
- Construction Management
- Management Contracting
- Turnkey (Finance, design, build and commission)
- Leaseback
- BOT (Build, Operate, Transfer)
- BOOT (Build, Own, Operate, Transfer)
Impact of Scope Definition on Effective contract Type

AMOUNT OF DEFINITION DEFINES NATURE OF AGREEMENT, regardless of FORM of contract signed.

Figure A2.4.1
<table>
<thead>
<tr>
<th>CONTRACT TYPE</th>
<th>OWNER</th>
<th>CONTRACTOR</th>
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<tbody>
<tr>
<td>- LUMP SUM:</td>
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<tr>
<td>- Fixed Price</td>
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<td>- Variable Price (indexed)</td>
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<td>- UNIT RATE:</td>
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<td>- Fixed</td>
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<td>- Variable - Quantity related</td>
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<td>- Variable - Price indexed</td>
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<td>- COST PLUS:</td>
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<tr>
<td>- Cost plus percentage</td>
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<td>- Cost plus fixed fee</td>
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<td>- Cost plus overhead plus fee</td>
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<tr>
<td>- Target Price with bonus</td>
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<td>- G.U.P.</td>
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</table>

The responsibility for EXECUTION of construction (or Design) always rests with the Contractor (or Consultant).

Responsibility for final cost depends on the type of contract.

Allocation of Cost Risk and Responsibility

Figure A2.4.2
## Risk Features of Contract Types

<table>
<thead>
<tr>
<th>CONTRACT RISKS</th>
<th>FIXED PRICE</th>
<th>VARIABLE PRICE</th>
<th>FIXED UNIT RATE</th>
<th>QUANTITY-VARIED UNIT RATE</th>
<th>INDEXED UNIT RATE</th>
<th>COST PLUS %</th>
<th>COST PLUS FIXED FEE</th>
<th>COST + OH &amp; FEE</th>
<th>TARGET PRICE + BONUS</th>
<th>O.U.P.</th>
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<tbody>
<tr>
<td>FINAL COST</td>
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<td>CHANGES</td>
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<td>DESIGN ERROR/OMISSION</td>
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<td>DRAWINGS DELAY</td>
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<td>CONSTRUCTION DELAYS</td>
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<td>CONSTR'N COST EXTRA</td>
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<td>FASTER CONSTRUCTION</td>
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<td>INCLEMENT WEATHER</td>
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<td>FORCE MAJEURE</td>
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<td>SOIL/SITE CONDITIONS</td>
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<tr>
<td>LABOUR DISPUTES</td>
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**EXPECTATIONS:**
- ○ = WORKS IN OWNER'S FAVOUR
- ● = NO ADVANTAGE EITHER WAY
- • = WORKS IN CONTRACTOR'S FAVOUR

**Figure A2.4.3**
The type of contract can be broadly grouped into **price-based** (Lump Sum and Unit Rate) and **cost-based** (Cost-Plus). A further breakdown is shown below.

**Lump Sum**
- Fixed Price
- Variable
- Guaranteed Upset Price

**Unit Rate**
- Fixed Rates
- Variable Rates

**Cost Plus**
- Percentage Fee
  - Fixed Fee
  - Target Cost

Selection of the most appropriate type of contract and the proper packaging of work to suit the requirements and circumstances of the project is important for effective risk management. This is rarely done well in the experience of the author. This process is an integral part of effective project planning. Consistent with the author's experience, industry leaders have commented on, and criticized, the planning process as not being done well. [Hartman and Grieef, 1991]
A2.5  Construction disputes: current practices

Partly because of the arbitrary way in which risks are addressed in the contracting process, and partly because of the confrontational nature of the process, contract disputes are frequent. Good information on the incidence of such disputes, their nature, and how they are resolved is not readily available.

Current practices for dispute resolution include the following.
- Litigation
- Arbitration
- Mediation
- Dispute Resolution Boards
- Negotiation

There is no information available on industry preferences for one type of resolution method over another, nor is there any reliable, quantified information on the actual relative usage of one method over another.

A2.6  Research and trends in contracting practices

Risk was identified in the literature review as an important issue. This facet of the construction business is actively being researched. There is growth in the use of risk analysis and management techniques, though it appears that this is currently restricted to the larger, more sophisticated owners. The cases quoted in the report by Thompson and Perry (1992)\textsuperscript{65} are a hypothetical 'New Industrial Plant' and 100 km of pipeline in the Middle East. The majority of risk quantification and management techniques used today have been in use since the 1970's. A highly acclaimed publication by the Association of

\textsuperscript{65} The report on Engineering construction risks, edited by Thompson and Perry, was supported by the Science and Engineering Research Council, UK.
Historically these techniques have been associated with very large high capital projects in specific industries such as defense, oil and gas, aerospace, and civil engineering." The author is aware of work being done by Shell Canada Limited and Esso Resources Canada in this area. Less sophisticated processes are used more widely, as is demonstrated by a paper at a recent conference in the United States, presented by a representative of one of the largest construction contractors in North America. Broad application of risk management in the North American construction industry has not yet happened. It is possible that this is due to a perception that risk analysis is either too complicated or too theoretical to be of value.

Research in the area of risk is also taking another direction in the development of tools such as DynRisk that combines influence diagrams with Monte Carlo simulations. Ward, Chapman and Curtis (1991) suggest that contractors could act as "quasiinsurers", and that the law and practice as it relates to the insurance industry should apply to the contract risk allocation process.

Contract Clauses need to be reworked on a contract-by-contract basis if risks are to be allocated on a rational and systematic basis. There is a reluctance to do this because often the contract clauses are tested through the courts, and the comfort of successful testing

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is lost if a reworded clause is substituted for a proven one. In this area, use of Artificial Intelligence would appear to have a natural application. Work in this area is being undertaken at the University of Salford. A draft working paper by Tetlow suggests that there is a potential application for this technology in the authoring of construction contract documents.70

A2.7 Future potential

The literature search, at this point revealed two significant gaps. There was a lack of quantified information on the incidence and impact of disputes, and an absence of information on the industry's attitude to current practices in contracting and dispute resolution. The research being undertaken in the important area of risk management is focussed on development of better risk modelling and assessment techniques, and on risk apportionment using contract clauses as a vehicle. The lack of broad application of risk management techniques in the North American construction industry remains a challenge. This challenge is the development of a workable, pragmatic approach to risk apportionment and a subsequent management process to mitigate the impact of disputes.

McKim's (1992) study of Canadian contractors suggests that the level of sophistication in dealing with risk is very low indeed. He suggests that the approach to risk is irrational.71 Certainly there are strong indications that the lack of sophistication of the significant majority of the construction industry is a barrier to implementation of effective risk management principles.


The development of a method for implementing more astute risk management is clearly indicated. Such a method must recognize, and address industry needs, and be responsive to the attitudes of practitioners to current practices in contract formation and dispute resolution.
CHAPTER A3.

DEFINITION OF THE PROBLEM

A3.1 Introduction
A3.2 The contract award process
A3.3 Contract Administration
A3.4 Litigation
A3.5 Complexity of construction disputes
A3.6 Alternate Dispute Resolution processes
A3.7 Completing a Contract

WARREN'S RULE:
To spot the expert, pick the one who predicts the job will take the longest and cost the most.
CHAPTER A3.

DEFINITION OF THE PROBLEM

A3.1 Introduction

The Business Roundtable defined the problem with contracts in North America in its report on cost effectiveness in the construction industry by stating that "the way construction contracts are written can add about 5% to the cost of typical projects." This report goes on to state that "the most successful contracts have at least one fundamental in common, whatever their precise form: thoughtful and meticulous preparation by the owner before the contract is let". This document concludes that savings can be achieved with more astute contracts. It does not, however, define "more astute" contracts.

The issue of risk and liability sharing in construction was addressed in some detail at a conference on the subject at Scottsdale in Arizona on January 24-26 1979. The papers presented at this conference demonstrated the different paradigms of the participants in construction projects. Casey(1979) identifies two precepts that are important to effective construction contracting, namely:

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(1) that all risks are rightfully the owner's unless transferred to or assumed by another party for a fair compensation; and
(2) that the principle guideline in demanding whether the receiving party has both the competence to fairly assess the risk and the expertise necessary to control or minimize it.

Strauss (1979) states very strong reservations to the contractor's argument that relieving the contractor of imponderable and uncontrollable risks will usually result in a lower ultimate cost to the owner. The reason for this is based on his experience in "too many situations involving contractors who having, either deliberately or incompetently submitted an inadequate bid, attempted to compensate by submitting every minor and insignificant deviation, whether detrimental or beneficial, as a claim for changed conditions".

At the same conference, Alldredge (1979) states that the owner assigns the responsibility to the designer to develop the project design and specifications within certain guidelines and to the contractor to construct the project within a given contract time and according to the contract documents. It is therefore the owner who has the best opportunity to control the results through effective design and construction management. It is also the owner that should, in the first instance, evaluate risks, and develop a strategy for managing them.

The foreword to the proceedings of this 1979 conference starts with the following words.

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"Extensive litigation, large claims, construction conflicts and long delays have been increasing at an alarming rate during the past decade. The trend is unmistakable and the dollar magnitude, work complexity and extended duration of performance of engineered construction exacerbates the problem. All parties - owners, designers, contractors, insurers, sureties - are being hurt."

That was some fourteen years ago. Today the same messages are being sent in both the United States and Canada. How much worse has it become during the 1980's? Rose (1991)\textsuperscript{77} refers to a ASCE report that claims that litigation costs, on a national average during the 1980's ran the cost of building up by 20%. Yet, to date, no effective process has been found to address this growing problem.

That the problem exists, and that it is broadly recognized, is clear from the literature. The cause of the problem is also recognized as being closely associated with the distribution of risk. The way in which construction is performed in practice suggests a distinct "pecking order" starting with the owner at the top, followed by the designers then the contractor and lastly, the subcontractors. This is partially recognized in law by the existence of construction lien acts. (Of interest, these are enacted at state or provincial level, not at a national level and are, at best, subtly different in each jurisdiction.) The court decisions over the past decade tend to ignore this, and assume equal negotiating power by both parties\textsuperscript{78}. What this has led to is a distinctly confrontational construction process where each party tries to protect itself, as best it can, from the others.


\textsuperscript{78} This observation was also made by one of the participants in the Industry evaluation of the proposed New Canadian Contracting method described in Chapter C.1.
The owner, who initially has all the risk for the project, tries to pass as much of this risk as possible on to other parties. Sometimes this process is, at least in part, controlled by the way in which the project is financed. Where the funds are public (tax) money, the process for award of contracts is fairly strictly dictated by a need for a perceived fair and politically correct competition. Where the funds are from a conservative lender or shareholder, a degree of certainty in the price of construction before the project is awarded may be required. Lump Sum contracts provide a perceived guaranteed cost and, often, a guaranteed delivery (or project completion) date. Reality suggests that these attributes of Lump Sum contracts are rarely met. More specifically, Thompson, Perry et al (1992) quotes a study of World Bank funded projects between 1974 and 1988 that showed that of the 1,778 projects reviewed, 63% suffered from cost overrun, and of 1627 projects reviewed for schedule performance, 86% were late.

The designer is delegated the responsibility to prepare a complete set of drawings and specifications that accurately reflect the intent of the owner, and which will meet all the safety and regulatory requirements for the proposed finished construction. This responsibility is delegated through a contract that, increasingly, is awarded on a competitive basis. The owner expects a quality design, so often the designers are prequalified, and only the prequalified designers are invited to bid. This process is intended to ensure that the design will be performed by a qualified designer at the lowest possible price for that design. Again reality and theory do not necessarily match. As a result of seeking industry input to this thesis, the Consulting Engineers of Alberta contacted the author. They are actively promoting "Qualification-Based Selection" as a means to avoid the downward pressures in fees that lead to inefficient engineering and resulting higher construction costs, errors and omissions and consequent litigation.

Contractors are delegated the responsibility to build the facility. They are also, increasingly, delegated risks that are beyond their control, because the owner does not want to pay any additional costs that may be associated with them, or the designer (who often prepares the contract on behalf of the owner) wishes to pass on the responsibility.
for errors and omissions to the contractor. The use of exculpatory clauses has grown, and with it has grown the tendency for contractors to seek alternative methods for recovering costs, other than a straightforward bid. The only real option is to claim for additional costs due to the actions or inaction, errors or omissions of the owner or the designer.

Some examples of such exculpatory clauses from recent contracts are quoted below.

"The dimensions and other information shown on the drawings are merely speculative. The contractor is deemed to have included for all materials and labour required to construct the facilities generally described in the contract documents."
[Source: Provincial Ministry of the Environment contract for construction of a wastewater treatment plant, 1990.]

"The contractor shall include for all the work shown or not shown on the drawings in order to complete the construction in accordance with the intent of the design."
[Source: Contract for Electrical Work for an expansion to an Art Gallery, 1991.]

Exculpatory clauses are discussed in more detail in section A4.2.2

The contracts themselves, and the tender processes combine to set a course towards conflict and mistrust on a construction project. Conflict arises out of the focus, implied in the contract wording and bid process, on protecting individual's positions. The owner is concerned with cost overruns and timely completion. The contractor will be concerned with profit and, possibly, reputation. The confrontational environment is potentially exacerbated by the tender process that encourages contractors to seek profit (or cost recovery) opportunities in the errors and omissions in the bid documents. Owners and
consultants are also known to hide information that may lead to a higher bid price.\footnote{Valbois Construction Corporation v. Sheppard Manufacturing Limited., Ontario Court of Queens Bench, 1988.}

A3.2 The contract award process

The intent of the tender process is to obtain the best competitive price for construction given the prevailing market conditions. What the process achieves is to obtain the lowest \textit{initial cost}. The difference between the original bid and the final cost on a typical construction project will vary considerably. Many experienced owners will allow a contingency over and above the accepted tender of 5\% or more.

The competitive tendering process that is common in most parts of North America happens as follows. \textit{This description is based on an educational video prepared by the Ontario General Contractors Association in 1990. It is typical of the author's experience in submitting bids on industrial, commercial and institutional projects.}

Bid packages are issued by the Owner, or by a Consultant on behalf of the Owner. General Contractors (G.C.'s) review the contract and then contact subcontractors who are going to bid on trade work. For many projects, between 80 and 95 percent of the work will be done by these trade contractors as subcontractors to the G.C. The G.C. will price the balance of the work and the "general Conditions" items. The General Conditions items include such elements as temporary site facilities, supervision, site safety, storage, bonds, insurances and the G.C.'s overhead and profit, though the latter may be distributed over other elements of the contract.
On the day that the tender is due to close, the G.C. will start to receive prices from subcontractors bidding on specific elements of the contract. Most of these quotations not only are submitted by telephone, but they are submitted at the last possible minute. This "eleventh-hour" process is the result of mistrust built up over the years due to contractors "shopping" subcontractor prices. The practice of price shopping, although frowned upon, remains common. "Shopping" is the practice of playing one subcontractor's price against another with the intent of obtaining an even more competitive price.

This practice exists between subcontractors and their suppliers and specialty trade contractors as well. Consequently, the subcontractor will not get its prices from such suppliers until the last possible minute, exacerbating the whole situation.

The prices that are received by the G.C. will often have a significant range. The challenge faced by the G.C. is in deciding which subcontractor price to carry in the bid. If the lowest bid is significantly lower than any other, the question remains whether that quotation is complete or not. Because of the time pressure, the G.C. may not be able to contact the subcontractor, alternatively other contractors who have also received that price may be jamming the subcontractor's switchboard (or often, telephone!) trying to obtain the same information. If the quotation is complete and the G.C. does not carry the price, it will reduce the likelihood of being the low bidder. On the other hand, the G.C. will not want to be the low bidder with incomplete subcontractor prices, or left with the prime contract and a subcontractor who refuses to do the work required for the price quoted because of some error or misunderstanding that could not possibly have been resolved before the G.C. submitted its tender to the Owner. This type of dilemma,
and many others all contribute to the G.C. adding contingency sums to the bid. These contingency sums may be optimistic evaluations of the potential risk. They almost certainly will be biased by the need to get work. The amount of the contingency will, in all likelihood, not be arrived at scientifically, but will be based largely on the knowledge and experience of the personnel involved in the decision as well as their "feel" for the marketplace.

G.C.'s often do not trust the majority of the subcontractors that are likely to bid to them on a project. At least they will not trust them with all the information that they really need to bid effectively. This information may include the detailed construction schedule, special ways of constructing the facility, or other information that the contractor feels will give it a competitive advantage. Releasing such information to subcontractors exposes the G.C. to having the information transmitted to its competitors. The result of this practice is that the subcontractor is pricing work on minimal information. In turn this results in contingencies being added that may or may not be justified. Ultimately, the cost of construction is increased as a result of the current competitive tendering process.

The contract, once awarded, is prone to confrontation as the contractor tries to protect its position, and the consultant and owner attempt to do the same. A process of dispute resolution should help to reduce the incidence of litigation. Finally, as the contract nears completion, final issues are raised that may or may not be legitimate. Some work may not meet specifications, some claims may not be resolved, changes are not finalized and so on. Completion becomes difficult to define, and this affects not only the contractor and subcontractors, but also the sureties and insurers that are involved.
Ahmad (1990) suggests that a decision-support model may be used by bidders in the decision process when considering a bid-no bid decision. The model presented is probably beyond the sophistication of most bidders in North America, other than the largest. This is recognized in the paper by a quote from a 1988 survey of the top 400 contractors in the United States (based on the Engineering News Record's top 400 of 1986). This reference identifies that "sometimes, these [bid] decisions are made without any reasonable basis, as evidenced from the findings of a questionnaire . . . ". Al-Bahar and Crandall (1990) also developed a risk analysis model that is both logical in sequence and uses a probabilistic approach to risk analysis. This paper also recognizes that risk management is relatively new in the construction industry. Further, it identifies two other problems: the lack of any significant data on which to base a probabilistic risk analysis process and the general absence of a risk management policy with most contractors. All of these points suggest that the industry is only now waking up to the need to manage risk more effectively. This is probably driven by a search for cost savings in the ferociously competitive marketplace created by the long recession of the late 1980's, and globalization.

A3.3 Contract Administration

Changes occur on virtually every project. The process for incorporating changes in the contract into the agreement between the owner and the contractor is normally stipulated in the contract. A common clause will state that the contractor will not be entitled to payment for any work done outside the terms of the contract unless a written approval (usually a Change Order) is obtained from the owner before commencement of the


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work. Common practice differs from the process that is required by the contract. Changes during construction often are instigated and the work undertaken without the proper contract change documentation in place. This can jeopardize the contractor's ability to recover the cost and delay associated with the change. This is a common enough problem that some attempts have been made by construction trade organizations to correct this.

Another administrative concern is the management of shop drawings. The purpose of shop drawings has been defined in different ways. One definition states that they are intended to allow the designer to verify that the intent of the design has been met by the contractor before fabrication, construction or assembly commences. Another interpretation is that the purpose of these drawings is to "illustrate the appropriate portion of the work, including fabrication, layout or installation details in accordance with the contract documents" - in other words a clarification tool for the contractor. Some of the issues that have grown around this include:

- the use of carefully worded stamps by the designers, to avoid any responsibility for the accuracy or correctness of the shop drawings that they review;
- the time required for turnaround of shop drawings by the consultant;
- the use of shop drawing reviews to redesign work, or to force the design responsibility onto the contractor.

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82 This is the essence of clause GC11 CHANGES IN THE WORK of CCDC2 - 1982, p 14. This is an industry-standard Stipulated price Contract, currently in use in Canada.

83 One example is the "Alberta Standard Guide for Change Order Procedures" prepared by the Alberta Construction Association in consultation with the Alberta Association of Architects and Construction Specifications Canada (Edmonton Chapter), 1982.


The costs associated with the litigation process are best illustrated by quoting from a report prepared by Fraser and Beatty, Barristers and Solicitors who practice in major cities across Canada. The cost of a $100,000 litigation is shown in a graph which is reproduced in Figure A3.4.

The results of a lawsuit are unpredictable. The litigation process dispenses judgments, not necessarily law or justice. Judgments are the opinion, suitably guided, of a judge. Hence the unpredictability of the process.
COST OF A $100,000 CONSTRUCTION LITIGATION

Cost x $100,000

NOTE: THESE FIGURES EXCLUDE $6,000 FOR TRANSCRIPTS AND $15,000 FOR EXPERT WITNESS FEES!

LEGEND:
1=Original Interviews
2=Drafting Pleadings
3=Affidavit of Documents
4=Witness and Expert Interviews
5=Discovery of Plaintiff
6=Discovery of Defendant
7=Interlocutory Motions
8=Preparation of Experts
9=Pretrial
10=Preparation for Trial
11= Trial

Minimum Probable Time (Months)

Lawyer's Time

Lawyer and Client Time

Figure A3.4
A3.5 Complexity of construction disputes

Unlike many other types of contract, construction contracts typically are complicated by technical issues, uncontrollable risks, the involvement of numerous organizations, both directly (such as owner, designers, contractors, suppliers, etc.) but also indirectly (such as regulatory agencies, governments, adjacent landowners, special interest groups, unions, etc.).

The most common types of dispute relate to delays, changed site conditions and the impact of changes in the work. The process of dispute formulation, negotiation and resolution is well documented and remains one of the most popular areas for continuing education in the construction industry.86 87 88

The technical issues in construction disputes are beyond the scope of this research. In the context of this research, however, it is important to identify the fact that complex technical issues arise related to design and to construction methods. This often requires the involvement of experts as witnesses in support of particular opinion. There is a shortage of well researched resource material that can be used in support of claims. One of the common areas of dispute is the loss of productivity that results from numerous factors such as changes, use of overtime, delay impacts, working in poorer than anticipated weather and differing soil conditions. For many years after its publication, the Business Roundtable Report on the impact of overtime on construction productivity formed the basis of many claims89. This has more recently fallen into disrepute as it became generally known that it was based on the findings on just one project!

87 Macklem, Douglas, Chair; “Avoiding and Resolving Construction Disputes”; Proceedings of Institute for International Research seminar, July 20 and 21, 1987, Toronto ON.

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Issues of "Industry Practice" and "Reasonableness" also lead to complications. Practices vary by location, union affiliations, and even sectors within the construction industry. To illustrate this, the trade unions in southern Alberta have negotiated two rates: one for commercial work and a higher one for industrial work. The reason for this is that in commercial work there is a greater continuity of work because contractors are able to keep tradespeople employed through on-going contracts. In the industrial sector, the large EPC contractors dominate. They can go from a construction labour force of zero in years one and five, to a peak of over 2,000 workers in year three, as a large refinery or pulp mill project reaches maximum construction effort. The collective trade agreements in Alberta are negotiated separately in the north and the south of the province. Alberta has a unique (in North America) agreement that allows construction firms to renegotiate rates on a project basis. Non-union and merit contractors also operate, each group with its own practices. Local union halls have different jurisdictional agreements between the trades. The fragmentation of the industry does not help in establishing any norms for "Industry Practice". Very strange practices have developed, and these practices lead to disputes at all levels of a construction project.

Resolution of disputes, particularly where "Industry Practice" is at issue, usually requires involvement of expert witnesses. This is costly and time consuming.

Another common issue is that of "reasonableness". This too is fraught with difficulties, as it is a matter of opinion. Again, expert witness often can play a key role in resolution of this type of dispute.

The growing cost of dispute resolution has generated a corresponding increase in the interest in Alternate Dispute Resolution (ADR) techniques.
Alternate Dispute Resolution processes

ADR has gained much attention over the past few years. Litigation costs make that process unpalatable for many industry practitioners. With costs as high as they are, even the winners of a lawsuit stand to lose after the legal cost has been deducted!

The following list of major ADR processes has emerged in North America.

- Dispute Review Boards
- Arbitration
- Mediation
- Negotiation

This list presents the techniques in order of increasing control by the participants. The techniques are outlined briefly below.

*Dispute Resolution Boards* are established in the contract. Their role is to hear presentations by the disputants on their position regarding the dispute, then to make a decision on how it will be resolved. Different rules have been established for selection of the board, how it operates and whether or not the decision is binding. If not binding, there are different rules for how and when the decision may be challenged.

*Arbitration* is increasingly being controlled by legislation. One or more arbiters are selected by the disputants, and the arbitrators then hear the evidence of the dispute. There is a strong trend towards use of court rules in these hearings and, increasingly, the courts in North America are treating arbitrator's decisions as binding and as enforceable as if they were court decisions. As with Dispute Resolution Boards, practices vary. The most common area for difference is in the selection process for the arbitrators, and in the number of arbitrators used, (usually one or three).

*Mediation* is, by definition, non-binding. The process is one of facilitating a difficult negotiation. There is a fast-growing interest in this option.
Negotiation is the first process used in resolution of any dispute. It needs no further explanation.

The literature in this area is extensive. What is missing from this is the frequency of usage of the different methods and any study on industry preferences for dispute resolution. Preferences and practice may not be the same because of the way contracts are written or because of unchallenged corporate policies and procedures.

A3.7 Completing a Contract

The problems associated with completion of construction contracts are not new. In Canada the recovery of statutory holdbacks by the contractor is governed by the lien act of the jurisdiction in which the project is constructed. Typically 10% (e.g., in Ontario) or 15% (e.g., in Alberta) of any progress payment is held back by the owner to protect subcontractors and suppliers from non-payment by the contractor. The contractor, in turn, holds back the same percentage from sub-contractors as protection for sub-sub-contractors, and so on down the contracting ladder. The release of this holdback is governed by statute. Typically the release is triggered by reaching a specific percentage completion of the Work. This percentage is normally estimated by the payment certifier. Consequently, reaching the required state of completion is a subjective judgment of the value of the work remaining, including the cost of outstanding work on deficiencies. This is such a significant and common area for disagreement that local practices have been documented in an attempt to standardize and rationalize the process. For example, in Alberta, the Alberta Construction Association in conjunction with the Alberta Association of Architects and Construction Specifications Canada (Edmonton Chapter) prepared the "Alberta Standard Guide for Take-Over Procedures" in 1980 (revised in 1984).
CHAPTER A4.

CURRENT INDUSTRY SOLUTIONS

A4.1 Claims avoidance strategies
A4.2 Contract terms
A4.3 Contractor Selection
A4.4 Contract Administration
A4.5 Legislation
A4.6 Litigation and alternate dispute resolution

BUCY'S LAW:
Nothing is ever accomplished by a reasonable man.
CHAPTER A4.

CURRENT INDUSTRY SOLUTIONS

The construction industry has been addressing the problem of low cost effectiveness for many years. The Business Roundtable Construction Industry Cost Effectiveness (CICE) Project started in the early 1970's and the work they reported on in the 1980's has been continued in North America, primarily through the Construction Industry Institute. The problems identified range from Management education and training to labour relations, and from construction methods to contracting processes. The CICE summary report identifies a number of solutions, and attempts to quantify the potential savings associated with them.

These solutions include the following:

- Improved contracts - 5%
- Constructability programme - 3 to 5%
- Effective cost control - 2 to 4%
- More effective planning and scheduling - 3%

Just these four major elements add up to between 13 and 17% of a construction project. Even if the savings are not cumulative, a substantial saving is potentially available. In December 1986, some three years after the summary report was published, a study was undertaken to determine the impact of CICE on the construction industry. The report was encouraging in some areas. Over 20% of the industry were implementing recommendations of CICE. Over half of these companies had already observed significant cost savings. Wide variations were observed in the way that these recommendations were being implemented. (This is not surprising given the fragmented nature of the industry.)
The industry’s largest owners and contractors provided the majority of programs for implementation of CICE recommendations, with a few programs reported by small companies. These programs ranged from detailed existing policies to future plans and a "cursory review of possible company action"\textsuperscript{92}.

If the "20% of the industry" referred to above was measured as a percentage of construction volume, rather than a percentage of the firms and organizations in the industry, acceptance of the CICE recommendations three years after their publication remains limited. The CII report does not clarify this, and it is generally vague in quoting statistics.

This chapter very briefly provides an overview of current solutions that exist in industry, and which are used to try to reduce the total cost of construction. This total cost includes the cost of contract administration, claims, litigation and general wastage that results from the present contracting processes.

### A4.1 Claims avoidance strategies

One of the obvious costs to the industry is that associated with disputes. Avoidance strategies are used to try to reduce this cost. The strategies fall into the following main types.

- Appropriate selection of the right contract type.
- Contractor selection based on capability and fit to the requirements of the project.
- Contract wording that eliminates potential disputes.
- Contract administration procedures that protect one or other party from being sued successfully.

These alternatives should be reviewed. They are discussed in the following sections.
A4.2 Contract terms

The terms of the contract are defined in part by the type of contract used, and in part by the specific wording of the contract.

A4.2.1 Contract type:

The Code of Hammurabi, in ancient Babylonia imposed absolute and unconditional liability on the design/builder (or the master builder of history). A quotation from this shows how the concept of passing liability on to the constructor has its roots deep in history.

"If a builder has built a house for a man, and his work is not strong, and if the house he has built falls and kills the house-holder, that builder shall be slain.

If the goods have been destroyed, he shall replace all that has been destroyed; and because the house that he built was not made, and it has been fallen in, he shall restore the fallen house out of his personal property.

If a builder has built a house for a man, and his work is not done properly, and a wall shifts, then the builder shall make that wall good with his own silver."

Liability was easy to assign where one party was responsible for all aspects of a project. It was during the Renaissance period that the Architect emerged and the Master Builder became the Construction Contractor. This divergence of roles has continued as the industrial revolution and technological advances have led to increasing specialization. This

specialization has, in turn, made allocation of liabilities and responsibilities amongst the
growing number of specialists much more difficult.

Construction contracts have been traditionally written by owners and their consultants
(Architects and Engineers). It is easy to understand how liabilities have been passed on
to the one party not represented in this process.

Contract types are selected with the intent of defending the owner (who normally does
the contract selection) from cost overruns. This routinely leads to the selection of price
based contracts. This type of contract has led to disputes where the project is not
sufficiently well defined through the drawings and specifications. Design/build and fixed
price EPC contracts were one solution used to address this problem by putting the onus
for definition of the design back on the contractor. This solution led to the problem of
adequately defining the scope and intent of the design/build contract.

Other solutions have also been tried, resulting in a plethora of choice of contract types.
The types of contract have probably helped in some instances, but the continued growth
of litigation in the industry suggests that no effective solution to dispute avoidance has
been found through these attempts.

A4.2.2 Contract wording:

The clauses in contracts offer another avenue for claims avoidance. These clauses are
usually added with the intent of eliminating the option to claim. This is done through a
number of clauses that have proliferated over the years. Some of these include the
following.

94: "Disclaimer Clauses Protect the Owner"; CCA National; February 1990, Front page headline and article.
Notice of Claim: this clause requires the contractor to give notice of an intent to claim within a specified time from the first occurrence of the incident that will result in the claim. Failure to submit a notice of intent within the time specified nullifies any affected claim.

Specific Exclusions: this type of clause specifically excludes certain types of situation that can lead to a claim by the contractor. Included in this type may be errors or omissions by the designers, delays in access to site, interference by other contractors and late delivery of owner-supplied equipment, to name but a few.

Exculpatory Clauses: This category goes further than the specific exclusions just listed. These clauses have been around for a long time. Some of the more common ones are the following:

- **No damage for delay** - This provision is intended to prevent the contractor from collecting monetary relief from the owner for delays caused by whatever event, including acts of omission of the owner or its agents.

- **No compensation for differing soil conditions** - this clause is very common in Canada. Different owners have varying solutions for achieving this objective. Some disclaim liability for the interpretation by the contractor of any supplied information. Others limit their liability for possible inaccuracies in the borehole logs. There are also those which shift the burden of both site and subsoil investigation onto the contractor, or simply furnish no subsoil information to any of the bidders.

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Quantity Variations in Unit Price Contracts - These are similar to other exculpatory clauses, and may accept liability if changes are significant (e.g., more than, say 25 percent), or else may shift the entire burden onto the contractor. A further variation is that the wording of the General Conditions (usually prepared by the owner) may not limit the owner's liability, while the Special Conditions (usually prepared by the consultant) do limit the liability. This is further complicated by the precedence of General Conditions over Supplementary Conditions in many government contracts while the converse is true of, say, the CCDC contracts.

According to Revay (1986), these clauses are often included without forethought or are carried forward from previous contracts. He goes on to say that discussion of such clauses usually ends up in heated arguments and total disagreement between owners and contractors.

Inclusion of such clauses can have extreme financial consequences. There are those who believe that such clauses are not enforced by courts. In Canada, at least, this is not true.97

A4.3 Contractor Selection

One of the other solutions to the growing incidence of disputes in the industry has been in the selection of contractors. Two factors are normally used in contractor selection: price and suitability. Price dominates the decision process, at times to the exclusion of contractor suitability.

Contractor selection, based on suitability for the contemplated work, is practiced most commonly by larger and more sophisticated owners. It is practiced in the private sector more commonly than in the public sector.

One process for qualifying contractors is to request an agreement to bond, to be included in the bid or to be submitted by a potential bidder to be considered for inclusion on the bidders' list. This document is issued by the contractor's surety. Often, the agreement to bond provides sufficient comfort to the owner that no bonding is requested. This saves the owner the cost of the performance (or other) bond. Sureties do not appreciate this practice!

In Canada the Canadian Construction Association provides a useful form for collecting pertinent prequalification data from potential bidders. Referred to as Form CCA 11, it requests, inter alia, the following information:

- CORPORATE DATA: Company registration or incorporation;
  Banker, Surety and Insurer;
  Corporate officers.

- FINANCIAL INFORMATION: Recent financial statement.

- CONSTRUCTION CAPACITY: Current workload;
  Construction Volume for past 5 years;
  Bonding capacity.

- RELATED EXPERIENCE: Similar projects constructed in the past;
  Recent and current projects, and when they will be completed.
-KEY PERSONNEL: Designated Project Manager;
Proposed Superintendent;
Other key personnel.

-OTHER INFORMATION: Current and past claims and litigation history.

This information is objective and useful in determining the suitability of a contractor to perform the work required. A shortlist of qualified contractors is selected using this or other screening processes. The shortlisted bidders are then typically asked to submit tenders for the work, and the final selection is made on price.

A4.4 Contract Administration

A number of techniques have been developed by contract administrators to reduce the potential for a claim. One is to include a standard item in weekly progress meeting minutes that confirms the contractor has stated that, to date, it had no cause for any claim. Once this pattern is established, it can often be made to stay, effectively reducing or eliminating the opportunity for the contractor to submit subsequent claims.

Another technique is to state that the request for additional payment has been received, that no entitlement is acknowledged, and that the matter will be resolved at the end of construction. At the end of the project, if the contractor persists in the claim, deficiencies, retained moneys and even counter-claims are used as leverage in negotiating a settlement.

A useful and constructive element in contract dispute avoidance is well maintained and complete records. These will include site diaries, correspondence, minutes of meetings, telephone conversion records, confirmations in writing of all instructions, weather records and site photographs or, increasingly, video recordings with commentary.
A4.5 Legislation

The various techniques used to reduce or eliminate disputes are confrontational and take advantage of the relative negotiating power of the owner and the contractor. Some more positive practices are appearing, but they are few and far between.

Lien acts have been legislated to protect contractors, subcontractors and suppliers from non-payment of sums to which they are entitled under the contract. The mechanisms used and rules followed in the implementation of this legislation vary from one jurisdiction to the next.

Most lien legislation requires that a lien claim be registered at the land registry office. Thus such liens become public knowledge. To preserve lien rights, legal action must usually be commenced within a specified time from the date of registration of the lien, typically 45 days. The number of lien actions continues to be high. Consequently, the number of legal actions commenced is high.

A4.6 Litigation and alternate dispute resolution

At the end of the day, the processes used to reduce disputes still leave a growing number of claims and lawsuits to be resolved. Their resolution is expensive, as may be seen from the costs discussed in Chapter A3.

In the event of failure to avoid a dispute, owners are increasingly turning to methods other than costly litigation to try to resolve differences. These methods have been described earlier, and include: Arbitration, Dispute Resolution Boards and Mediation. Increasingly, these resolution methods are written into the contract.
This review of current practices highlights a number of issues. The processes remain, to a large extent, confrontational. The approach excludes the contractor from formulation of the contract and often precludes contractor involvement, except in a passive role in formulation of contract administration procedures. The need for a better process for selection of contractors, formulation of contracts, and administration of the contract is strongly indicated.
CHAPTER A5.

INDUSTRY SURVEY

A5.1 Purpose of the survey

A5.2 Survey Methodology

A5.3 The Questionnaire

A5.4 Results

A5.5 Results Analysis

DUNLAP'S LAWS OF PHYSICS:
1. Fact is solidified opinion.
2. Facts may weaken under extreme heat and pressure.
3. Truth is elastic.
CHAPTER A5.

INDUSTRY SURVEY

This chapter presents the survey that was completed to start to fill some of the gaps identified in the literature search. The survey methodology and design are discussed. The results are presented, together with their analysis.

A5.1 Purpose of the survey

The four main gaps identified in the literature search are identified and highlighted in bold below.

The problem of inappropriate risk allocation in the construction industry is well researched\textsuperscript{98 99 100}. Yet, despite many publications on the topic, [1] \textbf{there seems to be a resistance to changing established practices}. This resistance manifests itself in the continued use of traditional contracting methods and in the face of repeated failures of the process and in increases of the incidence of litigation, yet any research on this phenomenon has not been published to the author's knowledge. Published literature does not address two other areas of importance for this research. There was a lack of information on [2] \textbf{the incidence and [3] impact of disputes}. [4] \textbf{Processes for effective and simple industry application of risk management had not been investigated in any detail}.

The main purpose of the survey was to identify possible causes for such resistance to change as well as trying to identify possible relationships between such causes and the
incidence of claims and disputes. A secondary aim was to verify the common impression that certain types of contract were used for reasons other than the appropriate apportionment of risk to the contracting parties.

Possible relationships between measurable circumstances and the incidence of claims and litigation were to be identified. The inputs of different professions were also to be explored to determine if such input had an impact on the potential outcome of the contracts they were involved in.

A5.2 Survey Methodology

A simple questionnaire was used to collect data. Graduate students on the Construction Contract Documents course at the University of Toronto acted as data collectors. To ensure consistent results and to minimize the potential for differing interpretations, each question was discussed in detail with the interviewers before they carried out the interviews. Sample questionnaires are included in Appendix A. The questions are explained below.

The questionnaires were completed by the students in meetings with the respondent. Personal interviews were encouraged primarily for educational purposes. However, for the purpose of the study, this approach also served to ensure that each question was explained to the person providing the answer, thus avoiding potential misinterpretation of the intent of the question.

Three types of data were sought and were identified as such on the questionnaire. DETAILS OF DATA SOURCE was a set of questions used to identify the source of information. CONTRACT INFORMATION questions addressed the types of contracts used. CORPORATE EXPERTISE questions identified the mix of professionals in the organization, and the type of expertise outside the organization that was used in contract
administration. The questions were designed to be easy to answer, and to fit onto one page. The "one-page" requirement was the result of a preliminary review with potential respondents who were reluctant to give too much time to the survey. An introduction, requesting answers to a one page questionnaire was found to achieve greater willingness to respond than other approaches that implied or stated a longer questionnaire may be involved.

A number of other issues were considered in the preparation of the questionnaire. These are discussed on the following pages. After the questionnaire design considerations described below, are the detailed descriptions for each of the questions.

The interviewers were all made fully aware of the purpose and intent of each question as described in section A5.3 details because a thorough understanding of the intent of the questionnaire was considered to be essential to the effectiveness of the study.

A5.2.1 Why a survey was selected as the most suitable vehicle for data collection.

The information being sought is not available through publications or through statistics gathered by government or other agencies. Nor was such information obtainable through vehicles other than either interview or structured survey.

Because of the sensitive nature of the information, it was decided that a personal contact would be more likely to generate a higher return as well as ensure that the questions had been correctly and uniformly interpreted. The sensitive nature of the information being sought mitigated somewhat against this approach. Few people, in the researcher's experience, admitted freely to the existence of a construction dispute because of the implied "failure" that such disputes often represented. However the need for clarity in explaining the questions and the potential for a greater response was considered more

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101 "Failure" here refers to uncoordinated drawings, contract inconsistencies, lack of foresight in planning or inadequate planning other similar factors which lead to dispute.
important than the latter. To obtain at least some feel for the accuracy of the responses, particularly to those which related to claims, two additional steps were taken.

First, a number of companies were interviewed where it was known that at least one lawsuit was pending. Second, different interviewers were sent into the same company, but on different occasions, and were asked to interview different people. Consistency in results would have provided some level of assurance that the answers were an accurate reflection of actual circumstances. In the event, in the two instances where it was known that a lawsuit was pending, only one of the respondents reported that it was involved in lawsuits, while the other reported that it was never involved in them. (The researcher's firm was the other party to the lawsuit and could thus verify their existence.) The numerical analysis of results was based on the value of responses, as it was not possible to evaluate the extent of the accuracy or voracity of responses. Interpretation, in the other hand, was based more on overall trends. This recognized that there was some error in the data. Statistical tests performed were limited for this reason. Data analysis is described in detail later in this chapter.

When two companies were interviewed twice, the results were also interesting. In both cases much of the information given by one representative of a company was significantly different from that provided by the other. In one of the two cases, the information differed because it was based on different divisions of the company, and in the other case no obvious reason for the differences could be identified. The implications of these findings are discussed in section A5.4.

Unstructured survey approaches were considered and tested on an informal basis. They were the foundation of the final design of the questionnaire. It was felt that the nature of the topic would lead the interviewer into a broad range of discussion at each interview, such that the collection of a cohesive set of data would prove to be difficult, if not impossible for the 40 to 50 interviewers who were to be involved in data collection.
The preliminary interviews also revealed a number of other issues that justified a more structured approach and which also suggested that a survey by interview would be appropriate. The two prime issues that led to this conclusion were: participants in the early discussion had differing definitions of the terms that were to be used (claim, dispute, project management, construction management, design/build, and so on); and the data being sought were considered by many to be both sensitive and inaccurate. The inaccuracy was a serious concern, as collecting such data would be an exercise in futility. Most practitioners appeared to not retain any precise statistics on the incidence of disputes and claims. Consequently the answers to the questions and thus the results of the survey were a good indication of the impressions of industry practitioners. Absolute facts on some of the topics surveyed were not available. The issue of data accuracy was further considered and the steps taken to obtain the best possible information are described in section A5.2.2.

A5.2.2 The survey methods adopted.

The four most important areas that needed to be addressed in the design of the questionnaire were:

1. How could information be obtained in areas where it was known that accuracy was unlikely to be available?

2. How should the questionnaire be structured physically, to facilitate the interview process without biasing the results?

3. Because of the strong opinions of the principal researcher, as a result of some twenty years in the industry, how could the wording of the questionnaire be structured to preclude influencing the survey through leading questions or other mechanisms?
How could the questions be asked to obtain the best and most consistent responses?

The question of accuracy of responses was dealt with through the use of percentages as the basis for collection of data. The percentages would all be based on as neutral and well-known statistics as possible. One statistic that is readily available to most participants in the construction process in North America is the value of construction that their company is involved in on an annual basis. For owners this is often the basis on which capital budgets are developed. For consultants and contractors this information helps them place themselves in the marketplace, relative to other participants or competitors. In surveys, respondents are expected to make judgments, or to provide information. The wording of the question has a significant impact on the result. As the information being sought was factual, but likely to have limitations on its accuracy, the approach to obtaining responses was to use informed people to collect the information by interview, using a questionnaire that was effectively a guideline for these interviewers.

Amongst the most common sources of bias in surveys are errors of central tendency or leniency. The halo effect is the effect of biases on survey results. There are methods (as prescribed by Guilford - Psychometric methods, McGraw Hill, 1954) that may be used to adjust the results of a survey to allow for these effects. Care must, however be taken in their use, to avoid worsening the effect of such adjustments. The simple tests on the accuracy of the data collected suggested that such biases did exist. This was reinforced through the preliminary informal discussions with respondents by the researcher, and are also supported by his experience. The impact of such bias is discussed in the analysis of the results in section A5.5.

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103 Ibid.
The second issue of the physical presentation and appearance of the questionnaire was not considered to be a significant one other than for the reason discussed earlier, namely the length of the document as a hindrance to obtaining the interviews and data required. Issues of layout are important if the respondents are expected to complete the questionnaire themselves. This was done in a few cases, but always with the assistance of the interviewer.

The layout identified the three segments of the questionnaire. Within these three segments, two questions could have had similar responses, and could have had an impact on each other, namely:

- Preferred type of Contract?
- Types of Contract Used?

To minimize the tendency to give the same answer to both questions, the first question was presented in open-ended form, and the second was asked as a percentage of total construction value.

The third issue had to do specifically with the possible bias of the researcher, and more generally with the reliability of the results. Sinclair suggests that the following criteria be used to obtain useful data about a subjective-environment system:

- Objectivity
- Quality of Measurement
- Validity
- Reliability
- Resource Availability

The first issue (objectivity) was addressed by independent interviewers. The second (quality of measurement) was achieved with quantitative data (i.e., numbers) rather than opinions wherever appropriate. Validity is a measure of the degree to which what is

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104 Gray, Morven; "Questionnaire Typography and Production"; Applied Ergonomics, Vol. 6.2, June 1775, p 81 - 89.

measured reflects the "true" situation. This was discussed earlier, in the introduction to this section and under the general topic of questionnaire format. Reliability was addressed by running the same survey using two independent groups of interviewers over two separate time periods. Whereas validity is to do with the accuracy of the method, reliability is concerned with internal consistency; thus the use of repetition was intended to test this issue.

Independent interviewers, using objective questions, collecting numerical type data wherever possible was intended to eliminate researcher bias. The number of respondents that any one interviewer could approach was also restricted to eliminate the impact of any interviewer biases. Running the survey twice with independent interviewer groups allowed a comparison of the results of the two data sets. Similar results would suggest that there was no significant bias introduced as a result of the process. The resources used were graduate students on a Construction Contract Documents Course at the University of Toronto (interviewers) and industry practitioners (respondents). The questionnaire results were used by the students in a separate exercise as a course assignment, though they were made aware of the overall survey, and the fact that the results of the individuals' interviews would be pooled by the author.

A5.2.3 Initial checking of data received.

The researcher's experience as both a consulting engineer and a contractor was consistent with the results obtained through the survey, in as much as:

- preferred types of contract and those used were not the same;
- there was a reluctance to admit to disputes; and
- the public sector tended to be more conservative than the private sector.

The construction volumes of some of the respondents' organizations were verified with published data.
The existence of specific lawsuits or other disputes was known to the researcher, and whether they were reported could be checked. For example, construction liens must be registered, and these actions are therefore verifiable. In a few instances they were checked for general consistency. Significant court cases are published in the Carswell Construction Law Reports, and where respondents who were named in such cases were identified, their response to the existence of such litigation was checked.

A5.2.4 How the survey was designed.

The survey document was set up primarily as a tool for the interviewer. The questions were grouped into three segments. The first segment dealt with facts relating to the respondent’s organization. Other than the questions relating to the incidence of claims, disputes and changes, all answers in this section were readily verified and were objective.

The second segment dealt with information on the types of contract used, and numerical answers were generally required. It was recognized that the percentages recorded here were likely to be subjective opinions of the respondent rather than hard statistics.

The final section dealt with the expertise available to the respondent’s organization. This information was collected in a variety of ways.

The types of questions were mixed in each section, to stimulate discussion for the student performing the interview, and so that the process of collecting the data was not "mechanized" to the extent that little or no thought was given to the responses.

The question types used were:

- open-ended questions for identification of the respondent, and where categorization would preclude some of the subsequent analysis options for the results of the survey;
- multiple-choice questions where the respondent was to be identified with one preselected category;
- Use of "standardized" (percentage of construction volume) numerical answers where data could be collected in this way.

A5.2.5 How the sample was chosen.

The survey was to test the opinions of the construction industry. Having selected the interview method for data collection, strict geographic constraints were effectively placed on the process.

The Toronto area was chosen as it was a clearly definable geographic area that was large enough to yield significant survey results. The area is one of the most representative of Canadian business. Other geographic areas tend to be dominated by a few specific industries (e.g., Vancouver with mining and forestry, Calgary with oil and gas, and so on). An added advantage was that the general framework of the construction industry was well known to the researcher.

A5.2.6 Questionnaire testing.

The questionnaire was tested in two ways: through informal application by the researcher in discussion with construction industry practitioners and through the graduate students who were to use the questionnaire, and conduct the survey.

In the questionnaire testing process a number of the questions were interpreted in different ways by test respondents. For example, the construction volume was taken as the fees earned by some consultants, rather than the value of the work that they designed and awarded construction contracts for. The latter interpretation is the intended one. This issue was clarified with the interviewers before they set about collecting the data.
Some respondents had difficulty in placing themselves in a specific category, where this was required. One respondent, for example was from a company that did design/build work, and did not know whether to identify as a contractor or as a consultant. A supplementary question was used to clarify this issue. The applicable category was the one for which the respondent entered into a majority of contracts. Thus if a design-builder was essentially a consulting architect or engineer, but did occasionally enter into contracts for design and construction, then that respondent would be classified as a consultant. If the same respondent entered into contracts for design of (say) $10 million worth of construction annually, but did $12 million worth of design/build contracts per year, then it would be classified as a contractor.

This testing process reduced the amount of potential error in the survey.

A5.3 The questionnaire

The questionnaire as finally developed was presented on one sheet of paper, and contained the following questions. The descriptions below formed the basis on which interviewers were asked to collect the information. Samples of this questionnaire are included in Appendix A as Figures AA1, AA2 and AA.3.

A5.3.1 Details of data source.

Following are the questions asked in this section with a brief explanation of the purpose of the question. The explanation was used where necessary as the basis for clarification in an interview.

1. The TYPE OF COMPANY identified whether the respondent was a construction owner, a contractor or a design consultant. If none of these categories was appropriate, an OTHER category was provided under which the interviewer could record the type of business that the respondent was in. Some 40 "other" respondents were interviewed. The
results from that part of the survey were excluded from the analysis as the background and involvement of such respondents in the contracting process were very varied. It was felt that too many variables would be introduced.

2. The NAME was used to identify the individual being interviewed. Because of the sensitive nature of the information, and because accuracy was required, this information was important to the survey where verification of apparent inconsistent data was required.

3. The POSITION identified the job title of the respondent. This helped in determining whether the respondent could reasonably have access to the information being solicited, and to obtain some indication of the function of the individual, and the extent of knowledge that was likely to be resident with that individual.

4. The COMPANY identified the name of the company for which the respondent worked.

5. The ANNUAL CONSTRUCTION VOLUME was used to record the volume of construction that was handled by the organization on an annual basis. In the case of consultants, this figure was intended to record the actual or estimated construction value of the design work undertaken, not the amount of fees received. In this way consistency between respondents from different company types could be maintained. The question was included to determine whether there was any correlation between construction volume and (a) the type of expertise the company retained (b) the type of contract preferred and (c) the incidence of disputes. As annual construction volume was a well understood and quantifiable item, this was to form the basis of a significant amount of data analysis.

6. The PERCENT OF JOBS WITH CLAIMS was perhaps the second most sensitive question in the questionnaire. All questions that requested an estimated percentage, were solicited on the basis of a percentage of the annual construction volume (see question 5 above).
7. The PERCENT OF CHANGES identified the extent, as a percentage of construction volume, that contracts changed after award.

8. The percentage WITH LEGAL ACTION was the most sensitive question in the survey. The intent of this question was to identify the extent to which the respondent felt it was involved in legal action resulting from unresolved disputes. Disputes were identified as issues which one party to the contract expected a change order to be issued, and the other party refused to concur.

Thus questions 6, 7 and 8 were connected. For this reason they were presented in a sequence that did not follow the natural progression, namely from change to dispute to litigation.

9. IS THE COMPANY Government/quasi government, publicly traded or privately held. These three classes were defined as such to cover the three broad types of ownership, and the extent to which they are audited and controlled or otherwise regulated.

10. NOTES could be taken at this point on any issue that the interviewer felt was relevant or of interest that came out of the first part of the interview.

A5.3.2 Contract information

This section of the questionnaire was intended to identify preferences and usages of contract types. The questions were as follows.

11. The PREFERRED TYPE OF CONTRACT was asked as an open ended question, as many different terms are used. The interviewer was to record the actual response to this question.
12. The TYPES OF CONTRACT USED identified the three most common categories of contract type, namely: Lump Sum, Unit Rate and Cost Plus. A fourth, open, category was also provided. The percentage use of each type of contract used (again as a proportion of total construction volume) was recorded.

13. The METHOD USED FOR AWARD was asked based on the three major categories: Open Tender, Invited Tender and Negotiated. These data were collected as a percentage of total construction volume. The purpose of this question was to identify possible relationships between contractor selection methods and the incidence of disputes or claims.

14. COMMENT... on other types of contract used in construction was included to solicit use of alternative methods such as design/build, Guaranteed Upset Price, partnering or the myriad of different options in use in the current marketplace.

A5.3.3 Corporate expertise

This section was used to identify the type of expertise available to the respondent to see if there was any relationship between this expertise and the contracting strategy used, or the results of that strategy.

15. The question WHAT EXPERTISE IS AVAILABLE IN-HOUSE, identified lawyers, engineers and architects by profession, and provided a general category of "Others". This last category was to accommodate such professionals as Quantity Surveyors, Cost Engineers, Project Accountants, Procurement Specialists and so on.

16. The EXTENT OUTSIDE SPECIALISTS ARE USED as a proportion of the number of contracts signed was asked, and broad categories (25% spread) were provided. The choice of percentage of contracts rather than percentage of construction volume was used purely for the pragmatic purpose of obtaining a response. The argument to support this
decision was that, based on an average contract size, the percentage would be the same, whether based on one criterion or the other, but the knowledge in the mind of the respondent would more likely be in the form of numbers or percentage of contracts for which such contracts were required.

17. The question IS THERE A TREND TO MORE SPECIALISED EXPERTISE? This was asked to identify the perception of the respondent to the growing (or reducing) complexity of the construction contracting process.

18. The question WHY? was asked to solicit specific reasons for this trend. It was asked as an open ended question to solicit a broad range of possible answers.

19. OTHER THAN LAWYERS, WHAT EXTERNAL EXPERTISE IS AVAILABLE? This question was intended to obtain a sense of the respondent's awareness of the specialist contract and construction services available, such as Quantity Surveying, Quality Assurance or Testing, independent Cost Engineering and so on.

20. The OTHER COMMENTS were solicited in this section as an open ended question, and to allow the respondent's comments to be added.

21. The SURVEY BY, and DATE were included to complete the questionnaire, and to identify the person who solicited the information so that queries on the data could be addressed to the right person.

A5.4 Results

The raw results of the survey were collected and summarized after the identity of the respondent was removed. This was done to protect the confidentiality of the information that had been collected. Many of the respondents preferred to remain anonymous.
The results of the survey are discussed below. The tables referred to in this section may be found in Appendix A.

A5.4.1 Respondents

In total 155 interviews of Owners, Consultants and Contractors were completed. Table A5.1 summarizes the type of respondent by business category and type of ownership. Tables referred to in this part of the thesis are located in Appendix A.

The respondents were selected by the graduate students who actually carried out the survey. A random selection was required, and this process was an effective way to achieve this. The students were directed to select one respondent each from three categories: Owner, Consultant and Contractor (or subcontractor).

That the majority of the respondents were from the private sector is not surprising, as most of the entities involved in Construction are privately held. Also not surprising is the absence of Government representation in the Consultant and Contractor categories. The low number of respondents in the Publicly Traded Consultant (2) and Publicly Traded Contractor (5) categories is also a reflection of the numbers of these companies which trade stock on the open market, compared to those which are more closely held.

The second highest business failure rate in North America is found in the Construction Industry, and it is second only to the Restaurant Business. The second highest incidence of litigation in North America is in Construction, which is second to Personal Injury cases. Both these ratings, are symptoms of the risks involved in the Construction

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106 Presentation by Fail Corporation executive, to Project Management Institute Toronto Chapter, 1990.

107 Canadian Dispute Resolution Seminar, Calgary, 1992.
Business, which, in turn is likely to be a reason for the low demand for such business's stock in the open market.

The definitions of the categories identified above is as follows:

*Private Ownership* means one or more individuals or companies own this business. The stock is not available for purchase on any stock exchange.

*Publicly Traded Stock* means that the company offers one or more types of share for purchase on the open market, and the business is therefore subject to the regulations and laws that govern such corporations.

*Government or Public Agency* means a government organization or one that is wholly owned or controlled by a government agency. (In Canada, an example would be a Crown Corporation)

An *Owner* is a business or organization that purchases design or construction contracting services for the purposes of developing or redeveloping physical facilities.

A *Consultant* is an individual or, more commonly, a business that provides design or other technical or management services to an owner for the purposes of constructing a new or renovated physical facility.

A *Contractor* is an individual or, more commonly, a business that provides construction services and materials for building or renovating a physical facility.

Table A5.2 shows the annual construction volume represented by the respondents.

The average reported volume of construction by category then becomes as shown in Table A5.3.
A5.4.2 Use of Contract Types

Tables A5.5, A5.6 and A5.6A compare use of contract types by different respondent types. This comparison was made to determine whether there was any possible preference for the use of one or other type of contract that may be related to the ownership of the respondent.

The possible relationship between use of contract type and other factors was further investigated by comparing the mean percentage usage of contract types by different respondent ownership categories.

The volume of construction awarded using different types of contract was examined to determine the incidence of disputes in each category. Two steps were required to complete this review. The first step was to identify from the survey, the construction value represented by each of the three dispute types broken out by type of contract. These figures are shown in Table A5.6. For the purposes of this discussion, "dispute" is defined as any changes, claims or litigation.

The significance of the information in this table is best realized when the data are presented as a percentage of the construction volume in each contract type category. This is shown in Table A5.6A.

The impact of having particular in-house expertise on the selection of contracts was also reviewed. The possibility that one or other type of professional, if employed by a respondent, may influence the selection of a particular type of contract was examined by extracting the volumes of construction awarded under different types of contract, by

\[\text{Mean percentage usage} = \frac{\text{average of percentage usage of a given contract type reported by every respondent}}{\text{percentage usage is calculated as the average of the percentage usage of a given contract type reported by every respondent in a given category. This statistic ignores the construction volume involved and consequently gives a more accurate picture of individual without allowance for weighting by volume.}}\]
category of professional employed by the respondent organization. The results are recorded in Table A5.7.

Table A5.7 shows total construction volume by organization employing a particular class of professional. To understand these figures, the gross figures should be divided by the numbers of organizations employing each type of professional. This will provide a volume of construction under each type of contract that is awarded by an organization employing a particular type of expertise. This is shown in Table A5.8.

Using the Chi-squared statistical test, demonstrates that the usage of contract types by organizations employing Lawyers, Professional Engineers and Other Professionals is similar, but the proportions for those Organizations Employing Architects differs from this pattern. This may be explained by the fact that Architects are involved in buildings - where the unit rate contract is rarely used - while the other professions are routinely involved in a broader range of construction projects. Some of the projects in this broader range will be for that type of work that lends itself to Unit Rate contracts because of the repetitive or linear nature: pipelines, road construction, power distribution (pylons), and so on.

The relationship between in-house expertise and other factors warranted further examination.

A5.4.3 Expertise Available to Respondents

Tables A5.9 to A5.15 compare the existence of different categories of in-house professionals (expertise) against a number of different factors. The first of these is construction volume. This was to determine whether there was any possible relationship between the volume of construction undertaken and the respondent's need for retaining specific in-house professional expertise.
Table A5.9 suggests that the need for in-house legal expertise grows with the volume of construction, while the use of other professionals does not appear to be connected in a significant way to the amount of construction undertaken.

The possible relationship between the type of respondent and whether a particular type of expertise is retained was investigated next. The survey information pertinent to this is presented in Table A5.10.

Immediately apparent in this table is the significantly higher tendency for Owners to employ lawyers, when compared to Contractors and Consultants. With the larger contract values for Contractors with Owners, as opposed to Consultants with Owners, the expectation that Contractors are more likely to employ Lawyers in-house appears to be met. However, these figures may have been influenced by the Ownership of Respondents. (E.g., there are no Government owned Consultants or Contractors in the survey population.) Thus a review of the possible relationship between Ownership and the employment of specific professional expertise was investigated.

This investigation required the comparison of Expertise Employed and Ownership of the respondent. The results are presented in Table A5.11.

The figures in this table suggest that employment of specific professional expertise, other than Lawyers, is not particularly sensitive to the type of ownership. The Government and Publicly Traded organizations are likely to be much larger. Consequently they are more likely to be able to afford to retain in-house legal council than the (generally speaking) smaller Privately Held companies. This is reflected in the approximately 4.5 times higher incidence of employment of lawyers in the former categories compared to the latter.

Some possible relationship may exist between the Contract Preference of a particular type of organization employing specific expertise, and the existence of that in-house expertise. The relationship between Contract types and Expertise also relates to this issue.
Table A5.12 presents the raw results of the survey. To understand these results better, it is interesting to review them as percentages of the column and row totals. These figures are presented in two tables (A5.13 and A5.14).

It was considered possible that the type of expertise employed could influence the method used for bidding. The pertinent information from the survey is shown in table A5.15.

**A5.4.4 Relationships between Dispute Incidence and Other Factors**

The existence or otherwise of some relationship between the incidence of disputes and other factors was considered important to understand to help identify a more effective method for contracting. One part of the definition of a more effective contracting method was one that resulted in fewer disputes. The following tables compare the incidence of disputes against a number of factors:

The first issue to be examined was the incidence of disputes in different annual construction volume categories. This is shown in Table A5.16.

The relationship between Contract Preference and the incidence of dispute was also investigated. See table A5.17.

The above table suggests that the Respondents who experience the most frequent incidence of disputes prefer Cost Plus type contracts. This should be compared with the incidence of disputes by actual contract types used (Table A5.6).

The potential for dispute should theoretically be higher if a totally unknown contractor is selected (Open Bid) rather than a known one (Invited Bid). Further, and on the same basis, the likelihood of dispute should be less if the contract has been negotiated rather than simply tendered. To determine whether this is the case, the following information was extracted from the survey.
If the total dispute volumes (annual construction volume x percent incidence of dispute type) are now divided by the total annual construction volume by bid type, the information in Table A5.19 emerges.

Interestingly, the results differed from those expected. The possibility still exists that other factors may influence the likelihood of disputes occurring. One such possibility is the existence, and therefore the affordable availability, of in-house expertise to prepare or defend against such disputes. This was investigated: see Table A5.20.

To understand the implication of the figures in this table, they should be divided by the total annual construction volume by type of expertise employed. This information is presented in Table A5.21. Other tables also contain relevant information that is discussed in further detail in section A5.5.

That there is a relationship between type of ownership and the existence of specific expertise on staff has already been determined. The relationship between type of ownership and the incidence of disputes was worth investigating. The relevant survey information is presented in Table A5.22.

**A5.4.5 Relationship between Respondent Type and other Factors**

A number of relationships between the type of respondent and other factors are worthy of review, to determine whether there is any influence on contracts and their outcome because of the impact of different types of ownership. These are reviewed below.

The relationship between the type/ownership of the respondent and the incidence of different types of dispute is shown in the following three tables (A5.23, A5.24 and A5.25).
The relationship between Contract Preference and Respondent Type is presented in Table A5.26.

**A5.4.6 Relationships between Various Other Factors**

Some other relationships were worthy of examination. These were the following.

Preferred Contract type v Contract Types used. (Table A5.27)

As with other tables, this one should be considered in terms of percentages of the column totals to have some meaning. This information thus becomes as shown in Table A5.28.

Preferred Contract Type v Bidding Method Used. (Table A5.29.)

The data in this table are more readily interpreted when the preferred contract type is viewed as a percentage of the total volume bid by bid method. This is presented in table A5.30. This table shows that the respondents who prefer Lump Sum contracts tended to negotiate in preference to using invited bidders, and used invited bidders in preference to open bids. The converse appears to be true of those respondents who stated a preference for Unit Rate contracts.

Another comparison of data collected in the survey was Construction Volume v Contract type used. (Table A5.31). This table reveals a consistent preference for Lump Sum contracts where the annual construction volume exceeds $20 Million. In the category that summarizes contract usage where the annual construction volumes are below $20 Million, this does not hold true, with a marked preference for Unit Rate contracts. No obvious explanation for this is offered. Some of the possible reasons may be: the use of Unit rate
contracts for site preparation and other smaller contracts, the possibility that smaller companies work on projects where this type of contract dominates, or possibly data error,

Following this result it is interesting to test whether a similar pattern exists for Preferred Contract type as opposed to the actual type used. This is examined in Table A5.32. The anomaly in the previous table does not appear in this one. The preference for specific contract types is fairly consistent for each of the categories of construction volume. An exception was the group representing greater than $100 Million in annual construction volume, where there was a noticeable preference for Lump Sum contracts with a corresponding reduction in preference for Unit Rate contracts.

To complete this area of review, a comparison of Bidding Method Used v Construction Volume was undertaken. This is shown in Table A5.33. This table shows a noticeable consistency between the use of different bidding methods used in all categories of construction volume. There is a perceptible trend to a preference for Open Bid as annual construction volume grows. To explore this further, and to determine whether this trend is connected to ownership, the comparison in Table A5.34 was made.

The significance of the data in the above table is most readily seen when the data are viewed as percentages of the column and row totals. These are shown Tables A5.35 and A5.36. Table A5.35 reaffirms that most of the construction volume represented in the survey was from the private sector. This distorts the results, so that these data add little to the findings of the survey. Table A5.36, however, shows that the usage of different bid methods is distributed quite differently between different types of owners.

The predominant use of Open Bid by the government sector is because of current public policy in Canada where the survey was conducted. Similar policies for public accountability exist across North America and it is therefore likely that a similar result would be obtained if the survey were extended to other parts of the continent. Of interest is the strong preference (83%) demonstrated for invited bidders by Publicly traded companies compared to a similarly high percentage (89.5%) for open bids with
Government agencies. The need for a degree of accountability is likely the reason for bidding rather than negotiating. However, this is tempered by a preference by the private sector to prequalify contractors, presumably to increase the likelihood of achieving the project objectives with a reduced risk of failure (performance, quality, disputes, etc.). The private sector has more freedom to act and this is reflected in the survey findings.

Significant findings from Table A5.37 (Percentage distribution of preferred contract type by Respondent Ownership) are the clear dislike for Cost Plus contracts by all respondents, with the dominant preference being for Lump Sum contracts. Unit Rate contracts are popular for repetitive and linear work, much of which is done by government agencies (Roads, sewers, etc.) The private sector and publicly traded companies also work in this area as consultants or contractors for such work or as owners - such as utilities (Power lines, Gas pipelines, etc.). Between Lump Sum and Unit Rate contracts, from 60% to over 80% of preferences are accounted for. The search for better ways of contracting has been going on for some time in North America, and a leading alternative is Partnering, or Strategic Alliances. This option and Design/Build contracts represent the majority of Other Types of contract, where such others were identified by respondents in the survey. It should be noted that this survey dealt with the prime (owner/contractor) contract and not with the subcontracts (contractor/subcontractor or supplier). The latter type of contract is almost invariably a tendered lump sum contract.

One other possible relationship was explored, namely Respondent Type v. Bid type used. This is shown in the Table A5.38. Interestingly this table suggests that Owners appear to prefer the use of Open Bid rather than negotiated or invited bids. On the other hand, both contractors and consultants appear to favour the use of Invited Bids. Given that all parties were from the same marketplace each group (owner, contractor, etc.) should, all things being equal, have demonstrated the same general usage (as percentage of annual group construction volume) of the different types of bid method. If the samples were representative of the industry, the proportion of construction that the owners completed using a given type of contract should be the same proportion that contractors and
designers worked to. This statement could equally be applied to table A5.4 where a more consistent result was obtained. Tables A5.4 and A5.38 therefore offer a good benchmark for determining the overall consistency of the survey results.

Using this as a basis for comparing expected results with actual, the Mann-Whitney confidence interval and test was performed on the datasets, as follows.

Construction volumes representing Lump Sum, Unit Rate and Cost Plus contracts were extracted by type of Respondent. A two-sample rank test was performed of the null hypothesis:

\[ H_0: \eta_1 = \eta_2 \]

Against the two-sided alternative hypothesis:

\[ H_1: \eta_1 \neq \eta_2 \]

The results showed that in six out of the nine comparisons, there was no difference in the tested populations at the 95% confidence level. In two of the other three cases, the difference in the populations was minor.

The same test was applied to the datasets that were created by extracting Bid volumes by Type of Respondent. In this case four out of the nine datasets showed that the populations were similar at the 95% confidence level. A further four demonstrated relatively small differences.

The significance of the relationships between different factors varies from "no apparent relationship" to "statistically significant relationship". The results of the study are not easy to interpret, as many relationships are closely interrelated. These and other issues are discussed in more detail in the next section.

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A5.5 Results Analysis

In this section the survey results presented in section A5.4 are discussed in detail and the relationships between different factors are examined. Finally the main conclusions drawn from this survey are identified.

A5.5.1 Review of Survey Results

RESPONDENT MIX: The majority of the respondents were from the private sector. This is not surprising as virtually all Consultants and most General Contractors are privately owned companies. There are two reasons for this. First, many of these companies are small and would not be of interest as an investment opportunity to the general public or major financial institutions. Second, these businesses tend to be not only high risk, but have few tangible assets. In the government sector, there are only Owners represented. In the smallest group (by ownership) are publicly traded companies, with the largest subgroup represented being owners. The dominance of contractors (by volume) in the sample is attributable to the fact that a number of contractors in the sample were working at a national or international level, and included that construction volume as well as the work in southern Ontario. Most of the Consultants had (or reported on) a more local market, as did the Government Agencies contacted in the survey.

CONSTRUCTION VOLUMES: The construction volumes reported by different Respondent groups reflected the same influences as did the respondent mix. The largest average volume was for privately owned Contractors, followed by Government Owners. The respondent groups were ranked in the following order (based on Average Annual Construction Volume:

- Private Contractor
- Government Owner
- Private Consultant
- Publicly Traded Contractor
- Publicly Traded Consultant
- Publicly Traded Owner
- Private Owner

There were no Government owned Consultants or Contractors.

The mean percentage use of the three major contract types shows a distinct preference for the use of Lump Sum Contracts by Type or Respondent (Owner, Consultant and Contractor) - Table A5.4, as well as by Ownership (Government, Publicly Traded and Privately Held) - Table A5.5. What makes this a surprising observation is the dominance of disputes (Defined as Changes, Claims and Litigation) in Lump Sum Contracts, when measured as a total volume - Table A5.6. This dominance is slightly modified when disputes are measured as a percentage of construction volume surveyed in each type of contract used. There is a clearly higher incidence of claims and litigation in Lump Sum Contracts, though the incidence of disputes including changes appears to be higher with Unit Rate contracts. This difference is likely to be attributable to the nature of the work that is usually performed under this type of contract that is specifically used where final quantities cannot normally be identified at the time of contract award. The higher incidence of changes is therefore consistent with its usage.

The possible relationship between usage of a particular type of contract and the expertise employed by the Respondent was investigated. (See Tables A5.7 and A5.8.) There was no discernible relationship. The preference for Lump Sum contracts was consistent regardless of the presence of one or other type of professional expertise. The only inconsistency observed was with respondents employing Architects. Here there was a skew towards a greater usage of Lump Sum contracts than with other Respondents, with a corresponding reduction in the use of Unit Rate contracts. This was to be expected as the type of construction for which Unit Rate contracts might be used would not normally require architectural input or expertise.

In table A5.9 the employment of specific types of professionals was reviewed to test whether there was a relationship with the annual construction volume. The results here were interesting. Engineers are employed fairly uniformly in the industry. Lawyers,
however, appear to be employed more by those Respondents who do a greater volume of 
construction annually. This is likely a reflection of the risks involved in the process. A 
principal role of the legal profession is to protect its clients from harm (which is 
synonymous with risk avoidance). The use of "Other" expertise (Quantity Surveyors, Cost 
Engineers, and other specialists) also grew with increases in the construction volume. This 
is likely explained in two ways. The first explanation is the same as that for the 
employment of Lawyers (see earlier discussion). The second reason may simply be that 
the respondents who did more construction employed more professionals generally in the 
business, and were therefore more likely to be able to afford to employ a broader range 
of expertise in this area. Finally, the survey revealed an interesting profile for the 
employment of Architects. Although overall, there was a growth in the employment of 
this profession as construction volumes increased, there was a sudden drop in the annual 
construction volume category that spanned $50 Million to $100 Million per year. The 
only rational explanation for this may be found in a review of the types of work that 
predominated in these ranges. This was not an issue that was surveyed, however, it is 
possible that the respondents who reported an annual construction volume in the $50 to 
$100 Million range were more involved in Engineering construction projects than 
Building construction and that therefore they would not require this expertise. Another 
explanation could be that the majority of respondents in this category were contractors 
who typically employed engineers more frequently than architects. This latter item was 
checked by reviewing the distribution of respondents in this category. Of the respondents 
in this category, 73% were Contractors. Owners and Consultants represented 15% and 
12% respectively. The latter explanation is, therefore, the most likely one.

The types of expertise employed by different types of respondent clearly warranted some 
further investigation. This was done in Table 5.10. This comparison of expertise employed 
by type of respondent showed that Owners employed the highest proportion of lawyers, 
with Contractors employing somewhat less than half that amount and Consultants half that 
amount again. Owners are usually the authors of construction contracts. Lawyers are 
normally retained to protect the interests of their clients. In this case: Owners. They are 
typically risk-averse, and the contracts used today reflect this. Lump Sum contracts have
not changed substantially since the second world war. Any changes have typically been additive, and have been made to further reduce the risks inherent in the construction process. That the Contractor group is the second largest employer of lawyers is possibly due to a response to the growing use of lawyers by Owners, and the higher risk of litigation that results. It is of interest to note that frequency of employment of lawyers by Contractors is half of that by Owners. The frequency with which Consultants employ lawyers is half again that number. The frequency with which a group employs a particular type of professional likely also has a connection with its size (as a business, larger organizations are more likely to be able to justify their employment). Professional Engineers are found in at least 72% of the organizations polled, with a slightly higher percentage - at 88.7% - for Contractors. Architects are mostly employed by Consultants, followed by Owners, with only a few being employed by Contractors.

Expertise distribution between different types of ownership is also interesting to observe. Table A5.11 shows that Government and Publicly Traded companies employ about the same proportion of Lawyers, and 4 1/2 times as many as Privately Held Organizations. This is certainly at least partly due to the size of the organizations. Privately Held companies tend to be significantly smaller than Publicly Traded ones or Government Agencies.

These two factors were compared to test the possibility that the type of expertise employed may have a significant impact on the preference of a respondent for a particular type of contract (Tables A5.12 and A5.13). The results were consistent with the expectations one might have after reviewing the results presented in Table A5.8. The strongest preference remained for Lump Sum Contracts. Also consistent with what one may expect, at this point in the review, is the analysis of contract type preference when compared as a percentage of the type of contract preferred. The most significant feature here is the zero-vote for Cost Plus (with its perceived or real risks) by Lawyers. Risk aversion is clearly demonstrated here.
Another comparison made was the use of different types of bid method against the expertise employed. Consistency between use of each of the three major bid methods and the types of Professionals involved was observed. In other words, the choice of a particular type of bid method did not appear to be affected by the type of expertise employed (see table A5.15).

The dominance of the incidence of disputes with Lump Sum contracts was noted earlier. The relationship of incidence of disputes to PREFERRED contract types (as opposed to the type used) was also investigated. Of interest is the higher incidence of disputes amongst those respondents who stated a preference for Cost Plus Contracts as shown in Table A5.17. This should be contrasted with the results shown in Table A5.7. Though the incidence of litigation was twice as high with Lump Sum Contracts, compared to when Cost Plus Contracts were used, and the incidence of claims is about 2.4 times as high, there remains a dominance in both usage of, and preference for, Lump Sum Contracts. A higher incidence of disputes was recorded where the preference was for Cost Plus contracts. This may well be the result of a recognition of the problems associated with the most used form of contract. This result indicates a strong shift towards a contract form which allocates risks differently (more equitably)?

The relationship between the incidence of disputes and the Bid Method used was also interesting. Changes and claims occurred as frequently with Open Bids as they did with Invited Bids, but litigation was almost twice as frequent when Open Bids were solicited compared to when Invited Bids were used. In comparison, Negotiated Bids had an incidence of litigation that was higher than Invited Bids, but lower than Open Bids. Invited bids also attracted the lowest incidence of claims and the highest incidence of changes. It is difficult to rationalize these results of the survey. This said, one possible explanation lies in the process of negotiation: frequently, in the researcher's experience, negotiations are fraught with miscommunications that are not discovered until the contract is being implemented, and these misunderstandings emerge. This would explain a high incidence of changes during the early part of the contract, hardening to a few claims and
a higher incidence of litigation as the parties' positions get more entrenched. This would likely be an interesting area for further study.

The incidence of disputes was also compared to the expertise employed. The results (Table A5.21) show that the incidence of any type of dispute appears higher if lawyers are employed than with any other profession. If the incidence of disputes involving respondents who employ lawyers is taken as 100%, then the relative percentage (ratios) of dispute incidence for other professions is as shown in Table A5.39. The figures in this table suggest a likelihood that employing lawyers will increase the probability that a dispute will occur. The likelihood of changes or litigation occurring appears to be lowest when Architects are retained, though the likelihood of a claim is almost as high as it is when a lawyer is employed. An almost converse pattern emerges when an Other professional is employed. No attempt has been made to interpret these results beyond that stated above. It would appear that any significant relationship between the presence of one profession or another on staff and the incidence of disputes is either extremely complex or nonexistent.

The incidence of disputes relative to the type of ownership was examined in Table A5.22. The results indicate a higher incidence of Claims and Litigation with government organizations than with the other two groups. This was potentially more significant than it first appeared, as the other two groups (Publicly Traded and Private) represent all three types of respondent, whereas the Government group is entirely Owners. A more detailed analysis was warranted, and this is shown in Tables A5.23, A5.24 and A5.25.

These three Tables deal with the incidence of Change, Claims and Litigation in turn. All three tables show the absence of government owned Consultants and Contractors. Thus a comparison of dispute incidence must recognize this. The incidence of changes amongst owners shows a high incidence of change with Publicly Traded Owners, and a lower incidence with both Government and Private Owners. Follow-up discussions with respondents and others suggest that this may be attributable to a distinct reluctance for Publicly Traded organizations to get involved in the costly litigation process. They are
usually able to settle disputes more easily because of leverage they have as a result of their long-term buying power.

An interesting exercise was to add the totals of all types of disputes by ownership and type, and to compare the results. This is done in table A5.40 for Owners. The figures in this table show that Government agencies reported a higher incidence of change to contracts than did Privately Held Owner companies, while Publicly Traded corporations reported the lowest incidence at just below 30% of their construction volume being effectively managed through the processes of change orders, claims and litigation! The comparable figure of 36.6% of construction for government agencies as reported through this survey is substantially greater than the figures reported by the private sector.

Comparable figures for Consultants and Contractors are shown in the two Tables, A5.41 and A5.42. Interestingly, Consultants reported a slightly higher incidence of dispute than did the Owners. A perception of a lower incidence of Litigation is also of interest to note. Contractors reported an even higher incidence of disputes than either Owners or Consultants reported. This may be attributable to a number of reasons. The survey gathered information that was to some extent subjective. Thus, one possibility is that Contractors are either more willing to identify, or else were more conscious of, disputes, so reported a higher incidence. This argument has some appeal, as it is consistent with prevailing attitudes that seem to suggest a degree of perceived failure by the Owner or it's Consultant implicit in changes, claims or litigation. It is the Owner and its Consultant(s) that define a project at the outset. If that project subsequently changes, this is seen as inconsistent at best, and a failure at worst. Many Owners' boards of directors (or equivalent) or other senior executives do not appreciate that changes are "normal" on construction projects that are exposed to all kinds of risks such as weather, labour disputes, availability of materials and much more. This lack of awareness raises performance expectations and reduces the permissible levels of contingency that are allowed by owner organizations. Follow-up questions on this topic, principally with Owners' representatives, suggest that the order of magnitude of an Owner's contingency at the time of construction contract award is between 5% and 15%. This figure does not
contrast well with the 30% to 36% figure reported above by Owners or the 44% figure quoted by Contractors.

Having identified a relationship between types of contract used or preferred and the incidence of disputes, it was interesting to look at the distribution of contract type preferences between Owners, Consultants and Contractors. This is shown in Table A5.26. The dominance of Lump Sum contracts is immediately obvious. The second obvious feature is the consistency of responses among the three types of respondent. Typically, all three types of respondent showed a fifty to fifty-five percent preference for Lump Sum Contracts and a twenty to twenty-three percent preference for Unit Rate Contracts. The other types of contract had a broader range of responses, with Owners and Consultants showing a more dominant preference for Other types (at about twenty percent), while Contractors possibly demonstrated their lack of control over the type and detail of the contracts they enter into, by dominating the No Preference group at almost ten percent compared to Owners who did not identify any lack of preference. Again, this is a likely reflection of the degree of control held by Owners over the process of selecting a type of contract.

The next comparison made was to check on the consistency between the type of contract actually used and the type preferred. This is shown in Tables A5.27 and A5.28. Again, the dominance of Lump Sum contracts is obvious. The latter of the above two tables compares actual to preferred contracts as a percentage of the actual type of contract used (by construction volume). This result is particularly interesting. It suggests a degree of resignation or disinterest in the use of any other type of contract by the users of Lump Sum contracts compared to a much higher interest in other types of contract by the users of Cost Plus contracts. Also of interest is an almost equal declaration of preference for Lump Sum and Unit Rate contracts by the users of Unit Rate contracts. This result supports the tendency towards conservatism in contracting which was observed elsewhere. It helps to explain the slow evolution of the contracting process in North America, particularly when compared to the development of other facets of the Construction Industry.
The relationship between contract preferences (a wish list for improvement?) and the type of bid method used was also considered important to investigate. The results - in tables A5.29 and A5.30 - were indeed interesting. Those who were able to negotiate contracts showed a stronger preference for Lump Sum contracts than (in descending order) those who used invited bids or those who used open bids. The exact opposite was true of the declared preference for Unit Rate contracts. The preference for Cost Plus or Other types of contract or those with no preference stated were all fairly equally distributed amongst the three bid methods used. One possible interpretation that may be placed on this result is based on the perceived risk apportionment differences between the types of contract and the bid methods used. Where a higher risk bid method was used there was a tendency to vote for a lower risk form of contract and vice versa.

The impact of annual construction volume on the choice or preference of contract type and bid method was investigated. The annual construction volume is an indicator of the experience and size of the respondent, as well as the amount of risk undertaken. Thus, any relationship between volume (and therefore risk and experience) would be of particular interest.

Tables A5.31 to A5.33 address these issues. In the category of respondents with an annual volume below $20 Million, the most common type of contract was the Unit rate contract. It is believed that this result from the survey may be the result of data error induced by Consultants responding to the relevant question concerning their own contract with the owner rather than the construction contracts that were used on the projects for which they provided design services. For this reason, the result has been ignored in this part of the review. Clearly this result has distorted some of the other findings. However, because the analyses were all in terms of annual construction volume, and this result is associated with consulting fees, the resultant distortion is considered to be relatively minor in the overall study.

The usage of Lump Sum contracts is highest, ranging from about 80% to just under 60%. Unit Rate contracts followed with between 15% to just over 30%. Cost Plus contracts...
were reported as being used in 7.6% to 12% of construction. A similar order was observed for preferred contracts. Other types represented between 15% and 27%, while between 3% and 9% identified no preferences.

Looking at bid methods as used by different respondents in the identified construction volume categories, showed a similar consistency across the board. Invited Bids were the most commonly used in each category (at between 42% and 62%). Second most common was Open bids ranging between about 30% and 40% of volume being awarded. Interestingly, negotiated contracts were most common with the larger construction participants (at over 20%), while respondents with an annual volume of less than $20 million used this method less than 9% of the time.

This last analysis led to the question of whether the use of one type of contract or another, or one bid method or another was based primarily on volume or risk, or whether the constraints imposed by respondent ownership played a role. The first issue has already been discussed (see references to table A5.5). The use of bid types by the different types of ownership showed a very clear pattern. Government used Open Tender almost exclusively and did not negotiate at all. Publicly Traded and Privately Held respondents used invited bids most frequently. As these latter two groups also included Consultants and Contractors who did work for the government Owner, the preference for Negotiated Bids by Owners in the private sector becomes more significant than that indicated by a superficial review of the results of the survey as shown in table 4.36. This picture is reinforced by the data shown in table A5.38 that shows the distribution of bid type used against type of respondent.

In summary, the following picture appears to emerge. Government Owners are constrained by a need to be not only fair to all, but appear to be so. Open bids and Lump Sum contracts appear to address this, regardless of the cost or the problems that may be associated with such an approach.
The suggestion that there are problems with such an approach is made because respondents who are not constrained in the same way are using different methods. Unlike the Government respondents, they are motivated to find more efficient methods as a result of their need to be profitable. Where risks are increased with one type of contract over another, there is a tendency to use a less risky process for tendering.

The relationship of disputes to contract types and to bid methods suggests that, in descending order of risk (i.e., most risky first) they are as follows:

<table>
<thead>
<tr>
<th>BID METHOD</th>
<th>CONTRACT TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Bid</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>Negotiated</td>
<td>Unit Rate</td>
</tr>
<tr>
<td>Invited Bid</td>
<td>Cost Plus</td>
</tr>
</tbody>
</table>

The relationship between the existence of Lawyers on staff and the higher incidence of disputes is likely related to the role of lawyers: we use legal advice in the preparation of contracts to reduce or eliminate risk. In today's competitive market this is more likely to lead to disputes than ever before. McKim\(^9\) suggests that the risk behaviour of contractors changes once a contract is awarded. This is certainly true at the superficial level. However, this conclusion is a bit suspect. If the Contractor's risk evaluation were wrong, it would eventually go out of business (and certainly they do from time to time). However, this is not the case, so some other factor must be at work. The author believes this to be a different type of risk evaluation before a contract is awarded to that which occurs after. The difference is not so much in the process - as suggested by McKim, but in what is being evaluated. Before submitting a bid, the contractor is aware that an overcautious approach will result in its price not being competitive. Thus, the evaluation of risk before submitting a bid is two-fold. The two questions asked are:

1. In what way am I exposed to risk?
2. In what way is the Owner exposed to risk?

---

The first question is related to the risks that the contractor assumes under the terms of the contract, and cannot pass on to its subcontractors. The second question relates to the perceived opportunity to make money on changes and claims. This is based on an assessment of the factors that affect this process. They included: completeness of design, degree to which drawings and specifications are inconsistent, who the owner and consultant (contract administrators) are, and experience with that particular form of contract.

A confrontational process that can easily lead to disputes and which is driven by a desire to "eliminate" risk by apportioning it to someone else regardless of the premium associated with that process, is what emerges. This is not a new picture, and dates back to the seventies.\(^9\)

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A5.5.2 Conclusions

A strong relationship was observed between the following elements. The relationship is discussed below and conclusions are drawn as to the reasons for the existence of such relationships.

The incidence of CHANGES in contracts was highest with Unit Rate type contracts. Unit Rate contracts are normally used where actual quantities are expected to vary or are unknown at the time of contract award.

The incidence of CLAIMS and LITIGATION was highest with Lump Sum contracts. Cost-based contracts attracted a lower incidence of dispute than Price-based ones.

The higher the annual construction volume of a respondent, the more likely they were to employ a lawyer in-house. The potential for dispute increases with construction volume.

Owners are more likely to employ lawyers than other respondents. This is normally because owners' business interests go beyond construction and often require legal advice in other areas of that business.

The incidence of changes, claims and disputes was higher with respondents who included lawyers on staff (as well as other professionals) than with ones that did not. There is a tendency to use resources that are readily available.

Government owned organizations had a higher incidence of claims and litigation than other respondents.

Lump sum contracts were the most commonly used and most commonly preferred. Price-based contracts strongly dominated over cost-based ones in both usage and preference.
A5.5.3 Implications drawn from the Survey Results

Analyzing the survey results has identified interesting relationships. The key to recognition of any pattern is to identify common issues. Contracts have been used to apportion risks. This is, perhaps, the principal reason for entering into a formal - and in the case of most Construction Contracts, a complex - contract.

As businesses grow, so the need, and indeed the ability, to retain in-house expertise grows. This is borne out by the relationship between in-house expertise and construction volume. More specifically, there is a growing use of lawyers as the volume of construction undertaken (and therefore the risk) increases. The legal profession fills an important role in the contracting process. This role has traditionally been that of protecting its client. The process of protecting translates quickly to eliminating risk. This helps us understand the relationships between in-house expertise (and lawyers specifically) and contract preferences.

As the need for additional protection in contracts has grown, this has led to the tendency to do several things. First, as the construction industry does not willingly embrace new ideas, changes to contracts have been made through the addition of terms and conditions to "established" contracts, rather than through a completely new approach. Second if a contract term has proven effective in protecting against a certain risk, then it is deemed foolhardy to change it. Many of the clauses found in the General Conditions of Contract in today's documents are the same or similar (but improved?) to those found in the contracts used shortly after the Second World War. Yet in the forty-plus years that have passed since then, there have been many substantial changes to both the construction industry and the construction process.

Some of these changes are tabulated below.
<table>
<thead>
<tr>
<th>Circa 1945</th>
<th>Circa 1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractors performed most construction with direct labour.</td>
<td>Most construction activity is subcontracted</td>
</tr>
<tr>
<td>Relatively few Regulatory requirements existed.</td>
<td>Regulatory requirements are burgeoning (environmental, public participation,</td>
</tr>
<tr>
<td></td>
<td>government approvals, etc.).</td>
</tr>
<tr>
<td>Most building materials were well understood.</td>
<td>New building materials and methods continue to be implemented (curtain wall</td>
</tr>
<tr>
<td></td>
<td>systems, HVAC systems, energy conservation, etc.).</td>
</tr>
<tr>
<td>Most design calculations and drawings were done by hand.</td>
<td>Computer technology affects most of the design process.</td>
</tr>
<tr>
<td>Building Technology was relatively simple.</td>
<td>&quot;Smart buildings,&quot; CTV, control systems, structural systems, communications</td>
</tr>
<tr>
<td></td>
<td>systems and other technologies continue to develop, some very rapidly.</td>
</tr>
<tr>
<td>Safety awareness was fairly low.</td>
<td>Safety standards and expectations continue to rise.</td>
</tr>
</tbody>
</table>

Table 5.5.3 - Changes in the Construction Industry.

These changes usually involve additional risks. Yet these changes are reflected everywhere except in the types of contract and contract clause used. One reason for this may be that legal advice considers risk as something to be eliminated by the author of the
contract. The author of the contract is invariably the Owner or someone retained by the Owner for the purpose. Many risks are identified and transferred to the contractor without the opportunity to evaluate the possible impact of passing the risk on in this fashion.

The impact of passing a risk on to a contractor can be measured directly in terms of the premium (or contingency) that the contractor carries for that risk. The process for quantifying the risk is not well understood, though some effort is being made to better understand how contractors evaluate risks [McKim 1992]. The mechanism for comparing the premium that the Owner would allow for the risk with that which the contractor would allow simply does not exist.

The competitive tendering process is not well understood by many owners and design practitioners (Architects, Engineers, etc., ...) though the result is well known. The process of collecting subcontractor prices and assembling a bid has evolved to what is described below. The end product is a last-minute delivery of the Tender Form by the contractor, minutes - and frequently seconds - before tender closing. This last part is visible and well understood. The lack of awareness of what precedes this was of sufficient concern to the Toronto Construction Association (an association of General and Sub-contractors) that they commissioned a Video in 1988, showing the process, so that the design community could appreciate some of the problems with the process.

The bidding process described in Section A3.2 is flawed. The survey findings reinforce this impression.

IN SUMMARY, we may conclude that a better process for construction contracting is required that addresses RISK APPORTIONMENT in four areas:

First, there is a high risk of corporate and personal incompatibility between participants if the contractor selection process is based on a random tendering method (such as open competitive bids based on price alone). This should be changed.
Second, today's construction owners tend to try to eliminate all risks, with no regard to the premiums associated with this exercise. *This should be changed.*

Third, conflict or disagreement on a construction project is common, yet the process for resolution through the courts or through arbitration is cumbersome and, indeed, risky in terms of the fairness of the likely outcome. *This should be changed.*

Fourth, the risk of getting timely payment of holdbacks and release of insurance and bonding obligations is high. *This should be changed.*

**A5.5.4 Areas for further study**

On the basis of the above, there is a need for a new approach to risk apportionment in the construction industry that will effectively reduce wastage that stems from the present confrontational process. Such a new methodology must address the issues of risk apportionment, dispute management and final close-out of a contract.

The writer undertook, as the main challenge of the research, to develop such a new methodology. This was done in three main steps. First a draft process was defined, with the input and assistance of selected industry practitioners. Next, this process was tested. Input from some 60 senior decision makers from industry was used. Finally, the proposed new construction process was modified, based on the input received. This part of the research is described in Parts B (the process) and C (the testing procedure and results).
PART B.

B0   Introduction

B1.   CHAPTER B ONE (The New Contracting Method)

B1.1  Background

B1.2  Proposed Method

B2.   CHAPTER B TWO (Evaluation: Participants and Method)

B2.1  Participants

B2.2  Process

B2.3  Analysis of Industry Evaluations

B3.   CHAPTER B THREE (Survey "B")

B3.1  Industry Input: Results

B3.2  Analysis of Survey

B1 + B2
PART B

INTRODUCTION

This part of the thesis presents the proposed new contracting method that was developed as a result of the work described in Part A. The new method of contracting presented in this part of the thesis was developed as a result of the literature search and survey described in part A. In addition to these findings, input was obtained from a number of individuals in industry with experience and expertise in the areas of bidding, contract administration and dispute resolution.

The process of developing the proposed new method is described. This is followed by a description of the process used to validate it.
CHAPTER B1

THE NEW CONTRACTING METHOD

B1.1 Background

B1.2 Proposed Method

MEYER'S LAW:
It is a simple task to make things complex,
but a complex task to make them simple.
CHAPTER B1

THE NEW CONTRACTING METHOD

This Chapter describes the background to the proposed new contracting method, explaining how this method was developed and the basis on which decisions were made in its evolution to a first draft. The second part of the chapter presents the proposed contracting method as it was presented to the construction industry for comment and validation.

B1.1 Background

It is worth reiterating some of the key findings of the work reported in Part A of this thesis. These key findings, which relate directly to the development of the new contracting method are as follows.

1. THE CONSTRUCTION INDUSTRY AS A WHOLE IS SLOW TO ACCEPT CHANGE. The impact of this finding on the development of a new way of contracting for construction materials and services was to try to (a) minimize the number of changes, and their impact on the construction contracting process and (b) to use new processes that had preferably been tried or tested independently by others, and found to work.

2. THE PREDOMINANT FORM OF CONTRACT IN THE INDUSTRY WAS THE STIPULATED PRICE OR LUMP SUM CONTRACT. This statement applies not only to the type of contract USED, but also to the type of contract PREFERRED. Thus, it would be prudent to avoid imposing a different, or any specific, contract form on the potential users of any proposed new process. The choice of the type of contract should depend on other factors that have an impact on the project, such as project requirements
for quality, schedule and cost, and on constraints that the Owner may have because of funding, or who the owner is.

3. BETWEEN 30% AND 40% OF CONSTRUCTION BILLINGS ARE PAID FOR THROUGH CHANGES, CLAIMS AND LITIGATION. Interestingly, these figures (for Canada) are consistent with, though lower than, the 20% surcharge on the cost of building in the U.S. during the 1980 due to the effect of litigation that was identified by Rose (1991). The survey suggests costs associated with "disputes" is approximately as shown in Table B1.1.

<table>
<thead>
<tr>
<th>CHANGE OR DISPUTE</th>
<th>Construction value per $ paid(^{1})</th>
<th>Median Percentage Incidence(^{2})</th>
<th>Overall Cost Impact (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change</td>
<td>0.70</td>
<td>12.0</td>
<td>3.60</td>
</tr>
<tr>
<td>Claim</td>
<td>0.50</td>
<td>17.5</td>
<td>8.75</td>
</tr>
<tr>
<td>Litigation</td>
<td>0.00</td>
<td>3.8</td>
<td>3.80</td>
</tr>
<tr>
<td>TOTALS</td>
<td>33.3</td>
<td></td>
<td>16.15</td>
</tr>
</tbody>
</table>

NOTES:

(1) Estimated cost of construction after paying for administrative, consulting, negotiating and other related, non-construction costs. Based on Bristow and Wise (1989).

(2) Taken from the pilot survey - see Table A5.16.

**TABLE B1.1 - Cost of Disputes in Construction.**

This finding suggests that one of the often-quoted reasons for preferring Lump Sum Contracts - namely that "you know what the job will cost before you sign the contract" - is perhaps not a valid one. This begs two questions. Why is so much money in construction managed through the relatively expensive and time-consuming processes of
administering changes and resolving claims and litigation? And why do we persist in the use of this type of contract when it regularly and clearly does not deliver the product for the originally tendered sum? The answer to these questions lies, in part, with the other findings of the survey.

4. THE PROCESS OF TENDERING CONSTRUCTION BASED ON COMPLETED DESIGN DRAWINGS PUTS THE EMPHASIS ON MINIMIZING PROFITS WITH NO CONSIDERATION FOR MINIMIZING THE LARGER POTENTIAL AREAS OF SAVINGS, NAMELY THE COST OF CONSTRUCTION AND THE COST OF ADMINISTERING THE CONTRACT(S) INVOLVED. To address this issue, the new contracting process would need to address ways of saving money through reducing the cost of both direct construction and contract administration.

5. MINIMIZING CONTRACTOR'S PROFITS, AND ASSIGNING MAXIMUM RISK TO THE CONTRACTOR THROUGH COMPETITIVE TENDERING AND COMMONLY USED CONTRACT WORDING CREATES A CONFRONTATIONAL AND NON-COOPERATIVE WORK ENVIRONMENT. This was considered to be a very significant contributor to cost inefficiencies in the construction industry. There appear to be deeply entrenched differences of opinion and a high level of mistrust between different sectors of the construction industry. This mistrust seems to translate into a reluctance to share information or to contribute cooperatively to the successful completion of the design and construction of projects. A new contracting method should address the relationships between contracting parties, by creating a more open working environment.

6. RISK IS TYPICALLY ASSIGNED THROUGH CONTRACTS WITH LITTLE OR NO ASSESSMENT OF THE FINANCIAL CONSEQUENCES OF THE DECISION. No mechanism exists for evaluating the risks assigned to contractors (or consultants) by owners, under the terms of the contracts that are used in the industry. A simple process for identifying such risks, and evaluating the premiums associated with carrying these risks, should form part of the new process.
7. TRADITIONAL DISPUTE RESOLUTION METHODS (CONSULTANT ACTING AS "ARBITER IN THE FIRST INSTANCE" AND LITIGATION) HAVE BEEN FOUND TO BE LESS EFFICIENT THAN SOME OF THE NEWER ALTERNATIVE DISPUTE RESOLUTION METHODS WHICH ARE BEING TRIED IN NORTH AMERICA. That early attention to disputes is more likely to result in a lower cost of resolution has been identified as a common experience. Where mediation is used in commercial disputes generally, and in the construction industry specifically, the success rate in North America has been very high\textsuperscript{111}. Inclusion of mediation as an integral part of the contracting process may lead to a lower incidence of formal disputes and litigation.

In the discussions with industry representatives that followed the analysis of the first survey and the findings of this study and the associated literature review, one additional item was commonly identified as a recurring problem in the construction contracting process. This is added here, as finding number 8.

8. CLOSE-OUT OF CONTRACTS WERE NORMALLY CONFUSED, MAKING IT DIFFICULT TO ESTABLISH START (AND HENCE END) DATES FOR WARRANTY PERIODS, AND END DATES FOR OBLIGATIONS OF INSURERS AND SURETIES PROVIDING CONTRACTOR'S INSURANCE AND BONDING FOR THE PROJECT. A "clean" contract close-out process would potentially lead to more efficient contract administration and potentially to lower premiums for construction insurances and bonding costs.

The above findings and the ways of addressing them that followed the findings formed the basis of development of the proposed new contracting method.

\textsuperscript{111} Canadian Dispute Resolution Corporation claims over 80% success to date in 1992. The Toronto Construction Association has used a voluntary Dispute Resolution Board to resolve disputes for several years. At the last check by the author, in 1992, they had failed to reach a resolution on only one case out of the over 100 that have been processed in the past few years.
To overcome the concern with change, the new contracting process suggests that no changes are made to the Owner's choice of type of contract or basic bid method. Instead, it is proposed that two other changes, of lower impact, are made. The first of these relates to the timing of contractor selection and the second relates to identification and evaluation of risks and the associated premiums.

One of the significant changes in the construction industry over the past three decades is that most contractors act more as brokers than direct-hire construction contractors. In other words, most contractors sub-contract the majority of the work, and manage the construction, rather than directly hire all the labour and procure the materials. This change has occurred in response to economic need. A stable workforce within a company is more productive than the random crews created by the need to job-hire labour. This advantage can be capitalized on by specialty trades that can maintain a smaller but more stable volume of work in a specific trade. This compares to the general contractor who normally bids a range of different types of project with a widely varying mix of trades required for each project. This would require constant hiring and firing if direct labour was used.

B1.2 Proposed Method

The proposed New Contracting Method was presented to industry representatives in a summary format that is included in Appendix B. Following is a more detailed presentation of this method that includes the key points made at a formal presentation to participants in the evaluation of this method.

B1.2.1 Introduction

The North American Construction Industry is very fragmented. As an illustration of the degree to which this is true, one can consider the different professional and technical associations that are part of the industry. Each province and state has its own Association for Professional Engineers and for Architects. Each Engineering Discipline has its own national association. Management of capital projects is the focus of such associations as
the Project Management Institute, the American Association of Cost Engineers, the Canadian Association of Management for Engineers and others. Specifically to do with the process of acquiring goods and services in the industry are associations (in Canada alone) such as the Canadian Construction Documents Committee (a national body), Canadian Construction Association, Specification Writers Association, Quantity Surveyors Association, Professional Purchasers Association, Logistics Association and, again, more! Add to this the numerous provincial Contractors' associations, specialty trade contractor associations and district or city construction associations. Then add other specialty groups such as national and provincial consulting engineers associations and it quickly becomes clear that there are many agendas and splinter groups in the business. Owners too have numerous associations. Locally in Calgary, for example, there are several, of which the Construction Owners Association of Alberta and the Building Owners and Managers Association are but two. (See also Section A2.2.) The challenge that this creates is that both communication and achieving successful input to any proposed change is extremely difficult. No "perfect" solution will be found. Even a compromise with input by most (all would be impossible or impractical) groups represented would be difficult. This attempt is being made at the "grass roots" level, with no specific organized group being represented in the preliminary process. Rather, input from selected individuals representing as many as practical of the different types of stakeholders was sought. The next step was to obtain the endorsement of the process by the major associations in the industry, as a consequence of the credibility of the participants who had been involved in the development process.

The construction industry in Canada lags behind that in the United States in addressing some of the key issues it faces today. In the U.S., the Business Roundtable and subsequently, the Construction Industry Institute has been actively researching potential solutions to problems in the industry. Symptomatic of today's challenges are the high incidence of disputes and litigation, the frequency with which construction related businesses are forced into bankruptcy, frequent cost and schedule overruns on projects and inefficiencies in design. Ultimately, owners pay for these problems.
The present method for awarding contracts is based on how the construction industry has traditionally operated. Many of the processes, contract types and clauses that are used date back to the 1950's with little change other than the steady addition of additional risks that have been passed on to the contractor by the owner and, in turn, by the contractor to the subcontractor and to suppliers. In today's construction business environment many of these processes and contract terms are inappropriate. This is because construction has evolved significantly over the past five decades. Most industry practitioners are aware of these problems and many have tried, with varying degrees of success, to find solutions. One of the biggest problem facing such pioneers of change has been the fragmented industry itself.

In the United States, the General Contractors and Consulting Engineers have addressed the apportionment of risk in their Publication "Owner's Guide to Saving Money by Risk Allocation"[1990]. They advocate a more equitable apportionment of risk, but do not present a process for achieving this. In the U.K. some significant work has been undertaken at UMIST, resulting in similar recommendations, though based on a more rigorous risk evaluation process [Thompson and Perry, 1992] [Thompson and Norris, 1993].

**B1.2.2 Objectives**

The new contracting process addresses three phases of construction contracting, and attempts to achieve the following.

*From an Owner's perspective*, construction cost savings resulting from: better designs, lower administration costs, fewer disputes, lower risk premiums and faster construction.

*From a Design Consultant's perspective*, lower design risks resulting from input from the General Contractor (and, possibly, selected subcontractors)*.
a better consultant and contractor selection process, less confrontation and improved profitability.

*From a General Contractor's perspective*, lower risk, better control over the construction process through input into design, greater profitability and better working relationships with not only the consultant, but also with subcontractors.

*From a subcontractor's perspective*, a fairer contracting process that reduces the need to assume inappropriate risks, increases the probability of timely payment, and allows for specialist input to the construction planning process.

The above is achieved by addressing four principal issues:

*First*, selection of the General Contractor is done at the same time as the Design Engineer, thus allowing shared input by designers and constructors to enhance constructability. The results of research in the United Kingdom at Loughborough University of Technology by Jergeas (1989)\(^{112}\) suggest that "we have less design difficulties in contracts where the construction process has been allowed to influence detail design".

*Second*, a process of identifying risk, and associating a premium with that risk, should allow the Owner to assess more objectively whether to assume the risk or pass it on to the Contractor.

*Third*, use of a pre-assigned mediator to each project, with defined guidelines for intervention, will help to identify and resolve disputes, or potential disputes, before they become too complex or confused through the passage of time.

Fourth, the completion of a contract should be "tidied up" by defining clearly what is required to meet the remaining obligations of all parties to a contract. In many instances, changes in circumstances, design or site conditions means that completion in strict compliance with the terms of the contract will be difficult and may even be impossible to achieve. Defining, or re-defining the remaining items to be completed as the project draws to a conclusion, allows all participants a cleaner and more cost-effective completion process. With a cleanly defined contract close-out, the date for completion can be clearly established, and thus the date for start of warranty periods can be established, and termination of insurers and sureties' obligations can be cleanly determined.

B1.2.3 Bidding and Contract Formation

At contract formation, the ground rules for the execution of a project are established. These rules determine the behaviour of the participants. Thus, defining the best set of rules serves the interests of all participants. Two of the major issues identified in the preliminary research were the inequities of risk apportionment in the construction contracting process and its confrontational nature. These two issues may be dealt with through modification of the bidding and contract formation process. In addition, the proposed changes can help to stimulate further constructive changes to the design-construction process.

Owners pay a premium to contractors for assuming construction risks. In turn, contractors often pay a premium to sub-contractors and suppliers for passing risks on to them. This can be demonstrated in two ways.

First, the contractors who survive, do so because they are profitable, and they are profitable because they are able to absorb losses incurred because of the risks they take. Unsuccessful contractors fail for two reasons: poor management or misfortune in the risks they assume (perhaps another type
of bad management). If the latter is considered, then the party or parties with which they are contracted at the time of their failure must bear the burden of dealing with the consequences. In any event, as most contractors survive, and as their income is derived from owners whose construction work they are doing, ultimately the owner pays these premiums.

Second, numerous examples exist in the industry of these premiums. In one day's discussion in Calgary, three examples were quoted of such premiums. The first involved a pump supplier who bid $1,300,000 to supply pumps to a public utility whose contract terms and conditions were particularly onerous. They would have quoted (and so stated in their bid) $1,000,000 had "industry standard" terms and conditions been specified. The contract was awarded to another bidder for $1,100,000. This represents a premium of at least 10%. In the second example, a General Contractor bid a construction package being managed by a multi-national engineering-construction contractor on a major industrial development. The contract terms allowed the engineering-construction contractor to interfere with, and delay, the General Contractor with no change to the fixed contract price. The General Contractor bid two figures: $5,600,000 based on the contract included in the bid documents, and $4,988,000 if that contract was replaced by the Canadian standard Stipulated Price Contract commonly referred to as "CCDC 2". In the third example, a gas pipeline company identified substantial savings achieved in their costs for pipeline construction as a result of removal of specific clauses from their contract, the principal one being that the contractor was no longer responsible for unknown ground conditions. The saving estimated by the owner was about 10%.
The confrontational nature of the contracting process has its roots in the continued efforts of owners to save money. Henri-F. Gautrin, in the foreword to a C.I.D.C. Report in 1991\(^\text{113}\) comments on this. The following extracts highlight the problem.

"All but one [heavy engineering companies responding to a survey] bitterly complained about the present system and type of one-sided contracts that Heavy Civil Construction firms are obliged to sign. The contracts, in the hands of greedy people, may lead the Heavy Construction Industry to catastrophe."

This attitude spills over to the design profession too. One of the constantly eroded areas is design fees. Many of the Consulting Engineers' and Architects' associations in North America are acutely aware of this and are actively battling to reverse the process. The way in which design fees are being eroded is as follows.

_There is a strong level of comfort associated with the process of competitive tendering. In order to tender design work competitively, many owners are prequalifying design firms, then asking them to bid on design assignments. The "logic" behind this is that all prequalified design firms can produce the same design product. Consequently, the designer that produces such a product at the lowest cost, offers the best deal._

What this argument misses is that to arrive at the lowest possible cost for design, several steps must be curtailed or omitted. Some of these include:

- design optimization, with resultant additional construction costs,
- design checks, with associated overdesign to compensate for potential errors,

coordination between disciplines, with resulting conflicts
and errors.

Clearly all these contribute to potentially substantial additional construction costs at the
saving of relatively small sums in design fees. This whole situation is exacerbated through
the expectations of owners for perfection in design and the litigious environment that
pervades the industry.

Confrontation grows out of the designer's defensiveness of its designs, particularly when
errors or omissions are identified by the construction contractor as part of a claim for
additional costs. The design consultant is often the "arbiter in the first instance" under the
terms of the construction contract and this creates significant potential for conflict of
interest. The significance of this becomes most apparent when reviewing the terms of
most Professional Liability (Errors and Omissions) insurance policies. These terms void
coverage if the policy holder admits to an error or omission without the express approval
of the insurer!

The potential for confrontation grows as a result of the bid process itself. This process
was described in Chapter B4. The opportunity for error is substantial. An adage in the
industry is that it is the contractor that made the biggest mistake that gets the job.
Sometimes this is indeed the case. And today, even more frequently than before, owners
insist on the contractor proceeding with the work, despite the fact that the error has been
discovered and declared before the contract is executed. The landmark case decided in the
Supreme Court of Canada, known as Ron Engineering, has set a precedent that
precludes a contractor from withdrawing from a bid in the event that an error is
discovered. Even where there is no error, the contractor is working with very small
margins. These margins are quickly eroded when things go wrong, as they often do. The
difference between profitability and loss on a project is so small that it must be

vigorously protected. The process of protecting profits routinely degenerates to confrontation as the contractor seeks opportunities for additional profits. Opportunity for additional profit depends on changes. Changes are created by the Owner, the Consultant and the Contractor. All such changes have the potential to attract either additional cost (with associated mark-ups for the contractor) or savings (suitably discounted by the contractor to preserve - or, indeed, increase - contribution to overhead and profit).

The New Canadian Contracting Method (NCCM) attempts to address the situation and problems described above. In terms of risk apportionment, a process is prescribed that will help the owner to identify the cost impact of assigning risks to the contractor. In terms of reducing conflict, and addressing the need for better relationships and improved constructability, a change to the timing of the bid process is proposed. This second change will provide some additional benefits that will be described below.

RISK APPORTIONMENT
NCCM introduces one additional step in the bid process. This step is to obtain opinion from bidders on the terms of the contract, and the perceived risks. Bidders will be asked to review the contract document, and identify the risks that they perceive in the document that they feel will increase the bid price. All such identified risks will be collected by the owner and included in the bid package. The bidders would then tender the work, based on the original contract, and offer a credit for each listed risk item should the owner assume that particular risk. Alternatively, they may be asked to bid the work as though the listed risks were excluded from the contract, and price the risks, if the owner decides to add them back in. The owner would also price the risks. This is readily done by asking: "how much am I prepared to pay to divest myself of this risk?" Particularly where the owner is a government agency, this owner's estimate can be made to serve as assurance to bidders that the process will not be manipulated by the owner in the contractor selection process. This is done simply by publishing this list after the tender closing but before bids are opened.
Once bids are received, the owner selects the contractor with the lowest combined base bid and risk premiums. In selecting risk premiums the owner uses the lower of the bidder's and the owner's premium. An example of this is presented below and in Table B1.2.
The following bids were received based on the owner's proposed contract with the identified risks removed, (referred to below as A to E):

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>BIDDER A</th>
<th>BIDDER B</th>
<th>BIDDER C</th>
<th>OWNER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Bid</td>
<td>$5,342,000</td>
<td>$5,298,000</td>
<td>$5,388,000</td>
<td>N/A</td>
</tr>
<tr>
<td>Risk A</td>
<td>$28,000</td>
<td>$0</td>
<td>$32,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>Risk B</td>
<td>$43,000</td>
<td>$70,000</td>
<td>$50,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>Risk C</td>
<td>$92,000</td>
<td>$123,000</td>
<td>$90,000</td>
<td>$45,000</td>
</tr>
<tr>
<td>Risk D</td>
<td>$30,000</td>
<td>$28,000</td>
<td>$5,000</td>
<td>$200,000</td>
</tr>
<tr>
<td>Risk E</td>
<td>$2,000</td>
<td>$44,000</td>
<td>$7,000</td>
<td>$0</td>
</tr>
<tr>
<td>Lowest Risk Value</td>
<td>$138,000</td>
<td>$183,000</td>
<td>$100,000</td>
<td>N/A</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$5,480,000</td>
<td>$5,481,000</td>
<td>$5,488,000</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Table B1.2 - Tender Analysis Example**

Based on the above, contractor A would enter into negotiation based on the bid documents, and changes to the original contract such that risks A, C and E would be assumed by the Owner and risks B and D would be assumed by the contractor for an additional premium of $138,000 on the "risk free" bid of $5,342,000 for a contract sum of $5,480,000. The only item to be negotiated would be the wording of the clauses that assign the identified risks to the appropriate parties. This negotiation also serves to clarify and reaffirm the intent of the risk assignment.

With the use of the above method, the owner's contract can be developed over time to reflect the most likely outcome of risk assignment. At all times, the owner can make an
informed judgment of the best way in which to manage contract risks. The contractors all benefit from the reviews of other bidders in identifying potential risks, and can then make a business decision and evaluate the likely impact of taking the risk, and the sort of premium that may be associated with it.

BID TIMING
With the relatively rare exceptions where the General Contractor does the construction using its own equipment and direct labour, the work is done by trade specialty contractors who subcontract to the prime Contractor. In typical Industrial, Commercial and Institutional Construction, between 80% and 95% of the work is performed by specialty trades. If any work is done directly by the General Contractor, the chances are good that this will be concrete forming and placing as well as miscellaneous general labour tasks.

Thus, it is common to have subcontractors bid on specialty trade work to the General Contractors who are bidding the Work to be performed under the Contract. The problems associated with this process stem from the process itself. Mistrust, built up over the years means that the trades and the General Contractors communicate as little, and as late, as possible during the bid period. The fact that several contractors are bidding means that the trade contractors must submit their bids to all those contractors with whom they want to work. They may also submit bids (albeit higher ones) to the General Contractors with whom they do not wish to work.

The result of this process is that trade contractors' prices are usually submitted based on little or no information from the General Contractor as to how the work is planned. Further, the prices are submitted so close to the final tender submission time that the General Contractor has little or no time to evaluate the bids and make sensible decisions as to which bid is to be accepted. This, in turn, results in an arbitrary trade contractor selection process. In turn, this means that companies that have a history of animosity or competition between each other on other projects may be forced to work closely together
on this one. These types of factors add to the confrontational and non-cooperative nature of the business and foster disputes and litigation.

The most common tendering practice in North America remains that the contractor is selected based on competitive bids based on completed working drawings. There is considerable "comfort" associated with this. The traditional arguments being that:

- the project is fully defined,
- the owner benefits from receiving a firm and final price, so knows what the project will cost before committing to the construction cost,
- competitive prices are obtained.

The traditional approach, however, does not consider some important facts about the way in which the industry actually operates. First, due to growing pressure on design fees, the quality and completeness of design documents is deteriorating. Second time pressure on projects is increasing because return on investment is affected by carrying costs, and a significant part of those costs will have been incurred by the time land has been acquired, regulatory, zoning and other processes have been undertaken and design has commenced. Further, litigation, disputes and claims represent a significant portion of construction costs. Consequently, the bid price for a contract may be no indication of the final cost of construction. Finally, constructability has been identified through many studies as a significant contributor to construction cost reduction. The best way of implementing a constructability programme\(^{115}\) is to involve the constructor in the design process (Jergeas, 1989).

If the prime contractor is appointed at the same time as the design consultant for the working drawings and specifications, some of the above issues are addressed. Furthermore, they can be addressed without significantly compromising the competitive tendering process. This is done by following the steps described below.

\(^{115}\) "Guidelines for Implementing a Constructability Program"; Construction Industry Institute; The University of Texas at Austin, July, 1987.
Select a contracting strategy. This may be done by the owner alone, or with professional advice if the owner is not involved in the construction process often enough to justify in-house expertise. Many owners, such as government agencies, are constrained in the options that are available to them. Constrained or not, a strategy for contracting should be developed that reflects the needs of the owner and the circumstances of the project. There are two elements to a contracting strategy: the scope of work and the type of contract. The scope of work (or contract packaging) defines what is to be done under any one contract. For example, the owner may choose a turnkey contract that includes design, procurement and construction as well as commissioning and training of operators. Another example of a "complete service" contract is a lease-back that is common for buildings. In this type of agreement the owner contracts for the design and construction of a building as well as the financing. The second element to the contract is the type of contract. This will range from a price-based contract such as Stipulated Price (the contractor takes all cost risk), to cost-based contracts such as Cost Plus Fixed Fee - where the owner takes an increasing amount of cost risk.

Once a strategy has been determined, the principal companies (or individuals) who will participate in the construction project should be selected. To help make the project a success, this group of companies and individuals should work as a team, rather than in the more common mode of confrontation. To this end, the team should be selected on a basis that goes beyond that of apparent cost, or initial price.

The term "apparent cost" is used to refer to the results of competitive tendering. The low bid is rarely a reflection of the final cost, as it is frequently increased by changes, claims and litigation (estimated at 35%- 45% in Canada - see Chapter A5). This spread between apparent cost and final cost leaves much room for selection of contractors for design and construction on a basis other than bid price. It is relatively rare that design or construction bids have as large a spread as 35%. So, potentially, the highest bid may even relate more closely to the final cost than the lowest one!
Select a General Contractor. Selection of the General Contractor, like the selecting of the Consulting Designers (Architect and Engineers) should follow a process that helps the owner to build an effective team. Selection of designers is increasingly done on the basis of design fees (see Chapter B1.2.3 above). Just as this is inappropriate because the savings achieved in selecting the cheapest designer are likely to be eclipsed by the additional cost of constructing an inadequately designed facility, so the savings achieved by selecting the cheapest contractor may be more than negated by the resulting claims and litigation. Contractor selection could be done in a more astute way.

This "more astute" method of contractor selection is accomplished in three recommended steps. First, prequalify the General Contractors. Second, identify construction contract risks. Lastly, bid the work, and negotiate the final contract to assign risks on a commercially sensible basis.

Prequalification of the Contractor allows several things to be achieved. First, the process is much cheaper than bidding, and so reduces the overall bidding cost to general contractors who are unsuccessful in securing the work. Second, the prequalified bidders will have been selected on the basis that they are competent to perform the work. Third, and particularly important in a recessionary economy, the number of companies who are involved in the bidding process is limited to a manageable number. This is important for the rest of the process.

The prequalified contractors are then asked to review the proposed construction contract, and identify the defined or implied risks in the contract that are likely to increase the price of their bid. These risks are consolidated on a list that is issued with the bid documents. The bidders then submit a construction services bid which identifies these risks and adds a premium for accepting each of the risks on the list. This process is described earlier, with an example. The bids for construction services will cover the following items for a stipulated price contract: Contract General Conditions, Contractor's Overhead and Profit and the cost of services to be provided during the design phase. The owner then selects the successful contractor on the basis of the best price, and distribution
of risk, together with whatever other factors may be important to the owner. The other factors that are considered in the selection process should be clearly identified in the bid documents. (In Canada, because of the impact of the Ron Engineering Case, these factors MUST be identified.) These factors could include matters such as:

- past claims history,
- proposed construction schedule for this project,
- selected key personnel,
- use of own equipment,
- proposed construction methods,
- experience in working with other team members (e.g., Consulting engineers),
- references from past clients, and so on.

Once the contractor has been selected, the design should be developed by the consultants with input by the contractor.

*Develop the design.* Development of the working drawings is an important step in the construction process. It is at this stage that significant money can be saved through constructability reviews, selection of the best materials (as a balance between function, price and availability, rather than function alone) and effective cost control through ongoing estimates of the final cost of the work. Changes to the design to meet cost constraints are significantly more cost effective at this stage than after the actual construction work has been committed to.

Once the design is sufficiently complete, trade packages can be defined and the subcontractors' work can be tendered.

*Select the Subcontractors.* The process for selection of the subcontractors is similar to that for selection of the general contractor. The key difference is that the Contractor works
with the owner and the designers in prequalifying the trade contractors and in the final bid analysis and selection process.

Through the revised bid process described above, it is expected that the owner will benefit from a better design and fewer changes for reasons beyond the owner's control. After this stage is complete, the contract administration process could follow that which is traditionally used in the industry. However, the new method for contracting suggests a change here to reduce the incidence of disputes and litigation.

**B1.2.4 Contract Administration**

Two significant changes are proposed for administration of contracts. Both are used in industry today, with success. The New Canadian Contracting Method advocates their use on all projects, because of their demonstrated success, as reported by practitioners (discussions with users of these methods and the author).

The two proposed changes are (1) an effective 'Kick-off' meeting and (2) the use of a third party mediator throughout the construction process, rather than just when problems have already occurred.

An effective Kick-off meeting serves one primary purpose. The key processes and procedures that are to be used in the administration of the contract are discussed and agreed. They are usually covered in the contract, but what is written in the contract, what people have read and what people understand is often different. Some of the key items that should be discussed in this forum are those which frequently are abused by the participants. This would include the following.
- Payment Applications.
- Timing of Payments to the Contractor and to Subcontractors.
- Work Stoppages.
- Decisions by the Owner where they materially affect the progress of construction.
- Management of Changes.
- Resolution of Disputes.
- Shop drawings: expectations, processing, and turnaround.

The intent of the Kick-off meeting is to ensure that all participants have a clear understanding of the rules. Such a meeting would be attended by representatives of the owner, the design consultants, the general contractor and all the subcontractors. If the meeting size is too unwieldy, two such meetings would be held with the same agenda and all participants would be issued with the minutes of both meetings.

The second change involves use of a third party mediator. Both "third party" and "mediator" should be defined. A "third party" is someone who is independent of all the other participants in the process. Payment to this person would be by the owner. Ultimately, the owner would pay this cost anyhow, whether directly, or indirectly through its contracts with the other parties. A 'mediator' should not be confused with an arbitrator. The role of the mediator is to help the participants in resolving disputes by facilitating the resolution process. An additional role of the mediator in the proposed model for contract administration is to identify potential problems before they become major issues, and to help the parties in addressing them. The parties to the various contracts should, wherever possible, be people with the authority to resolve contract related issues. Keeping control
of the outcome of such disputes with the disputants is the intent. It is believed that such a process is more conducive to effective on-going business relationships.\textsuperscript{116} 117

B1.2.5 Contract Close-out

Despite effective administration, the physical (and contractual) process of completing a contract tends to be made cumbersome. The process of completing a construction contract involves a number of steps. These are:

*Complete Contractual obligations*
- Complete deficiencies;
- Deliver required spare parts, and as-built drawings.

*Complete Contract Documentation*
- Deliver specified User manuals;
- Hand over warranty documentation;
- Construction Lien release (where permitted by law).

*Complete handover to Owner*
- Commission the facility;
- Complete physical handover to Owner;
- Release of final payments and holdbacks.

The above steps are described in detail in several books and manuals.\textsuperscript{118} The most significant problem associated with this part of a construction contract is obtaining agreement on what needs to be done. Deficiencies are argued about (are they adequately


completed, are they really deficient, etc.). Payments are not released. The contract requirements cannot always be met practically because of changed circumstances (e.g., details were changed on drawings, and the work does not exactly reflect these changes, a supplier became bankrupt before sending user manuals, warranties were invalidated by changes or use of the equipment, and so on).

The proposed process is to identify potential problem issues some weeks before completion is planned, and to obtain agreement on what must be done to meet the requirements of the contract, or to negotiate changes to these requirements to the benefit of the owner and the contractor, and in such a way as to simplify contract close-out.

Following contract close-out, one final step is recommended. The participants should meet to discuss what went well and what went wrong, so that the next project may benefit from the learning process.
CHAPTER B2

EVALUATION: PARTICIPANTS AND METHOD USED

B2.1 Participants

B2.2 Process

B2.3 Analysis of Industry Evaluations.

HLADE'S LAW:
If you have a difficult task, give it to a lazy man - he will find an easier way to do it.
In this chapter the evaluation by industry of the proposed new contracting method is described. There were two parts to this process. The first was the evaluation itself (described in this chapter) and the second was a survey, referred to in this thesis as Survey "B" to distinguish it from the initial survey. Survey "B" is discussed in chapter B3. A novel approach was used to obtain input from industry practitioners. It combined some of the advantages of the Delphi Method with a seminar-like format while also collecting the input in a form that allowed for a more objective and complete evaluation of the suggestions made by industry contributors.

B2.1 Participants

The proposed new contracting method uses a combination of contracting processes that is new, though many of the individual elements are proven as being cost-effective. The new method, to be successful, must be accepted by those who will be affected by it. Thus the validation of the process requires input from people who are the type of decision makers who will ultimately implement the process.

The decision makers who influence the construction process are usually senior executives and their advisers. These people represent a number of different industry sectors where terminology, processes and traditions vary. These sectors may be broken down conveniently into the following groups.

- Residential Construction;
- Heavy Civil Engineering;
- Resource and Process Projects;
- Industrial, Commercial and Institutional Construction.

The latter three groups may be further split into Government and Private sector projects.

The Residential Construction sector has many significant differences compared to the other three. For example, the trade unions are often different, ownership of the projects is normally by private individuals rather than corporations or governments, project costs are lower and regulations differ. Few companies operating in this sector also operate in the other three. The residential construction market is made up of primarily real estate developers and trade contractors. The real estate developers usually use in-house designers, or contract directly with firms or individuals who provide the design input for the individual building units. Larger Architectural firms are used for design of condominium or apartment buildings. Traditionally the Architect subcontracts the engineering design to specialty firms. The larger projects are managed in much the same way as commercial ones. The smaller housing projects are handled very differently, and are therefore excluded from this study.

The industry representatives who were to comment on the proposed new contracting method had, therefore, to represent as many of the other sectors identified above as was practical. Further, they should also represent the different players in those sectors (owners, consultants, contractors, etc.). To recruit potential qualified evaluators, the following process was undertaken.

As a starting point, a small number of qualified candidates known personally by the researcher were invited. These individuals were asked to participate in the evaluation and to recommend other qualified candidates. The recommendations were followed up, and the new candidates were invited and asked for potential candidates. This process was repeated until a list of about 80 qualified candidates had been obtained. It was expected that about 1 in 4 of these candidates would agree to participate in the process. In the event, of the 77 people finally invited, 75 agreed to participate, one declining because
of prior commitments and one because he felt that he could not contribute constructively to the process. This extraordinarily high response is attributed to a perceived need in the industry for constructive change to the contracting process.

All participants who were invited were sent a package of information that is included in Appendix B. Of the 75 invited participants, 62 took part in the laboratory sessions. The 13 who did not take part were unable to attend the session for which they were booked because of business commitments (8), because they forgot (2) or because they got the time wrong (3).

A breakdown of the sectors and interests represented in the group of participants follows.

<table>
<thead>
<tr>
<th>Industry sectors:</th>
<th>Privately Held Businesses</th>
<th>37</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Publicly Traded Businesses</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Government Agencies</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Other (e.g., partnerships)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Not identified</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Business Types:</th>
<th>Owners</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Contractors</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Design Consultants</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construction Sector*:</th>
<th>Commercial</th>
<th>19</th>
</tr>
</thead>
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<tr>
<td></td>
<td>Residential</td>
<td>0</td>
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<tr>
<td></td>
<td>Heavy Engineering</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Resource Development</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Institutional</td>
<td>12</td>
</tr>
</tbody>
</table>

* Companies working in these sectors
Of the invited participants, 83% actually turned up for the laboratory sessions at which their comments were collected. 100% of the laboratory session participants completed the survey which was included in the package they received.

B2.2 Process
A number of different processes were considered for the evaluation of the proposed new contracting method. It was considered that a survey was too structured and restrictive to obtain adequate response. Individual interviews were discounted for two reasons: the number of participants would be restricted for practical purposes, and the respondents would feel constrained by commentary on the interviewer's own work. A seminar environment was considered as this would allow broader participation, but effective capture of individual comments would be missed. Use of the Delphi Method was felt to offer an opportunity to obtain broad, yet relevant feedback, as the iterative nature of the process would help to home in on key issues. One final method was also considered and eventually selected because it offered a combination of the principal advantages of both seminars and the Delphi method. This process is describes as a "modified Delphi method" below.

B2.2.1 Modified Delphi Method
The accepted process for the Delphi method typically involves three or more iterations of questions. A panel of experts is first assembled. This panel is frequently limited in size for practical, logistical reasons. The panel is then asked for general input and commentary on the proposed process, hypothesis or other issue under study. On the basis of the comments of the panel, a second round of more focussed questions is developed by the investigator. The panel is then approached again with these new questions. The commentary is analyzed and an even more focussed query set is developed and responses are sought from the expert panel.
It was felt that this process could be accelerated and improved by doing two things. First, the panel could be extended from the normal smaller size to a larger group. This could be achieved if the number of iterations could be reduced and the obtained opinions or data could be analyzed effectively. Second, the commentary could be obtained in a manner that allowed panelists to comment on each other's comments at the same time as making original comments, thus obtaining some of the advantages of the iterative process of the traditional Delphi Method.

To achieve these two objectives a number of additional features needed to be added. First, the commentary would have to be anonymous, so that inhibitions by panelists could be overcome. Second, a mechanism was needed to capture all comments in a forum setting where panelists could see others' comments and react to them. Third, a filtering process was needed to help in analyzing the commentary where clearly conflicting input was received. The procedure described below was developed to address these issues.

The draft document describing the proposed new contracting method was sent to the selected panel of 75 potential participants in the process. These participants were requested to read the document in preparation for the laboratory session. At least one week after the participants had received the document, they were invited to attend one of four sessions at the University of Calgary where a decision support laboratory would be used to capture and share commentary on the proposed new contracting procedure. This laboratory is described in more detail in section B.2.2.2.

Recipients of the proposed new contracting method draft document were also sent a survey form to complete. This survey was designed to obtain opinions on a number of issues that might affect the participants' opinion of the new contracting method. It also served to provide a method to capture key general information on the type of participant involved in the commentary sessions. This latter issue was important for two reasons. First, the comments were "anonymous", and some indication of who had participated would be useful in the analysis of the comments made. The word "anonymous" is in
quotation marks, because all the participants were known to the researcher. However the commentary collection process precluded association of any one comment with its author.

The second reason was that further analysis of the survey data could be made to determine whether there was a discernible difference in paradigm between different categories of participant. This second issue, of paradigm differences, would help to interpret and understand the reasons for, differences in the comments made by the participants.

The surveys were generally completed before the participants arrived at the laboratory session, and were collected at the session, to ensure a direct correlation between the survey input and the comments made by participants.

The next two sections describe the survey development and the laboratory operation.

**B2.2.2. Concurrent survey**

A degree of variation of opinion on the proposed new contracting method was expected. It was felt that knowing the source of such disagreement would be of value in the analysis and interpretation of the comments. For example, if contractors generally felt that mediation was inappropriate while owners felt that it was an effective dispute resolution tool, a difference in opinion as to the applicability of mediation as presented in the proposed method could be explained and a solution may be proposed in the re-write of that section of the New Canadian Contracting Method. Similarly, where there was a clear divergence of opinion in the commentary, yet consistency of opinion on a very closely related issue in the survey, this would suggest that rewording the method may be needed to clarify a misunderstanding of the intent of the proposed contracting method.

It was important to understand the paradigms of the participants in the commentary sessions for analysis of the comments, particularly because of the anonymity of the
process. Thus a process for capturing and classifying opinions was built into the process. Interviews were discounted because they effectively took away from the anonymity, and were therefore less likely to produce "honest" opinions.

A survey was the most logical choice of data collection vehicle as the anonymity of the participant could be maintained. The concern of obtaining only partial returns of survey forms sent was considered invalid, as the surveys were to be completed only by people who were going to attend a laboratory session. Thus, if they had forgotten their survey forms when they turned up, they could be asked to take a few minutes to complete the form and return it before leaving. In the event, three participants completed forms during the laboratory session. All the others brought completed surveys to the laboratory with them.

The format of the survey was the next consideration. Of greatest importance to this investigation was to obtain a profile of participant paradigms relevant to the research. Thus agreement or disagreement to particular points of view on matters related to the acceptance of the new contracting method would be the critical item to measure. A multiple-choice format where the participant identified the degree of agreement or disagreement was considered most appropriate.

There are several differing opinions as to the extent to which the range from total agreement to total disagreement should be classified or divided. Few researchers, however, disagree with the use of an odd number of choices, with the "middle" choice being neutral. The range from neutral to extreme can be split into differing numbers of divisions. For this survey two divisions were considered appropriate, signifying agreement (or disagreement) and strong agreement (or strong disagreement). Any further breakdown would complicate the questionnaire and would add little in the way of information, as the participants in the survey would likely interpret the divisions differently anyhow.
Two decisions remained in design of the survey: how many questions were to be asked, and what should those questions be. The first issue related primarily to the time required to complete the questionnaire, and the second related entirely to the information being sought.

As with the pilot survey described in Section A of this thesis, senior decision makers were to be solicited for input to the proposed contracting process. The time required to complete a survey was, therefore, of significant importance. After some consultation with prospective participants, it was decided that the questionnaire should not take more than half an hour to complete. Allowing between 60 and 90 seconds to answer each question, between 20 and 25 questions was a reasonable target. The final questionnaire design was governed by this constraint. Twenty-two questions were finally selected. In addition additional information about the respondent was solicited, as this information was considered to be of potential use in analyzing the results.

The questionnaire, as finally designed, can be divided into three main areas. Questions 1 to 17 inclusive solicited opinions on a variety of issues. All these questions were multiple choice, with the respondent checking one box per question, to select between "Strongly Agree", "Agree", "Neutral", "Disagree" and "Strongly Disagree". Questions 18 to 22 sought more specific data, though the responses were again multiple choice. Question 19 was slightly different in that it required the respondent to rank four choices. Questions 21, 22 and 23 collected data that would help in classifying and interpreting the responses to the preceding questions. The third part of the questionnaire was marked "THIS SECTION IS OPTIONAL". Information of a more personal sort was solicited here, and there was concern that a sense of obligation to complete all or none of the questionnaire would preclude some respondents from returning their completed forms if this additional information was requested in a more forceful way. In the event, 100% of the questionnaires were completed and returned, though some respondents chose to not complete this last section. The following paragraphs describe the issues raised or questions asked, together with the rationale for collecting the selected data.
The first questions solicited the information required to obtain a paradigm profile of the participants as it might relate to some of the prime issues that would affect acceptance or rejection of the proposed new contracting method. They are discussed first.

**Question 1:** Using Contractor's expertise during the design process increases the opportunity to reduce costs. The purpose of this question was to determine whether there was any resistance to constructability programs which form part of the proposed new contracting method.

**Question 2:** Contractor input to design tends to reduce quality. This question was worded to provide a different response to question 1, while seeking reaffirmation of support or resistance to constructability programs. Designers' potential resistance to contractor input to the design process could also be tested.

**Question 3:** Legal counsel should always be consulted before signing a contract. The impact of the legal profession was identified in the pilot survey (Section A). One of the earlier findings was that the likelihood of litigation increased with the existence of on-staff lawyers. Another finding was that the probability of the presence of lawyers on staff was related to annual construction volume. Attitudes towards the use of the legal profession in the formation and administration of contracts were considered to be important to the success of the proposed new contracting method.

**Question 4:** Legal counsel should always be consulted before agreeing to any change to a contract. This question was the second of three that addressed attitudes to the use of lawyers (see question 2 above).

**Question 5:** Advice of legal counsel should always be followed. This was the third question on this topic. See above.

**Question 6:** Many contract disputes are known about (by at least one party) for a long time before they are dealt with. An important aspect of the proposed contracting method
was the use of mediation in a Proactive way to identify and resolve disputes early. The researcher suspected that this would help bring issues to the discussion table sooner than might otherwise occur, and wished to verify this. At the same time, an indication from respondents that this was a real issue would suggest support for earlier resolution might exist.

**Question 7:** Contractors save claims until the project is complete or almost complete because they do not want to spoil their relationship with the (a) Owner; (b) Consultant. This question was intended to identify whether there was a concern over possible repercussions resulting from earlier announcement of an intent to claim.

**Question 8:** Construction contracts apportion risks unfairly to (a) Owner; (b) Consultant, (c) Contractor; (d) Subcontractor. The majority of court decisions in Canada and the United States over the past decade have been based on both parties to a construction contract having equal negotiating power. An indication of the reality of this assumption by the courts would be a blend of opinions on the fairness of contracts in the industry. If contracts for one group of stakeholders were generally considered to be unfair, then it was a reasonable deduction that the negotiating powers were not equal. It was important to obtain an understanding of this in the context of the proposed new contracting method for a number of reasons. First, if contracts are based on unequal negotiating power, so too must dispute resolution. Second, a contract that starts on a basis that is acknowledged to be unfair is conducive to dispute.

**Question 9:** Exculpatory clauses increase the likelihood of a contract dispute. One of the hypotheses behind the new contracting method was that inappropriate risk apportionment would increase the probability of disputes. Exculpatory clauses are a classical way of reassigning risks that are essentially beyond the control of the party to whom the risk is assigned. Also, opinions on this statement will further test the solidity of the answers in question 8 because exculpatory clauses are an indication of the greater power of the party that has authored the contract.
Question 10: Use of "standard" contracts (such as CCDC 2 - Stipulated Price Contract) reduces the potential for dispute. A preliminary study of over 200 actual construction claims\textsuperscript{119} showed that less than five (5) percent of these were based on use of CCDC 2\textsuperscript{120}. All the others were based on construction contracts that were developed by the owner or its consultant. Although the proposed new contracting method was non-prescriptive in the type of contract recommended for use, an understanding of attitudes towards the use of industry standard contracts was needed to understand the approach that owners might take to contract document preparation.

Question 11: Bid prices are affected by the bidder's expectations of fair contract administration. Earlier questions were designed to determine opinions on the relative equality of negotiating power of owners and contractors. Often contracts are administered by the consultant on behalf of the owner. The impact of fairness in the administration of contracts on bid prices was of interest in determining the position of different sectors of the construction industry regarding the use of a process that was intended to increase fairness.

Question 12: Consultants who act as Contract administrators on behalf of their clients are usually completely objective in making decisions about contract issues and interpretations. This question was intended to determine opinion on the most common practice of using the consultant as the "arbiter in the first instance" of the terms of the contract. The new process recommends that a third party mediator be used throughout the life of the contract. The opinions of practitioners on the issue identified in this question would help to clarify any anomalies in the acceptance or otherwise of this option.

Question 13: More effective risk management will reduce the final cost of construction to the owner. This question raises the issue of risk management that is the most significant element in the proposed new contracting process. If opinions in this area differ

\textsuperscript{119} Semple, Cheryl; Preparation for MSc thesis at the University of Calgary, under the supervision of the author.
\textsuperscript{120} "Stipulated Price Contract" Canadian Construction Documents Committee, Ottawa ON, 1982.
significantly, then where such differences lie would help to identify possible reasons for
disagreement, and thus allow the researcher to seek a different approach to the issue.
Alternatively, strong agreement or disagreement would allow the researcher to rewrite the
proposed contracting method accordingly.

Question 14: Competitive tendering is the most effective method for ensuring that the
owner obtains the best return on construction capital. Because the first survey showed
a preference for lump sum competitively bid contracts, opinion on the effectiveness of the
preferred tender process was considered to be important. The new contracting method is
a departure (at least in part) from the apparently preferred process. It was considered
important, therefore, that any difference of opinion be identified in this area, so that
potentially divergent comments might be better understood.

Question 15: Contractors should be screened and prequalified before being allowed to
bid on a contract. The prequalification of contractors was to be an important part of the
new process. Opinion on this issue in isolation was needed to determine where any
differences might exist. Questions 14 and 15 also combined to obtain an indication of
participants' opinion of selection on price alone of prequalified contractors.

Question 16: Once prequalified, consultants should be selected solely on price. This is
the same question as the combination of questions 14 and 15, but aimed at the selection
of consultants. The selection process for design and construction expertise in the proposed
new contracting method was based on criteria that potentially extended beyond price
alone. Opinions on this issue were therefore of interest.

Question 17: A qualified, knowledgeable and experienced mediator, paid for jointly by
both parties to a contract, could facilitate dispute resolution. This question further
addresses the participants' opinion on the use of a mediator. See also questions 6,7 and 12.

Question 18: A fair expectation of profit for a contractor (as a % of contract value) is:
<2%; 2-4%; 4-6%, 6-8%; > 8%. One concern that is commonly expressed by owners and
consultants is that contractors primary, and in some instances only, interest is to maximize profits. This concern was often cited to the researcher by proponents of lump sum, open tendered, contracts as the reason for their choice. The proposed new method provided for contractor appointment using processes that had the potential to increase the contractors profit. A comparison between the actual profits of many North American contractors (net profit before tax) of less than 2% on turnover, and the amount that participants considered reasonable would help in determining the degree of resistance to less traditional contractor selection processes.

Question 19: In order of preference, rank the following dispute resolution methods: Negotiation; Mediation; Litigation; Arbitration. This question was used to identify preferences for dispute resolution methods. The proposed contracting method suggests mediation - not yet as common as litigation or arbitration - as the preferred method where normal negotiation fails.

Question 20: Which of the following most closely describes ownership of your business: Owner; Contractor; Consulting Engineer; Architect; Other. See question 20 above.

Question 21: What type of business are you in? Please select ONE of the following: Owner; Contractor; Consulting Engineer; Architect; Other. See question 20 above.

Question 22: Which sector of the CONSTRUCTION INDUSTRY most closely describes the one you work in: Commercial Construction; Residential Construction; Heavy Engineering; Resource Development; Institutional/Government. See question 20 above. Note that one of the options was residential construction. This category, because it is significantly different to the others was excluded from the overall study. This option was inserted in this questionnaire so that there was confirmation that this sector had not inadvertently been included.
A further section was included, requesting personal data. It was marked optional. The data requested was as follows:

- Education (highest level);
- Experience in years;
- Position or function.

Overall in this survey, the sequence of the questions deliberately did not follow that in which the ideas on the new contracting method were presented in the document on which the participant was to comment at the laboratory "high-tech brainstorming" session.

B2.2.3. Decision support laboratory

The University of Calgary has a Decision Support Laboratory that uses a computer network to allow participants to communicate both with the data capture system as well as with each other. It offers a perfectly anonymous method for submitting and sharing commentary. It is this facility that was used. The facility and the process are described in the following paragraphs.

The Decision Support Laboratory at the University of Calgary is a large room that is pleasantly decorated and has subdued lighting. It has seating for about thirty people in a U-shaped arrangement. At each place is a computer terminal (networked personal computers). At the front of the room is a control desk with the main terminal and file server. On the wall behind this is a large screen used to project the image from the controller's computer screen. The computer system can be operated at several levels of sophistication. The simplest method was used in this case because the respondents were known to be cautious of computers or not computer literate and would want as friendly an environment as possible with as short and flat a learning curve as could be achieved.
The computer option used presented an electronic file for each section in the advance material sent to the participants. These sections were:

A. INTRODUCTION
   lines 1 to 43
B. BACKGROUND
   lines 44 to 99
C1. CONTRACT FORMATION
    lines 100 to 192
C2. NEW TENDERING STEPS
    lines 193 to 230
C3. CONTRACT FORMATION
    CHART
C4. ALTERNATIVE CONTRACT FORMATION
    CHART
C5. CONTRACT ADMINISTRATION:
    CHANGE/DISPUTE MANAGEMENT
    CHART
C6.* CONTRACT ADMINISTRATION
    lines 231 to 265
C7. CONTRACT CLOSE-OUT
    lines 267 to 295
D. CONCLUSION
    lines 296 to 310
E. THE NEXT STEP
    lines 311 to 345
F1. WISH TO RECEIVE ALL THE COMMENTS
    MADE IN THIS SESSION
    lines 350 to 351
F2. WOULD LIKE TO RECEIVE A COPY OF THE
    REVISED "CANADIAN CONSTRUCTION METHOD"
    WHICH RESULTS FROM THESE ADVISORY
    SESSIONS
    lines 352 to 353
F3. ARE INTERESTED IN PARTICIPATING IN A
    FUTURE SESSION ON THIS TOPIC WHERE
    THE OBJECTIVE WILL BE TO OBTAIN
    CONSENSUS ON THE FINAL "CANADIAN
    CONTRACTING METHOD"
    lines 354 to 357
F4. WOULD BE PREPARED TO FINANCIALLY
    SUPPORT FUTURE DEVELOPMENT OF
    THIS CONCEPT
    lines 358 to 359
F5. HAVE ANY COMMENTS ON THIS PROCESS,
    OR SUGGESTIONS ON HOW TO
    IMPROVE IT
    line 360.
*This appears as C5 in the material issued to participants, and was corrected in the laboratory sessions.

These electronic files appeared on the computer screen as pictures of file folders that the user could select at random. The users were asked to pick the files that corresponded to the section they wished to comment on, and to type in their comments. The format for typing comments was to type the line number (or range of lines) first, then a space followed by comments. At any time the participant could see, at the push of a button, comments made by others. After reviewing other participants' comments, they could react to them and provide additional input. There was no way that any comments could be identified with any participants, so responses could be made freely.

Because of the strong response to the request for input, four sessions were run in the laboratory, on November 3rd, 5th, 10th and 17th, 1992.

The comments were captured electronically, and copied to diskettes in ASCII format. The analysis of the comments was performed after the laboratory sessions were completed.

B2.3 Analysis of Industry Evaluations

The results were copied into a word processor system, and were sorted by line number within each section of the method description as issued to participants.

Where there was a consensus, the resulting commentary was summarized and incorporated in the revised New Canadian Contracting Method. Where there was no consensus, the results were analyzed further to determine what the issues behind the disagreement might be.

If the additional analysis led to a clear definition of the issue, then an attempt was made to accommodate the concern. Where the issue remained unclear or ambiguous, a decision
was made whether to change the original version. A change would be made if there were strong indications of ambiguity or misunderstanding observed in the analysis. Section C describes the results of the laboratory sessions. A concurrent survey was conducted as described in chapter B.1. The purpose of the survey was to determine whether there were any strong biases by different participants that may lead to conflicting responses to the proposed contracting method. The questions in the questionnaire were designed to identify such potential influences so that some attempt may be made to address concerns raised by groups with different paradigms. It should be remembered that the method used to collect opinions was selected, in part, because it achieved a large degree of anonymity. This precluded biases in the analysis of comments, but also precluded identification of biases in the individual participants that may have influenced their opinions. The survey was designed to retain anonymity while identifying bias towards specific opinion by particular groups of participants (such as owner, contractor, private or publicly traded company, etc.).

It was also felt that some sense of how different participants or groups of participants responded to the questions might throw new light onto the more general problems associated with introducing change. Specifically, the concern was with change to the traditional contracting processes used in the North American Construction Industry.
CHAPTER B3

SURVEY 'B'

B3.1 Industry Input: Results

B3.2 Analysis of Survey.

LACOMBE'S RULE OF PERCENTAGES:
The incidence of anything worthwhile is either 15-25 percent or 80-90 percent.
CHAPTER B3

SURVEY 'B'

This chapter describes the survey portion of the process used for validation and input from industry. The purpose of the survey was to determine opinions of participants on matters that may materially affect their decisions or perceptions. The questions were intended to help identify reasons for broad differences of opinion on specific elements of the proposed contracting method, and to help in resolving those differences.

The results, presented in Appendix D were analyzed only to the extent that they helped in understanding the input of participants in the laboratory sessions. Some additional analysis was done where results were not readily explainable, or where there was a range of opinion. In the latter case, a check was made to determine whether opinions were related to specific interest groups. An interesting finding was that the divergent opinions remained divergent regardless of the breakdown of the results by respondent categories.
B3.1 Industry Input: Results

The raw results of the survey are shown below. The questions are listed, together with the total of responses to each choice available in the questionnaire.

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Percentage Response</th>
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<tr>
<td>Using contractor's expertise during the design process increases the</td>
<td>30</td>
<td>28</td>
<td>1</td>
<td>3</td>
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<td>opportunity to reduce costs.</td>
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<td></td>
<td></td>
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<td>Contractor input to design tends to reduce quality.</td>
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<td>7</td>
<td>4</td>
<td>33</td>
<td>16</td>
<td>98</td>
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<td>Legal counsel should always be consulted before signing a contract.</td>
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<td>13</td>
<td>16</td>
<td>16</td>
<td>7</td>
<td>100</td>
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<tr>
<td>Legal Counsel should always be consulted before agreeing to any</td>
<td>7</td>
<td>4</td>
<td>14</td>
<td>24</td>
<td>10</td>
<td>95</td>
</tr>
<tr>
<td>change to a contract.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advice of legal counsel should always be followed</td>
<td>4</td>
<td>9</td>
<td>17</td>
<td>25</td>
<td>6</td>
<td>98</td>
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<tr>
<td>Many Contract disputes are known about (by at least one party) for a</td>
<td>21</td>
<td>38</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>98</td>
</tr>
<tr>
<td>long time before they are dealt with.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<th>Table cont. from previous page.</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Percentage Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractors save claims until the project is complete or almost complete because they do not want to spoil their relationship with:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Owner</td>
<td>5</td>
<td>22</td>
<td>12</td>
<td>19</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>(b) Consultant</td>
<td>4</td>
<td>26</td>
<td>7</td>
<td>15</td>
<td>4</td>
<td>90</td>
</tr>
<tr>
<td>Construction contracts apportion risks unfairly to:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Owner</td>
<td>3</td>
<td>0</td>
<td>10</td>
<td>34</td>
<td>11</td>
<td>94</td>
</tr>
<tr>
<td>(b) Consultant</td>
<td>1</td>
<td>5</td>
<td>15</td>
<td>27</td>
<td>9</td>
<td>92</td>
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<tr>
<td>(c) Contractor</td>
<td>6</td>
<td>41</td>
<td>8</td>
<td>4</td>
<td>1</td>
<td>96</td>
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<td>(d) Subcontractor</td>
<td>15</td>
<td>28</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>90</td>
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<tr>
<td>Exculpatory clauses increase the likelihood of a contract dispute.</td>
<td>9</td>
<td>32</td>
<td>9</td>
<td>7</td>
<td>0</td>
<td>92</td>
</tr>
<tr>
<td>Use of &quot;standard&quot; contracts (such as CCDC2 - Stipulated Price Contract) reduces the potential for dispute.</td>
<td>6</td>
<td>27</td>
<td>11</td>
<td>14</td>
<td>2</td>
<td>96</td>
</tr>
<tr>
<td>Bid prices are affected by the bidder's expectation of fair contract administration.</td>
<td>12</td>
<td>38</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>94</td>
</tr>
<tr>
<td>Consultants who act as Contract administrators on behalf of their clients are usually completely objective in making decisions about contract issues and interpretations.</td>
<td>1</td>
<td>6</td>
<td>11</td>
<td>24</td>
<td>17</td>
<td>95</td>
</tr>
<tr>
<td>More effective risk management will reduce the final cost of construction to the owner.</td>
<td>17</td>
<td>33</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>97</td>
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</table>

Table continued on next page.
<table>
<thead>
<tr>
<th>Table cont. from previous page.</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Percentage Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitive tendering is the most effective method for ensuring that the owner obtains the best return on construction capital.</td>
<td>7</td>
<td>10</td>
<td>11</td>
<td>22</td>
<td>10</td>
<td>97</td>
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<tr>
<td>Contractors should be screened and prequalified before being allowed to bid on contracts</td>
<td>27</td>
<td>26</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>98</td>
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<tr>
<td>Once prequalified, consultants should be selected solely on price.</td>
<td>5</td>
<td>9</td>
<td>3</td>
<td>28</td>
<td>15</td>
<td>97</td>
</tr>
<tr>
<td>A qualified, knowledgeable mediator, paid for jointly by both parties to a contract, could facilitate dispute resolution.</td>
<td>12</td>
<td>41</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>A fair expectation of profit for a contractor (as % of contract value) is:</td>
<td>&lt;2%</td>
<td>2-4%</td>
<td>4-6%</td>
<td>6-8%</td>
<td>&gt;8%</td>
<td>7</td>
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<tr>
<td>In order of preference, rank the following dispute resolution methods:</td>
<td>Negotiation</td>
<td>Mediation</td>
<td>Litigation</td>
<td>Arbitration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>4th</td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
</tr>
<tr>
<td>57</td>
<td>1</td>
<td>52</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1</td>
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<tr>
<td>Which of the following most closely describes ownership of your business?</td>
<td>Privately Held</td>
<td>Publicly Traded</td>
<td>Government Agency</td>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>13</td>
<td>6</td>
<td>5</td>
<td>97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What type of business are you in?</td>
<td>Owner</td>
<td>Contractor</td>
<td>Designer</td>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
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<td>15</td>
<td>14</td>
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<td>15</td>
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<th>Experience (total number of years)</th>
<th>Owner</th>
<th>Designer</th>
<th>Contractor</th>
<th>Other</th>
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<td></td>
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<th>General Manager</th>
<th>Executive</th>
<th>Project Manager</th>
<th>Estimator</th>
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<tr>
<th>Position/Function</th>
<th>Administrator</th>
<th>Accountant</th>
<th>Lawyer</th>
<th>Other</th>
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<td>0</td>
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<th>Percentage Response</th>
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<tr>
<td>87</td>
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<tr>
<td>82</td>
</tr>
<tr>
<td>90</td>
</tr>
<tr>
<td>77</td>
</tr>
</tbody>
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**Table B3.1 - Raw Data obtained from Survey "B".**

### B3.2 Analysis of Survey

The survey results were analysed further where there was no clear consistency of opinion, in order to determine what may underly these differences. Where the opinions of all participants were consistent, no further analysis was attempted. The results were sorted by the following items:

- Ownership:  
  - Privately Held  
  - Publicly Traded  
  - Government Agency  
  - Other

B52
Business Type:  
- Owner
- Contractor
- Consulting Engineer/Architect (Designer)
- Other

Construction Industry
Sector:  
- Commercial Construction
- Heavy Engineering
- Resource Development
- Institutional/Government

(NOTE: there were no Residential Construction representatives, for reasons previously stated.)

Education:  
- Secondary School
- Technical/Community College Diploma
- University Degree
- Graduate Degree

Position/Function:  
- General Manager
- Executive
- Project Manager
- Estimator
- Technical
- Administrator
- Other

The result of this sorting process was that no significant difference in response was discernable for any one category in any of the above groups. The expectation that specific groups would respond differently to the issues raised in the questionnaire was not measurable.
PART C
This part of the thesis describes the results of the input by industry to the proposed New Canadian Contracting Method. In this section the proposed method is specifically referred to as the New Canadian Contracting Method as the input was received primarily from Canadian Construction Industry Practitioners.
C1. CHAPTER C 1 (Industry Comments on the Original Proposed realized)

C1.1 Summary of key points of agreement

C1.2 Summary of key points of disagreement

C1.3 Resolution of disagreements

C1.4 Summary of Key Issues raised by commentators

C2. CHAPTER C 2 (Revised Canadian* Contracting Method)

C2.1 Major changes

C2.2 Revised document

C3. CHAPTER C 3 (Conclusions and Recommendations)

C3.1 The next step towards implementation

C3.2 Recommendations

C3.3 Conclusions
CHAPTER C 1

INDUSTRY COMMENTS ON ORIGINAL PROPOSED METHOD

C1.1 Summary of Key Points of Agreement

C1.2 Summary of Key Points of Disagreement

C1.3 Resolution of Disagreements

C1.4 Summary of Key Issues Raised by Commentators

FITZ-GIBBON'S LAW:
Creativity varies inversely with the number of cooks involved in the broth.
INDUSTRY COMMENTS ON ORIGINAL PROPOSED METHOD

In this chapter the input of participants in the laboratory sessions is summarized. The summary categorizes comments under the headings of Agreement and Disagreement, then presents how those comments where some disagreement was observed were addressed. The comments on the proposed contracting method and the results of the concurrent survey of participants were used together to resolve differences wherever possible.

The comments made during the four laboratory sessions are included in Appendix C.

C1.1 Summary of key points of agreement

A number of points were raised consistently. They may be summarized as follows:

(1) There is a clear need for teamwork in the construction industry.
(2) Many of the problems encountered with construction contracts are people problems which can best be resolved through training and education, development of better attitudes and development of people management skills.
(3) Definition of contract requirements is often inadequate. Expectations of one or other party to a contract are unreasonably inflated.
(4) Risks are not apportioned properly.
(5) Planning for projects is usually inadequate.
(6) Communication between participants must be improved.

The key issues listed above are discussed in more detail in section C1.4.
The following comments represent the areas of agreement. They are presented with reference to sections and line numbers in the original draft of the New Canadian Contracting Method.

A. INTRODUCTION

Line 001 The percentage quoted from the pilot survey, of 30-44% of construction expenditure being handled through changes, claims and litigation was felt by this group to be inappropriately high. A number of participants suggested the figures were incorrect (too high). The researcher believes this reaction is more one of reluctance to accept what is really happening because it is a poor reflection on management skills in the industry. This point was specifically made by one reviewer of the material. The observation was made by 8 of the 62 participants. The other 54 reviewers of the material did not make a point of disagreeing with the quoted figures, so it may be concluded that there was some significant agreement with these statements on the extent of wastage in the industry.

Line 005 - 029 Fourteen independent observations of the importance of good definition of requirements in Lump Sum contracts were made. This is clearly an important issue, and relates to the fundamental concept of risk and its apportionment in contracts. The question raised by poor definition of requirements is: "who is responsible for something that is inadequately defined?".

Supplementary comments on these lines referred to unreasonably high expectations being established, selection of contractors being related to owner competence, and the assumption by the courts that both the owner and the contractor are on a level playing field.

Line 018. One of the main issues today is the potential for litigation. There was strong agreement on this.

Line 032-036. Three additional challenges to be met by the new Canadian Contracting Method are to improve quality, to improve profitability and to reduce conflict.

---

121 Mr. R. Balfour, a retired Executive Vice President of SNC, a major Canadian Engineering Consulting Firm, wrote to the researcher with this comment in December 1992.
There was considerable agreement with the suggested solutions for reducing waste, risk premiums and costs. Additional areas to be addressed were also identified - see above.

The comments on the confrontational nature of the industry elicited 62 responses. Generally the comments supported and added to the concern stated in the draft, though there was some disagreement. Some of this disagreement was an issue of semantics. Other dissenting comments suggested that it was the participants and their lack of mutual trust that led to disagreements or confrontation, not the system. The new contracting method is intended, in part, to help change the mistrustful attitudes of contracting parties. This is done by creating a working environment that encourages openness and better communication. There were two bald statements which disagreed that the industry was confrontational, without further elucidation or comment. Perhaps the most interesting issue raised in connection with this topic was the extent to which confrontation is apparent in different market conditions. There was a suggestion that confrontation is less prevalent in a market where the contractor can be more certain of a profit. Another point of interest raised in this context was that of premiums carried by contractors to cover risks. One respondent believed that contractors did not carry any risk contingency.

The ranking of contract types and bid methods in order of incidence of disputes raised questions which will require clarification in a revised document. The ranking is that on frequency of disputes (measured in estimated value) per unit of construction (also measured in estimated volume).

The comments made on the observed relationship between incidence of disputes and the existence of exculpatory clauses in the draft contracting method were generally agreed with. Both additional information and clarification were requested by the respondents.
There was significant agreement with the concept that most contracts used in Canada today are either clearly lump sum, or include elements which are of that type of contract. Also attracting agreement was the concept that even if other forms of contract were used between the owner and the prime contractor, there was an increasing tendency towards the use of lump sum contracts further downstream.

The conclusions drawn in the preamble to the new contracting method created some controversy. Clearly there was some disagreement on whether or not the industry was conservative. Fifteen comments generally agreed with the conclusions - that the industry was conservative - 3 disagreed and 5 remained unconvinced either way. This said, the more common impression was of recognised conservatism.

Four respondents commented that this method was not new. Their statement is partially correct, as most of the elements of the process are proven ones. A proven method, by definition, is not new. However, this is a new COMBINATION of these processes. Also, the method proposed for apportionment of risk is new and untested. There was confusion on the apportionment between the process and the contract (one comment). The proposed Contracting Method is a PROCESS, not a CONTRACT. The process may lead to adjustments of the terms of a contract. One of the important premises of this process is that established contract formats do not have to be replaced. The implication of a major change in contract form is that the previous contracts used were wrong. This could act as a major barrier to implementing such changes.

There was agreement that the team approach should be stressed.

The suggestion that a contract could be awarded on a general scope of work was commented on by eight respondents. Six disagreed with this approach. One comment related to award of subcontracts to bring buildability into the equation and one questioned the quoted range for the percentage of work that was typically subcontracted.
The use of both design (consultant) and construction (contractor) expertise in the development of working drawings met with general approval and agreement. This issue raised 28 comments, of which 17 were supportive and two were negative. The remaining comments were neutral or supportive, but raised specific concerns or issues. There were two major concerns. The first related to timing: bring the contractor on board after the consultant has been appointed and the design concept has been developed, but before working drawings are produced. The second concern was that subcontractors often have the best trade construction expertise and should also be involved in the design process.

There was strong agreement with the observation that the existing "traditional" process for tendering construction precluded effective planning and increased the risks for subtrades. Of the 19 comments, 15 were fully supportive, while four raised minor concerns or added commentary to the New Canadian Contracting Method without either supporting or disagreeing with the statements.

The staged selection of subtrades attracted 34 comments. Of these 19 agreed with the proposed process and 2 disagreed. A few suggested that the identified problem had been solved through the bid-depository, though there was acknowledgement that both general contractors and trade contractors found the existing system was flawed. The remaining five comments raised questions and issues on bonding, cooperation between general contractor and trade contractor, and incentives to develop better construction methods.

There are several ways in which the bid depository system is by-passed by the less scrupulous contractors. The most blatant is to obtain subcontractor quotations directly, without using the bid depository system, even though its use may be stipulated in the bid documents. The less blatant, but frequently used, method is to accept the bids through the bid depository, then renegotiate with subcontractors ("Shop" the prices). Bid
depository rules do not permit this practice, so the renegotiated price is hidden in the subcontract agreement. Normally, this takes the form of an agreement by the contractor to provide "services" to the subcontractor for a sum equal to the difference between the bid depository bid and the renegotiated price. Another version is for the subcontractor to provide additional services, worth this difference in price, to the general contractor. As a result of this type of abuse, using the bid depository has lost favour with many general contractors and subcontractors.

Lines 193 - 229 Chart 1, describing the new tendering steps received 170 comments and observations from participants. Some were in agreement with the process, others disagreed with elements while yet others simply made observations. Refer to C1.2 for points of disagreement.

There was general agreement that the proposed process would add time to the tendering process, i.e. it would take longer to bid and to analyse the bids and make an award. A number of comments were made expressing concern that the process would not be applicable in the public sector. There was a significant amount of confusion created by the proposed tendering process as described, resulting in a need to expand and rewrite this procedure to clarify the steps. There was general agreement that a process for risk assessment was a good idea, though the method of achieving this was debated. A number of comments were made on the issue of the owner evaluating risks. Most comments suggested that the owner was not qualified to do this because of a lack of experience or expertise in design and construction. Again clarification on this issue was identified as necessary.

Figures 1 and 1A. There was a clear preference for the process identified in chart 1A. Missing from this chart was the Consultant's role. There were several comments on the need for input by a consultant to the owner during the contractor selection process,
particularly where the owner lacks the necessary expertise to make a sound and effective
decision.

Prequalification of bidders was reinforced as being necessary.
The issue of timing of bids relative to completeness of design was raised again here.
The relatively time-consuming nature of this process was raised again here as (apparently)
a concern.

Figure 2. This figure was intended to depict, in simple terms, the contract administration
process that is proposed. From the comments, it would appear that there was agreement
generally with the process. Based on some commentator's observations, the chart was not
detailed enough to highlight the key differences and advantages of the new process.

Lines 231 - 245. Three guidelines are introduced related to contract administration. The
first relates to a construction start-up meeting. Several participants correctly pointed out
that this occurs on a number (many?) projects today. There was general agreement that
this was a good idea. Further clarification on the purpose and agenda is required. Some
useful ideas were proposed for this. One such was that the contractor chairs the meeting
and the consultant keeps minutes. Another was that both the contractor and the consultant
keep minutes, as interpretations are often different. It may also make sense to have the
mediator take the minutes. (This last option was not suggested by participants.) It
appeared that the purpose of this kickoff meeting, namely to ensure that the actual people
involved in the contract's administration agreed amongst each other a process by which
the intent of the contract could be effectively managed, was sound. It was intended that
issues such as communication, authority to instruct, changes, turnaround times for
questions, approvals and other such details were to be discussed and agreed. This intent
was not expressed clearly enough in the NCCM draft.

Lines 246 - 255. The concept of regular, well organized meetings on the project
throughout design and construction received strong agreement.
There was strong agreement with the concept of using a mediator as a "safety valve" for disputes during the course of the contract. Of the 44 comments, 30 were in clear agreement, three disagreed and the balance either added ideas or displayed a misunderstanding of the intent of mediation (typically confusing it with arbitration).

Of the 47 comments on the Conclusion, 21 were in agreement that the proposed process was worth pursuing. Of the others, the comments were spread as follows.

- 7 reflected an opinion that the intent of the process was unachievable.
- 5 felt that the existing methods offered adequate solution to the problems being addressed.
- 3 commented on a need to improve planning at the start of the project.
- 2 comments added opinions that litigation would be reduced or eliminated.
- 2 comments, from representatives who identified themselves as being from the insurance and surety industry, commented on risk management requiring input from their sector.
- 1 commented that the process was too dependent on the human resource to be dealt with in any detail.

The remaining comments either identified a need for more detail and clarification in the document or were comments that clearly showed a need for further explanation in the revised document.
C1.2 Summary of key points of disagreement

Line 012 to 014: There was disagreement on the issue of whether the type of contract has changed significantly since the 1950's. This disagreement is most likely due to different interpretations of the wording in the draft New Canadian Contracting Method. There was disagreement too on the effective apportionment of risk. It is interesting to note that this disagreement was minor and made reference to "firms involved in large, high risk projects have already implemented risk management policies in response". The dissenting view reflects the sophistication of the Calgary-based multinational oil companies.

Lines 023 to 030 There was fairly strong disagreement on whether the Canadian and USA construction markets were similar in the premiums being paid for the problems of litigation, poor communication and unmet expectations, or poor definition of contract requirements. Most of the comments suggesting that the USA and Canadian markets were different were based on current market conditions in Canada. Specifically, one comment, on premiums being included in construction costs, suggested that "quite the contrary prices have dropped by 30%". There is agreement, however, that some premium resulted from the identified problems, the issue is the amount of that premium. If prices have, in fact dropped by 30%, and the companies doing the work are not going out of business, there is a clear indication that the premium (spread over good and bad times) is indeed high!

Profits of contractors in North America are not well publicised because the vast majority of contractors are closely held businesses that do not disclose such financial information. However, a few sources do exist, usually associated with the surety industry which routinely request this type of information from their clients - the contractors. The profit figures suggested by Schliefer (1990) and through interviews by the researcher with representatives of sureties suggest that they lie in the range of 0-4%. This is a much smaller figure than is intimated by the price drop. The only other potential source for such savings would be the risk premium which is reduced as contractors take greater business risks in order to survive in lean economic times.
Two diametrically opposed views are stated. Both suggest that it [improved design teamwork, better risk allocation and more effective planning] will work on large projects, but one says that costs to the owner will increase, while the other says they will decrease. The cost of tendering and analysis of bids will be higher, but the expectation is that, as a result, overall construction prices and costs will decrease.

There were a number of comments that suggested that confidentiality was not a prerequisite of effective competitive tendering. These statements contradict the intent of sealed bids, formal tender closing times and the competitive nature of bidding construction work. These comments have been interpreted as an indication that the revised NCCM should be clearer in its explanation of the proposed bidding process.

There was disagreement on what a strategic alliance (partnership) was and how it worked. This may be more correctly interpreted as misunderstanding. Alternatively, it may be that these strategic business relationships are very different, each one being tailored to meet the needs of the partners entering into the relationship. There was disagreement also on the efficacy of the partnering process. It was not possible to determine whether this was based on actual experiences or on pure opinion.

There was considerable debate over the effectiveness of Guaranteed Maximum Price contracts, with arguments ranging from "The GMP form of contract is the biggest con job the construction industry ever developed..." through "..the missing ingredient ... is to includes [sic] members of the design team in the sharing of savings..." to "GUP ... have strengths for some situations ...". As the NCCM does not promote one form of contract over another, these comments were not considered to impact the development of the method.

An informal poll of participants in the review of the draft NCCM identified several who had one or more active partnerships with clients or contractors or suppliers. Gulf Oil and Quantel have a Strategic Alliance which has led to work overseas as well as the originally intended domestic work. Colt Engineers and Constructors has an Alliance with Imperial Oil. Their work is focussed on Alberta installations. The Shell Canada Limited/Optima Engineers and Constructors Alliance is relatively new. All of these, and other alliances identified in this poll were different in both style of operation and in form of agreement.
There was disagreement on whether or not risks in contracting carry premiums. The argument previously made on this issue (see lines 023 - 030 above), should be included in the introduction to the NCCM.

The issue of awarding design and construction at the same time raised significant commentary. There were 38 responses to this point. With very few exceptions, there was agreement that this could not be done. The exceptions came from respondents who worked with EPC companies which routinely bid and worked on projects where the design and construction were awarded at the same time. The concern comes down to awarding design to one company and construction to another - and doing so concurrently. Clarification of this process is required.

Converting a contract from one form to another attracted 18 comments. Eight disagreed with the viability, six commented on or identified potential problems without specifically agreeing or disagreeing while four felt this was a good approach. This process needs to be re-worked in the revised draft NCCM, to select the consultant before the contractor, and to recommend that the contractor be selected before production of working drawings commences.

This part of the new Contracting Method attracted 31 comments. The issue of the General Contractor pricing a project (Contract General Conditions only) based on minimal scope and design criteria was illustrated by a high-rise example. This may have led to a number of participants' comments that this could only happen in the building construction sector. This was the opinion of three participants. Of the remainder, 5 felt the approach was a good idea and 11 thought it was not workable for a number of reasons. The remaining comments raised interesting issues, the most pertinent being the relevance or usefulness of Bid Bonds in this process and the opportunity for new contractors to participate. Some referred to a likeness to the design/build process, which again implies one source (contractually) for design and construction.
Chart 1, describing the new tendering steps received 170 comments and observations from participants. Some agreed with the process, while others disagreed with some of the elements, while yet others simply made observations. Refer to C1.2 for points of agreement.

There was a significant amount of commentary on the role of the consultant in the proposed bidding process.

Requiring the owner to "bid" the risks was considered both good and bad, though the comments against this process appeared to be based on a misunderstanding of the proposed process.

Holding bid documents in escrow was generally considered to be good, though the 24-hour timeframe for submitting these documents caused concern over the opportunity for the contractor to cheat.

Subcontractor involvement in the revised bidding process was clearly a topic of interest, and two schools of thought emerged: one suggested an "arms-length" relationship between owner and subcontractor, while the other advocated closer involvement. The first approach appeared to be driven by a need for simplicity (legal, commercial and administrative). The second appeared to be driven by a need to eliminate real or perceived abuse of subcontractors by general contractors.

Fifty-six comments were made about the contract close-out process. The comments were mixed, and varied from agreement with the idea, to suggestions that the concept was unworkable for a number of reasons. Interesting to note was the absence of any strong disagreement with the proposal as being a good idea. The big issue was clearly one of pragmatism. The concerns raised revolved around a number of points:

- were the participants likely to be on speaking terms at the end of construction?
- how was this process impacted by legislation (i.e., the lien act)?
- should changes not be fully addressed during the execution of the contract, rather than at the end?
- would there be any incentive to take the time to review the project?
If the proactive mediation and the preceding steps have been effective, then the above concerns should not be relevant.

C1.3 Resolution of disagreements

The disagreements between commentators, summarized in C1.2, can be categorized as follows:

- opinion: the respondents differed on specific issues;
- misunderstanding: the respondents interpreted the document differently, and this resulted in different opinions.

Listed below are the issues on which disagreement was observed, together with an interpretation of the likely cause of the disagreement. Also listed is the action taken by the author in terms of changes to be made to the revised contracting method.

Changes in type of contract since 1950's. The wording in the introduction to the NCCM will be modified to clarify this issue.

Apportionment of Risk. Some sophisticated owners now do perform a risk analysis on their projects before proceeding, and, to some degree, apportion risks more equitably. The proposed method goes beyond that which is now used in that it allows the contractor to participate in this process.

Similarity and difference between US and Canadian construction markets.

This topic has been debated by many practitioners. Generally, those construction professionals (designers or contractors) who have actually worked on both sides of the border find little difference between general practices in one country compared to another. Differences between Provinces and between States within one country can be more significant than between the two countries as a whole. Equally, differences between industry sectors (e.g., industrial construction versus commercial construction) can be just
as significant. This was verified through a number of personal interviews with practitioners who routinely do business on both sides of the US/Canada border. Though no firm figures were found to verify the impression, it was felt by some that there was a marginally less litigious construction environment in Canada compared to the United States.

Cost impact of improved design, teamwork and risk allocation. There were participants who felt that the effort required to implement the process would add to the cost of construction. Others felt that the net impact would be to reduce overall costs. There is little doubt that the proposed contracting method will add to the cost of preparing and entering into an effective contract. There is more work demanded in this process. Also, there is the added cost of a (full- or part-time) mediator to be accounted for. This said, the intent is to eliminate some of the waste that has been identified by so many studies over the past two decades. (See chapters 2 and 3 for details.) Because this waste is very much larger than the cost of implementing this process, the potential savings will likely exceed the potential cost.

Confidentiality is not a prerequisite to effective contract tendering. The confidentiality of contractors' bid information, and their need to preserve it is demonstrated by the timing of events in tender closings. (See section A3.2 for a description.) The issue of confidentiality was brought up in the context of contractors' reluctance to share plans for construction execution with the subcontractors who were bidding on the project for fear that one of them would (deliberately or inadvertently) share this information with a rival contractor to whom they were also going to submit a price. The first draft of the contracting method was not clear on this matter, however. Rewording of the document will likely reduce or eliminate the apparent disagreement resulting from this ambiguity.

Definition of Strategic Alliances. The definition of a strategic alliance (or partnership) depends on the parties who enter into that type of agreement. There is no industry standard. Thus disagreement in this area is to be expected. This does not materially affect the purpose of the proposed contracting method.
Effectiveness of Guaranteed Upset Price Contracts. This area of disagreement did not materially affect the proposed method because the potential user was not obliged to enter into any particular form of agreement. The draft suggested that such a form of contract might be used. This reference will be eliminated in the next version.

Concurrent design and construction. The timing of award of the construction contract was an issue to many participants. The underlying concern of those who disagreed with the proposed timing was that it was impractical. Some suggested that the process would require designers and contractors to team up for a bid. This was not the intent. The next draft will clarify this issue.

Conversion of contract from one type to another. This issue was identified as impractical or difficult to implement by some, while others felt it was a good idea. There was a majority opinion amongst those who did comment on this issue that there were likely to be difficulties in execution. The process can be very simple, and the New Canadian Construction Method revised draft should include a more detailed description of this process.

Applicability of the process to one sector only. The first draft of the new contracting method gave an example of how a project might be priced with minimal information by a general contractor. This example was based on a high-rise office building. Unfortunately, this led a number of respondents to conclude that the process was aimed exclusively at the commercial construction sector. The examples in the new version either will have to be expanded to include other sectors, or else all examples will have to be excluded from the summary, and left for inclusion in a more detailed manual.

The bidding process. There was a significant amount of dissension on this topic. First, some participants felt that the bid process required a consultant to represent or to advise the owner. Others felt this was not necessary. There is a need to develop different versions of the base method to deal with differing levels of sophistication or experience amongst owners. The other participants in the construction process will, more likely, have
extensive experience in it because they do that type of work as a business. Owners are usually involved in construction as a byproduct of their business, not as a mainstream activity, so the experience and expertise of the owner varies considerably. This is not reflected in the first draft of the new construction method.

Requiring the owner to "bid" the cost of identified risks created a mixed response from reviewers. The intent of this process was to make the owner think in terms of whether it really placed a value on the risk it was asking another party to take before paying the premium for doing so. Often owners are persuaded by their legal counsel or advisers (design consultants, investors, financiers...) to divest themselves of particular risks. This is typically done on the basis that the owner cannot afford to take that particular risk. The question of whether the owner can justify the cost of divesting itself of the risk is rarely, if ever, raised. Again, clarification of the intent in the description of the new contracting method is required.

Holding the bid preparation documents of bidders in escrow was generally considered to be a good idea, though the 24-hour time to submit them was considered inappropriately long, allowing the bidder to amend the document. (See also comments on lines 193 to 229 in section C.1.2) If the only reason for holding bid documents in escrow was to protect the bid, this was probably a fair assumption. However the main reason was to provide untampered documents to support the successful bidder's position in the event of a subsequent dispute. This is not a new concept, having been successfully implemented in the US by the Army Corps of Engineers. This point is unclear in the draft commented on by the reviewers, and therefore needs clarification.

The relationship between the owner and subcontractors was debated by some of the reviewers. The view that owners should have an arms-length relationship with subcontractors competed with the view that owners should be more closely involved. This appears to be an issue of risk apportionment. If the owner or the subcontractor want to have a close working relationship they should contract directly with each other, and not involve a general contractor in the role of go-between. Often, on construction sites, the
relationship between the contractor and its subcontractors is weakened through direct contact between the subcontractor and the owner or its consultant. This direct contact short-circuits the contractual relationships and leads to misunderstandings. The new contracting method should be clear on this point, recommending a contractual relationship that reflects the planned management of the construction work.

Contract close-out procedures. The concerns raised on this issue revolved around the issue of pragmatism of the process. The first issue was to do with the relationships of the participants at the end of the contract period. Assumed in this statement was a failure of the proposed new contracting method: the participants were taken as not being on speaking terms any more! The close-out process should be taken in the context of the result of the overall process, and this should be stated in the methodology.

The Lein Acts typically prescribe the legal requirements of contract completion. They do not set out any mechanism for achieving the required degrees of completion that lead to release of holdback. Nor do they address the process of certification of completion. They usually address the types of completion, typically "substantial completion" and "total completion" or "total performance", and specify, by means of a formula, how they are arrived at. The actual process leaves much to the interpretation of the consultant. The proposed contracting method attempts to address this. It does not attempt to interfere with the legal requirements of the lien process. This needs to be clarified as the draft is unclear on this issue.

The issue of outstanding disputes and change impacts was also read in isolation by some participants. One of the main thrusts of the proposed new contracting method is to deal with disputes as they occur. Given this, it is still likely that some issues are left for the end of construction. It is the intent of the close-out procedure to negotiate a satisfactory completion to the contract. Again, it appears that clarification on this point is warranted.

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123 See Goldsmith on Building Contracts and other legal texts for details.
Although there was agreement that the parties should meet to discuss the project some time after the completion, it was felt that this was not practical as there was no incentive to do so. Some form of incentive for such meetings is needed, and this should be addressed in the next draft of the new contracting method.

C1.4 Summary of Key Issues raised by commentators

A number of key issues recurred in the commentary made by the participants in the laboratory sessions. These are highlighted in this section because they were the basis of the philosophy that drove the rewriting of the New Canadian Contracting Method. These issues are discussed in turn in the following paragraphs.

TEAMWORK. There was a strong recognition of the effectiveness of a team approach to projects. The traditional process for award of construction contracts mitigates against this in a number of ways.

First, the timing is wrong. Contractors are not involved in the design process because they are not appointed until the design is complete. Traditionally bids are based on complete design documents (drawings and specifications). There is a reluctance to revisit the design at this stage for a number of reasons:

- reworking designs implies incorrect design work in the first place;
- schedule constraints usually preclude this process after award of construction;
- the confrontational relationships invariably established by the current contracting process precludes effective design input by the contractor.

Second, relationships established in the traditional contracting process are confrontational. The very nature of the legal process is, at least in part, responsible for this. Contracts are typically referred to by the parties to that contract in the event of a dispute. If resolution is not found between the contracting parties, the problem is taken to court. The court process is based on a winner and a loser emerging from the process. Authors of contracts
are aware of this and write terms that reflect a will to win. The contractor is rarely the author of such contracts, so prepares itself to defend its position and its profit through claims and through identifying failures, errors and omissions of the owner and its consultant(s). Clearly a non-cooperative, mistrustful work environment will emerge.

Where partnerships (or strategic alliances) have been developed, such as the long established one between duPont and Flour Daniel Inc.\textsuperscript{124}, they are based on a number of common points:

- a will to establish a long term business relationship;
- development of an integrated technical team;
- performance incentives for both parties to the arrangement;
- a minimum of legal or contractual regulation of the working relationship.

This type of model is based on the relationships of people, and is governed by a common need to meet certain objectives. It is an effective model for development of other working business relationships.

Theory and practice come into conflict when the reality of competitive tendering and development of an effective team are combined. Teamwork requires a team, not a random assortment of firms - selected because their price was lowest - trying to protect their interests. When design starts, this team will be incomplete, as the contractor (and also the trade contractors) will not be part of that group. The basis of selection of the contractor is usually through competitive tendering, which may or may not include some prequalification process. This tendering process is usually based on pricing a design. There are many ways that have been used successfully to deal with this situation. They include contracting for design and construction at the same time (Design/Build and EPC contracting), bidding on General Conditions of Contract only, and awarding trade work subsequently, use of GUP contracts, and numerous other variants. Where these options are viable, they should continue to be used with the New Canadian Contracting Method.

\textsuperscript{124} Luncheon presentation to the Calgary Chapter of the Canadian Society for Engineering Management, November, 1992.
if it is appropriate to do so. Where they are unacceptable, for any reason, another process should be used or developed, even if that process precludes some of the potential advantages of the new method.

PEOPLE: TRAINING, ATTITUDES AND SKILLS. The key ingredient in any contractual relationship is the people who are involved. There were several comments made by reviewers that emphasized this point. Three concerns were raised in the context of people involved in the contracting process.

- Many participants were inadequately trained for their role.
- Attitudes towards other participants were often negative, in that these attitudes tended to preclude cooperation between parties.
- Skills of key players were lacking in some important areas: human relations skills, negotiating skills, knowledge of other people's functions are just some of these often missing, yet important capabilities.

Training of construction professionals is inadequate. Until the industry recognizes the benefits of more effective management training, this will continue to be an issue. The new contracting method offers an opportunity to provide on-the-job training through the mediator. This is an opportunity only, and its effectiveness will depend on the participants and their will to take advantage of it.

Attitudes in the construction industry have developed over history. It is not the intent of the proposed new method to change them instantly and radically. The purpose of the methodology is to direct participants towards a problem-solving, solution oriented approach to dealing with construction issues rather than the confrontational approach that stems from the more traditional one. Though there is hope, and a possibility, that attitudes may change over time if the process is broadly adopted, this is not a prerequisite to the success of the new construction method.

DEFINITION OF OBJECTIVES AND EXPECTATIONS. Defining what expectations are is a common weak link in the contracting process. A Lump Sum contract should be based on a clear definition of the work to be performed. This, in turn, implies that it is possible to reasonably assess the risks involved in execution of the construction. Frequently, Lump Sum contracts are awarded on inadequate or ambiguous definitions of expectations. Consequently, disputes arise when the interpretation of the contractor and the owner or its consultant differ. The frequency with which lump sum contracts are used with inadequate definition of expectations has not been evaluated in this research. However, there were a number of participants who commented on this issue, and the symptoms were observed in the first survey performed in this work.

RISK APPORTIONMENT. Closely tied to the issue of adequate definition of expectations in a contract is apportionment of risk. The tie between these two elements is that inadequate definition creates additional risks. Whether the risk is created for the owner or the contractor is based on the wording in the contract, and ultimately may be based on the decision of a court.

That there is a premium to be paid in exchange for assuming a risk has been demonstrated. Respondents appeared very supportive of the proposal to identify and, in some way quantify, the risks being apportioned in a construction contract.

PROPER PLANNING. One of the strong criticisms that came out of the laboratory sessions was that there was inadequate planning done by all parties. Owners did not plan the overall project adequately. Consultants focussed their planning on the design process with inadequate thought for the overall process, including construction. Contractors

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planned their work badly, if at all. The foregoing statements are generalizations of the types of comments made and recorded in the laboratory sessions.

COMMUNICATION BETWEEN PARTIES TO A CONTRACT. Poor or inadequate communication between contracting parties was identified as another problem that should be addressed. The respondents commented on this point primarily in the context of the sections in the draft New Canadian Contracting Method that related to today's problems and to the development background of the new process. The issue of communication is addressed by implication only in the proposed use of proactive mediation.

PRAGMATISM OF SOME SUGGESTIONS. A number of processes that were included in the new contracting method were criticized as being impractical. These are addressed below.

- RISK EVALUATION
  The proposed process for evaluation of risk is based on using the "marketplace" to help identify and price these risks. The process as described has not yet been tested, so reference to actual experience in use of the process is not possible, either in criticism or in defense. The concern that was raised was in three parts. First, contractors would not be prepared to share "risk" information before a bid closed. Second, owners would not be prepared to submit "Sealed Bids" for their own evaluation of risks. (Who ever heard of an owner having to do that sort of thing!) Third, the owner may not have the experience or expertise to evaluate risks in any event. All three concerns are valid and are addressed below.

It is the author's opinion, based on experience in the contracting business, that the proposed process could be accepted by most contractors for a number of reasons. Contractors are risk averse. Taking unnecessary risks merely reduces the potential for reliable profit. A common concern expressed by contractors is that the low bid
will go to someone who lacked the experience to identify the risks in a project and therefore did not cover them adequately. Defined as poor management in an earlier chapter, this is a symptom of moving into a new project size or type or into a new market area as well as a lack of experience of key personnel in the company\(^{27}\). They prefer to bid on more, rather than less information. This point was raised in a different context as a lack of definition of the expectations of the owner in a contract. Absorbing construction related risk is clearly an expectation of the owner in many contracts. Lack of definition of the risks that the owner expects the contractor to take is a common occurrence. Contractors prefer to have risks properly defined so that the cost of taking that risk is included in their bid as well as in those submitted by others. This reduces the risk to the parties that the successful bidder is appointed on the basis of an error which will subsequently lead to difficulties during construction. Interpretation of a contract, if ambiguous, will be against the person who prepared it\(^ {28}\).

The proposed new contracting method draft suggested that the owner submitted a sealed bid with its own evaluation of the risks to be taken. This was proposed primarily to protect the owner from criticism that the bid evaluation process was "rigged" in any way. Submitting a sealed bid, or declaring the risk evaluation after bids are received, but before they are opened, eliminates this risk. It does so by making the bid evaluation process fully auditable and visible. The need to do this is largely dependent on who the owner is and the extent to which the bid process needs to be clearly visible. The term "bid" may also have been offensive to some. This required revision in the next draft of the NCCM.

The third concern raised in this context was that owners may lack the expertise or experience to perform an effective risk evaluation. This is a valid concern. If

\(^{27}\) Schiefer, 1990; Causes of contractor failure include: Increase in project size; moving into new types of construction; changes in key personnel and lack of managerial maturity in expanding organizations.

the owner is unable to prepare such an evaluation or is uncertain of its own capabilities to do so, it will be reluctant to use the results, let alone to publicize them! The evaluation of risk and the need to plan effectively are also closely linked. Consideration given to risks early in the development of a project will often lead to appropriate planning to mitigate such risks. One of the most common risks is that of delays to completion. The potential impact of this risk is high for the owner, and in the absence of appropriate wording in the contract (such as liquidated damages for delays), are arguably less for the contractor. Contractor's losses are related to the cost of remaining on site. The owner loses its opportunity to mitigate this risk when the proforma for the project is set and approval for expenditure is given. The early decisions on a project, typically made with little information, often set the path for its execution. An unrealistic schedule will invariably lead to a "delayed" completion. Improved ways for owners to identify, evaluate, and quantify risks are being produced. Owners who are not familiar with current research in this important area should be made aware of it. Consultants who advise owners at the critical formative stages of a contract, and during contractor selection are often well placed to assist the owner in quantifying the cost of a risk. The proposed process is very simple: just ask how much you would be willing to pay to get rid of a particular risk.

TIMING OF CONSULTANT AND CONTRACTOR APPOINTMENT

Many participants felt that the proposal for bringing together the team that will ultimately build the project was impractical in that the contractor was being selected on inadequate information or else it was being asked to bid on inadequate information. These comments reflect valid concerns. This said, selection of contractors early in the process of design development is not new. In industrial projects the EPC (Engineer, Procure, Construct) process that fasttracks design and construction is well established. On international industrial projects, bidding these

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contracts for design, procurement and construction on a lump sum basis is not uncommon. One participant in the evaluation process identified (during a subsequent interview) a project in the middle east that was currently being negotiated by his company, valued at over $500 million, on a lump sum basis. Because of the specific requirements of the lenders, the project will be contracted on a lump sum basis. The cost of carrying the substantial design and construction risks on this project is expected to be very high indeed.

The intent of the new contracting process was to bring relevant expertise to bear on the project as early - and therefore as beneficially - as possible. Greater attention to the potential mechanisms by which this may be done will form part of the revised contracting method.

- **CHANGING TYPE OF CONTRACT**

One of the possible methods for introducing construction expertise into the project team early was the use of a contract type that is changed once more information becomes available. This is not a new concept. It has been used successfully before in Canada in the industrial sector as well as on commercial (and even residential) projects. From the wording of the comments made on this topic, it would appear that the concerns over its practicality were raised by those participants whose personal experience excluded use of this technique. This would suggest that this process should be explained in more detail, with more examples, in the revised contracting method.

- **FOLLOW-UP MEETINGS**

There was general agreement that the proposed follow-up meetings, some time after the completion of a contract would be beneficial to the parties involved in the original contract. The extent to which the owner would benefit from the process would depend on how frequently it constructed new or renovated work.
The concern with its success was that there was no [financial] incentive for the consultants and contractors to commit the time to this process. The researcher offers two possible solutions to this, both of which will ultimately be paid for by the owner.

The first solution is to include the meeting in the terms of the contract, and to assign part of the contract payment to this activity. If this is done, care must be taken to exclude this activity from the legal requirements of prevailing legislation, such as lien acts, so that payment and contract close-out is not complicated by this added requirement.

The second solution is to encourage this activity as a business development tool for the consultant and contractor. This can be achieved in a number of ways and has two distinct advantages. First, those owners who would benefit from the activity would encourage it, thus restricting the additional work to where there is a direct benefit. Second, the process does not involve contractual obligations and all the associated potential problems. The participants all have a stake in its successful performance. Encouraging this activity as a business development tool is achieved by including it as part of the consultant or contractor selection and prequalification process.
CHAPTER C 2

REVISED CANADIAN CONTRACTING METHOD

C2.1 Major Changes

C2.2 Revised Document (New Canadian Contracting Method)

HOROWITZ'S RULE:
Wisdom consists of knowing when to avoid perfection.
On the basis of commentary reported in Chapter C1, the original version of the proposed contracting method was modified. The changes and their rationale are discussed in this chapter. Following this discussion, is the revised document.

C2.1 Major Changes

The changes made in the revised "New Canadian Contracting Method" may be put into two groups. The first set of changes are in presentation and style. An expanded introduction and background address comments of reviewers that reflected incompleteness in the first draft. Examples of applications needed to be broader to include more of the different industry sectors that the process is trying to address. The second set of changes are in detail, and pick up on the specific comments and concerns of the reviewers as they related to the methodology itself and its pragmatism.

The changes may be summarized as follows.

Presentation Style

- Simplify flow of the description.
- Expand on detailed methodology where needed.
- Offer a broader range of application examples, or provide none.
It was decided that the detailed charts, checklists and other material that were needed for effective implementation of the NCCM should be included in a separate Procedures Manual. This manual will be produced on the first test case for implementation of the method.

Detail Changes

(A) Based on points of agreement:

- Address people problems and the need for effective team building.
- Address issue of definition of work to be performed under the contract.
- Deal with concerns related to evaluation of risk in greater detail.
- Include a more detailed description of the planning process.
- Address the issue of project communications.
- Provide better references and descriptions associated with the costs of doing business as it is done today.
- Provide some commentary on the need to improve quality, profitability and reduce conflict.
- Add information and explanation on the relationship between exculpatory clauses in contracts and conflict in administration of the contract.
- Identify clearly what is new and what is not, and state why the method is referred to as "New".
- Rework the sequence and timing of award of contracts to the consultant and the contractor, to address the concerns that the contractor does not have enough information with which to bid, and the consultant may be required by the owner to provide advice in selection of a contractor.
- Address the need for staged selection of subtrades, and the reasons for this despite the existence of the bid depository process.

- Address the issue of the relationship between the general contractor and subcontractors in this new process.

- Address the concern that the new contractor selection process would add time to the tendering cycle and add to the overall construction delivery schedule.

- Rewrite the tendering procedure to make it easier to understand, eliminating the apparent confusion in interpretation of the first draft.

- Address the process to be used by the owner in assessing the risks involved, for pricing purposes.

- Delete Chart 1, and re-draw Chart 1a to clarify the contractor selection process, and add selection of the consultant(s).

- Redraw Chart 2 to clarify key differences and advantages of the new process.

- Clarify the purpose and agenda of the construction startup meeting.

- Add a recommendation that the minutes of the meeting be kept by one party to the contract and the meeting be chaired by the other. The consultant may substitute for the owner in this instance. Alternatively, consider the Mediator as minute taker and the contracting parties alternate in chairing the meeting.

- Restate the purpose and need for the regular design and construction progress meetings.

- Clarify the difference between mediation and arbitration as there seemed to be some confusion amongst the participants in the laboratory sessions, and therefore there
is likely to be confusion with other construction industry practitioners.

- Elaborate on the role of the insurance and surety business in the new process.

(B) Based on points of disagreement:

- Recognize that major privately held owner corporations were already using some type of risk analysis in the process of selection of projects and in planning of their execution.\textsuperscript{130}

- Reword the comments on changes to contracts since the 1950's, to clarify this issue.

- Add to the comments on the differences and similarities between the Canadian and US markets.

- Add commentary and explanation (definitions) of the different types of contract referred to in the New Canadian Contracting Method.

- Address the cost of implementing the process, particularly the additional planning and design review effort. Identify potential returns that may result from this added investment.

- Address the issue of confidentiality of a contractors' bid.

- Rework the approach to concurrent design and construction so that this is clearly an option.

- Generally re-write the document to reduce the potential for misinterpretation of its intent.

\textsuperscript{130} For example, Shell Canada Limited uses a risk management process which was developed specifically for them by Mr. Cel Sime.
The New Canadian Contracting Method (NCCM)

SUMMARY

The New Canadian Contracting Method has been developed to address specific concerns identified by industry as being major cost-incurring factors in the construction process. Developed with considerable input from construction industry practitioners from across Canada, NCCM addresses the following issues that have been identified by the construction industry and its users.

- Projects are inadequately planned.
- Risks (in contracts) are inappropriately allocated.
- There is an unnecessarily high incidence of changes, disputes and confrontation.
- It is difficult to cleanly complete construction contracts.

The purpose of NCCM is to encourage better working relationships on construction projects by reducing risks through better planning, apportioning them more astutely and reducing the incidence of disputes and confrontation. The method uses four steps to achieve these objectives.

The first step is the selection of the team that is to design and build the project. The selection process is based on prequalifying the participants, so that they are selected on the basis that they can successfully and economically perform their role in the execution of the project.

The second step is apportionment of risks in a way that makes the most sense to the participants. The process is designed to be as simple as possible, while involving all the
participants. It is based on identifying risk, isolating the cost of carrying it, and attaching a commercial value to it.

The third step is in the application of proactive mediation throughout the contracting process. It is generally agreed in the industry that one party to a dispute is aware of a problem long before the other is. It is also agreed that mediation is preferred over arbitration and litigation as a means of resolving disputes. The process used in the administration of the contract recognizes these points and is intended to reduce the risk of a dispute becoming unnecessarily expensive to resolve.

The final step is to review the work to be done by the contractor as completion is approached. The remaining work can usually be divided into three categories: contracted work remaining; deficiencies that must be made good by the contractor and deficiencies that the owner could live with or make good itself. On many projects it is the work in this final category that is hardest to get completed satisfactorily, and that therefore delays release of final payments and extends the start dates for warranties while extending insurance and bonding commitments. All of this costs the contractor, and ultimately the owner, more money. In this step the remaining work is reviewed to categorize it. Any work in the last of the above three categories is then renegotiated and a change order issued to reflect how it will be dealt with.

DEFINITIONS
Because of the different usage of specific terms in the construction industry, the following definitions are used in the NCCM.

Owner - means the individual, corporation, government agency, joint venture or other legally existing entity that will own the constructed project.

Contractor - means a designer or constructor who has contracted directly with the owner to provide goods or services for the design and construction of the project.
Consultant - is the designer or specialist who advises on matters related to the design and construction of the project.

Constructor - is the builder or supplier of equipment, materials or labour for the purpose of constructing the project.

Bid - means an offer to provide goods or services for the design or construction of the project.

Project - is a facility, large or small, which is to be built, renovated or expanded.

Sub-contractor - means a consultant or constructor that has contracted with a contractor to provide goods or services for design or construction of a project.

Price-based contract - is one that is based on a fixed price, and the contractor is responsible for costs and thus, any cost overruns.

Cost-based contract - is one that is based on paying the contractor for the cost of goods and services plus a fee or profit.

INTRODUCTION AND BACKGROUND

The construction process, like other processes, involves risk. Yet there is a reluctance to acknowledge many of these risks or their consequences. This reluctance manifests itself in a number of ways.

- The risks inherent in the construction process have grown substantially over the past 50 years, through increased regulation, higher technical complexity, political change, environmental regulation, economic volatility and a myriad of other factors. Despite this dramatic change in the risks associated with construction,
the process for contracting out this risk has not changed significantly over the same period.

- Most construction budgets are presented based on single-point estimates. If a risk analysis had been performed, the budget would have been based on a range of possible outcomes derived from the analysis. The development of an appropriate contingency would have flowed from this.

- Risks are not constant, but change as the project progresses. **Risk analyses are performed at the beginning of the project, if at all, then are not repeated.**

- Contract strategies tend to be based on what was done before, or on policies and guidelines that may have little or nothing to do with the project in hand. The contracting strategy is often established without consideration of the risks that are effectively being managed by the resulting process. Consequently, risks are not managed effectively.

- The preferred method of contracting is to bid competitively, then award a lump sum contract. **This process mitigates against recognition of the premiums which are paid for risk-taking.** The premiums remain hidden, buried in the overall bid and its subcontractor price components.

In 1991 and 1992, a survey was performed in Canada,\textsuperscript{131} which involved 155 senior construction practitioners, representing in about equal proportions, owners, contractors and consultants. The survey identified some of the major issues that face the construction industry in Canada. This survey, combined with the findings of other research in North America, suggests that there is significant opportunity to reduce construction costs. The following, related, areas of potential cost savings are targeted by the NCCM.

\textbf{Between 14\% and 40\% of the money spent on capital projects is wasted because of inadequate planning.}\textsuperscript{132} An essential ingredient of efficient planning of capital projects

\textsuperscript{131}Harmon, Francis T.; Survey completed as part of the requirements for completion of a Doctoral Thesis for Loughborough University of Technology. The survey was completed in conjunction with the University of Toronto, Toronto, Ontario.

\textsuperscript{132}Harman, Francis and Griese, William; official recorders. Observation recorded at the October 1991 seminar for senior construction industry executives sponsored by the Construction Industry Development Council at the University of Calgary.
is understanding the risk associated with the project. Risk must be assessed and allowed for at the earliest stages of a project. Part of this substantial estimated wastage is related to inadequate assessment and subsequent ineffective or inappropriate management of risk.

Between 30% and 40% of the money paid by owners to contractors is paid as a result of changes, claims and litigation. These payments offer a lower return per unit spent than money expended under the base contract. This is because of the administrative overhead that is associated with the process of dealing with changes, claims and litigation. Reducing changes, claims and litigation will clearly lead to improved value for construction money.

As much as 20% of the cost of building in the United States during the 1980's has been attributed, by the American Society of Civil Engineers, to the impact of litigation. Such an impact is due to two factors: the incidence of disputes and the process for resolving them. A reduction in the incidence of disputes and a more cost efficient way of resolving the ones that do occur will go a long way towards reducing this cost.

In a survey of 62 participants in the evaluation of the first draft of the NCCM, all except three agreed or strongly agreed that many contract disputes are known about by one party for a long time before they are dealt with. Of the remaining three participants, two were neutral and one did not comment. This suggests that resolution of disputes is deferred for one reason or another, on a regular basis.

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134 Ibid.

Changes, claims and litigation are all symptoms of risk. Risks include the potential for
design changes, unexpected ground conditions, delays of all sorts, availability of labour
and materials, to name a few of the most common ones that lead to disputes. If risks are
managed more effectively, then there is a high likelihood that the associated potential
disputes will not arise, or else will be more easily and economically resolved.

Recent developments in the better management of construction risk are by Thompson and
Perry in the United Kingdom (1992) and by the American Consulting Engineers
Council and the Associated General Contractors of America Inc. (1990). This work has
in common the need to identify risk as an integral and important part of construction
planning. One of the key steps in this planning process is development of a contracting
strategy. The contracting strategy should allocate unavoidable risks in such a way as to
minimize the cost to the owner. This should not be confused with either hiding the cost
by hiding the associated premium) or with minimizing the initial or apparent cost (as is
often done by accepting the lowest bid, even if the bidder may not be properly qualified
or capable of doing the work).

The work done in the United Kingdom and in the United States is significant in that it
identifies the importance of risk management as a part of the construction process. The
NCCM builds on this and other work to offer a pragmatic approach to risk and dispute
management in construction. This is achieved in a four-step process that is described in
detail in later sections.

The four steps to the NCCM are:

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137 Taskforce of the Consulting Engineers Council of America and The Associated General Contractors of America Inc; "Owner's
guide to saving money by risk allocation" Publication of the Taskforce of the Consulting Engineers Council of America and The
Associated General Contractors of America Inc; Washington D.C.; June 1990.
Prequalify the Contractors to limit the number of bidders to those who are qualified to do the work. A process similar to that used in the public sector today is proposed. An added benefit to limiting the number of bidders is that the cost of bidding is reduced. As owners ultimately pay for this, they effectively benefit from the cost reduction.

Allow the prequalified bidders to share in the identification and quantification of the construction risks inherent in the project. This will not only simplify the identification of risk, but will help in its proper allocation through contracts.

Use proactive mediation during the management of the contract. Current practices for dispute management tend to be confrontational and have a poor record for success. This poor record manifests itself in the high incidence of construction litigation.

Provide a simplified process for completing a contract. Completion of contractual obligations by both parties to a construction contract triggers many things. Included in these are: end of the bonding obligations, changes in insurance coverage, start of the warranty period, release of holdbacks after statutory wait times, and the start of limitations periods for lien claims and other potential litigation. This date is clearly significant. It needs to be cleanly identifiable and achievable by both parties. Often its achievement is clouded by other factors, such as deficiencies and meeting of particular contract requirements or interpretations of them. NCCM addresses this through a process intended to simplify contractual completion.

The need for better contracting methods has been identified in numerous technical journals and articles over the past twenty years. The rationale used in the development of the NCCM is outlined below.
Today's construction contracts are based on a confrontational system that precludes a number of opportunities for specialists to pool their expertise to produce a better product. Confrontation has also led to attitudes that are based on mistrust and which will not allow owners, consultants and constructors to work closely together towards a better product. Owners, sometimes through their consultants, produce contracts that are intended to eliminate construction risk. Consequently, to stay in business, contractors assume these risks that are often inappropriate. In turn, contractors will pass as many of these risks on to their subcontractors as possible. These risks translate into premiums that, ultimately, the owner will pay.

The standard arguments used in the industry that suggest that there is no premium associated with construction risk are myths that are worth addressing.

*Myth: In competitive tendering, the contractor cannot afford to include a premium to cover risk.* If the contractor did not include an allowance to cover risk, and the inevitable risks occur, then the cost of such risks must be either absorbed by the contractor or claimed from the owner. If the cost is successfully claimed from the owner, then the owner will have paid the premium for carrying that risk. If not, then the cost is absorbed by the contractor. If there is insufficient profit to do this, the long term result is bankruptcy. In the event of contractor insolvency, the cost to the owner is even higher, as the cost of completing a construction project abandoned by a failed contractor is always higher than the difference between payments made to date and the original contract price. Again, the owner pays. If, however the contractor survives, then it must be because income exceeds expenditure. In other words, the income must include the cost of the construction plus a premium to cover the risk and some profit. The competitive tendering process has helped hide the premiums associated with risk in the cost of doing business so successfully, that even contractors are often unaware that this cost exists. Sureties often cover all or part of the cost of contractor business failure. However, ultimately it is owners who pay the premiums for the performance bonds.
Myth: Competitively bid price-based contracts are the safest and often the cheapest form of contract for the owner.

Safety implies little or no risk. The cheapest form of contract is one that carries no hidden or additional costs. It is therefore unlikely that the safest contract - with its attendant risk premiums - will also be the cheapest. In all likelihood it will be one of the most expensive. The additional cost of the premium to carry the risk will either be included in the base price for the work, or will be claimed by the contractor afterwards. The latter alternative carries the additional cost of preparing, presenting, defending and, if needed, litigating the claim.

Myth: The main advantage of price-based contracts is that you know at the outset what the project will cost; this is not true of cost-based contracts.

The evidence of actual performance on many projects in North America and elsewhere suggests that cost and schedule overruns are common. Thompson, Perry, et al (1992) refer to numerous examples of this, quoting in particular a review of World Bank projects between 1974 and 1988 (63% with cost overruns and 88% with time overruns). They also quote a 1975 report on public works projects in the UK that states that one in six contracts overran the original contract period by more than 40%, and a significant number overran by more than 80%. More recent studies suggest no improvement on these types of performance.

Myth: The construction industry continues to improve its performance. Today's performance is as good as may reasonably be expected.

The American Society of Civil Engineers published an article in 1990 that suggested that as much as 20% of the cost of construction was attributable to the impact of litigation. A study in Canada suggests that between 30% and 40% of the money spent on construction is processed through changes, claims and litigation. Changes, claims and litigation are all symptoms of poor risk management and they attract additional costs associated with administration and dispute resolution.
All of these myths relate to risk, how it is apportioned between project participants and how it is subsequently managed.

Allocation of risk to the party best able to manage or control it will tend to result in the lowest premium. The benefit will go to the owner, though there is potential for more reliable, if not greater profit for contractors and subcontractors. Development of a team approach between the owner and its contractors will allow the team to work together to address the problems associated with design and construction of the project.

The process described below is intended to help all project participants to understand and manage risk more effectively.

STEP 1: CONTRACTOR PREQUALIFICATION

A major risk on any project is the performance of the contractor. Prequalification of contractors will significantly reduce this risk, while adding other benefits for all parties.

From an owner's perspective, limiting the number of bidders will reduce the cost of bidding and subsequent analysis and selection. Prequalifying contractors for design and construction will help assure the owner that the expected quality will be achieved.

A consultant should be selected primarily on the basis of suitability and capability to perform effectively on the project. The consultant's fee will represent a relatively small portion of the total project capital budget. The difference between one fee proposal and another will likely be less than the savings in the overall project cost that the best consultant can achieve relative to the cheapest one. Selection of the best consultant is, therefore, more important than selection of the cheapest proposal.

Construction bidders that have been prequalified on the basis of capability to do the work are most likely to be competing on a similar basis. The prequalification process not only
restricts bidding to companies that are likely to be able to complete the project, but it simplifies and reduces the cost of the tendering process. What is more important is that the probability of a contractor that does not understand the construction risks and problems submitting an inappropriately low bid is largely eliminated. It is very difficult for an owner to ignore a low bid, even if it is known that this bid is incomplete in some way. Often the owner pays for the consequences of selecting an erroneous bid in a number of ways. First, quality is likely to suffer. Rework can add to construction times. Disputes, claims and litigation are more likely to occur as the constructor seeks ways of recovering losses. Even if the contractor is not paid directly, there is a potentially high cost of defending against the claim, and the additional cost of administering the contract under such difficult conditions.

Prequalification of the contractor can be done in a number of ways. Industry standard forms are available to collect key data on contractors, their experience and financial capabilities. For owners who regularly build projects, one process is to allow any contractor to bid on small projects. Their successful completion of one or more of those will qualify them to bid on larger ones, and so on through a range of project sizes. Consultants often use a similar process to prequalify constructors that they recommend to owners who build only occasionally and who therefore have less exposure to the construction market.

In turn, subcontractors may be prequalified by the contractors. Whatever the mechanism used, a relatively short list of bidders will lead to more effective bidding. It may also be appropriate, where corporate practice permits, to negotiate with the best qualified contractor to do the work, thus eliminating the time required to bid the work. The involvement of appropriate expertise in evaluating the contractor's offer to do the work will help the owner in arriving at a reasonable cost of construction.

The NCCM does not advocate any one method for selecting the contractor, nor does it recommend a specific type of contract. Selection of the right type of contract will depend on the type of project that is being built, the risks associated with construction and
possibly the limitations placed on the contractor by bankers, corporate or public policy or other external factors.

STEP 2: BIDDING AND RISK APPORTIONMENT

Having restricted the bidding (or negotiation) to a limited number of qualified contractors, the next step is to involve these companies in the process of identifying risks. The proposed bid documents are issued to all bidders for review. The bidders are asked to identify, based on their experience, the risks that they are expected to assume and that are likely to attract a premium. These risks are then listed and the information is shared.

This information is shared in the form of a list of all identified risks. Bidders are then asked to submit a price on the basis that, the wording of the contract notwithstanding, the listed risks are excluded from the base bid. The contractor then prices the risks, on the basis of: "If I were to take this risk, I would need to add $"x" to my base bid." The owner also prices the listed risks, on the basis of: "How much would I be prepared to pay in order to not have to take this risk?"

More sophisticated risk analysis techniques are available, and nobody is restricted to using the simple process described above. However, the above process does force the issue of pricing the premium required to take and, where appropriate, manage a risk.

A similar process may be instigated with the key subcontractors, again, where appropriate.

The bid evaluation process then helps assign risks to the party that requires the lowest premium for assuming that risk. The process is self-governing.

- If a contractor prices a risk at zero, that risk will be passed on to the contractor.
If a risk is priced very highly by a contractor, the owner may wish to retain the risk itself, because passing on the risk is too expensive.

Consistently over-pricing risks, will mean that the owner's evaluation will govern, and will be added to the base bid for bid evaluation purposes. This will reduce the chances of winning the contract based on price as other contractors, who have bid risks below the owners price will have their own evaluation of the risk added to their bids, and because these are lower values, by definition, the bids will be more competitive.

If the contractor consistently underprices all risks, it will be obliged to carry those risks. Because the contractor bid on those risks, it will be difficult to subsequently avoid responsibility for them. Consistent underpricing will ultimately lead to business failure, as risk costs exceed risk revenues. Involvement of Sureties in this process will help minimize the potential for this type of failure.

THE OWNER SHOULD CAREFULLY REVIEW BIDS WITH CONSISTENTLY LOW RISK EVALUATIONS. BIDDERS SHOULD BE AWARE THAT LOW OR ZERO RISK EVALUATIONS WILL BE CAREFULLY EXAMINED BY THE OWNER.

The bid analysis is illustrated in Table C.2.2. The key point in this analysis is that the comparison and selection is made based on the best combination of owner and contractor prices for risks with all risks included. The contract, however, is awarded for a price comprising the base bid plus the price of the risks to be assumed by the contractor, i.e. the contract excludes the cost of the risks to be carried by the owner.
EXAMPLE OF A BID ANALYSIS (Simplified)

<table>
<thead>
<tr>
<th>LIST OF BIDDERS</th>
<th>OWNER</th>
<th>BIDDER-A</th>
<th>BIDDER-B</th>
<th>BIDDER-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>RISKS V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Conditions</td>
<td>$100,000</td>
<td>$400,000</td>
<td>$250,000</td>
<td>$150,000</td>
</tr>
<tr>
<td>Schedule</td>
<td>$1,500,000</td>
<td>$230,000</td>
<td>$5,000</td>
<td>$340,000</td>
</tr>
<tr>
<td>Delivery of Component &quot;X&quot;</td>
<td>$50,000</td>
<td>$75,000</td>
<td>$50,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>Labour Availability</td>
<td>$1,000,000</td>
<td>$80,000</td>
<td>$100,000</td>
<td>$120,000</td>
</tr>
</tbody>
</table>

**BASE BID**

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<tr>
<td></td>
<td>48,300,000</td>
<td>48,400,000</td>
<td>48,100,000</td>
<td></td>
</tr>
</tbody>
</table>

**ADD PREMIUMS FOR:**

<table>
<thead>
<tr>
<th></th>
<th>OWNER</th>
<th>BIDDER-A</th>
<th>BIDDER-B</th>
<th>BIDDER-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Conditions</td>
<td>$100,000</td>
<td>$100,000</td>
<td>$150,000</td>
<td></td>
</tr>
<tr>
<td>Schedule</td>
<td>$230,000</td>
<td>$5,000</td>
<td>$340,000</td>
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</tr>
<tr>
<td>Delivery of Component &quot;X&quot;</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
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</tr>
<tr>
<td>Labour Availability</td>
<td>$80,000</td>
<td>$100,000</td>
<td>$120,000</td>
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**ADJUSTED BIDS**

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<tbody>
<tr>
<td></td>
<td>48,760,000</td>
<td>48,655,000</td>
<td>48,760,000</td>
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</tr>
</tbody>
</table>

Bidder-B would be awarded the contract, and would take responsibility for the Schedule, Delivery of Component "X" and labour availability, while the owner would assume the risk for Soil Conditions.
The bidding steps may be summarized as follows.

1. PREQUALIFY BIDDERS.
2. SELECT BIDDERS.
   2A CONTRACTORS SELECT SUBCONTRACTORS.
3. BIDDERS IDENTIFY CONTRACT RISKS.
   3A SUBCONTRACTORS IDENTIFY SUBCONTRACT RISKS.
   3B A CONSOLIDATED LIST OF RISKS IS ISSUED TO BIDDERS AND THEIR SUBCONTRACTORS.
4. BID PROJECT WITH ZERO RISK AND PRICE ALL RISKS SEPARATELY
   4A SUBCONTRACTORS PRICE SUBCONTRACT PACKAGES ON ZERO-RISK BASIS WITH THEIR RISKS PRICED SEPARATELY.
5. SUBMIT BIDS WITH ALL RISKS PRICED SEPARATELY.
   5A BID PREPARATION MATERIALS MAY BE PLACED IN ESCROW BY THE CONTRACTOR UNTIL A SUCCESSFUL BIDDER IS SELECTED.
   5B THE SUCCESSFUL CONTRACTOR MAY ELECT TO KEEP ITS' BID IN ESCROW UNTIL THE PROJECT IS COMPLETE.
6. OWNER PRICES RISKS FOR BID COMPARISON PURPOSES.
7. ANALYZE BIDS, SELECTING LOWER PREMIUMS OF BIDDER OR OWNER FOR ALL RISKS.
   7A ASSIGN RISK TO BIDDER IF ITS PREMIUM IS LOWER THAN OWNER'S.
   7B ASSIGN RISK TO OWNER IF OWNER'S PREMIUM IS LOWER THAN BIDDER'S.
   7C BASED ON THIS ASSIGNMENT AND THE LOWER PREMIUMS, ADD BASE BID TO PREMIUMS TO DETERMINE LOW OVERALL BID AFTER RISK ASSIGNMENT.
   7D BID EVALUATION IS COMPLETED, TO TAKE INTO ACCOUNT OTHER FACTORS WHICH MAY BE CONSIDERED, SUCH AS STAFFING, CONSTRUCTION PLAN, INNOVATIVE IDEAS ETC.
NEGOTIATE WITH THE SELECTED BIDDER TO ENTER INTO A CONTRACT WITH THE RISKS ASSIGNED BASED ON THE BID EVALUATION.

MANAGE THE CONTRACT.

9A KICK OFF MEETING.

9B SELECT MEDIATOR.

9C CONTINUE WITH PROJECT . . .

Timing of the bidding process is also worth review. The NCCM does not require, but does recommend that the owner build an effective team to design and build its project. Bringing the constructor into that team after the concept for the project has been determined, but before the working drawings are developed and the specification is finalized offers a number of advantages. These advantages are:

- the constructor can have input to the design, offering constructability expertise;
- constructor's construction cost expertise can be utilized to check project costs as the design develops;
- delivery of materials and equipment and other schedule items can be addressed as the design develops, rather than wait for it to be completed;
- alternatives can be discussed, and action taken with minimal impact on design rework;
- the constructor and consultant can develop a working relationship over a longer period of time;
- disagreement over design details, interpretation of specifications and other contract interpretation issues is reduced through the constructor's involvement in their preparation.

It should be stressed that in such an arrangement, the consultant's decision on matters related to design must be final, with only the owner overriding such decisions. If the owner does override a consultant's decision or recommendation, the owner assumes
responsibility for that decision. Similarly, on matters of construction process, the constructor’s decision should be final, except where design considerations govern.

Selection of key subcontractors should follow a similar process, with similar potential resulting advantages.

The mechanism for bringing contractors onto the owner’s project team before the design is completed is well established and has been successfully performed on a large number of projects. This process is common in design/build projects, in many applications of cost-based contracts (e.g., cost plus type), in EPC (Engineer, Procure and Construct) contracts and in BOOT (Build, Own, Operate, Transfer) projects. It also commonly occurs where owners have formed strategic alliances (also referred to as Partnering).

The process for retaining a constructor before the design is complete, is to use a cost-based contract. The constructor is paid a fee for design related services and a fee is agreed (to include profit and, possibly overhead) for the construction portion. The construction portion of the fee would likely be based on a preliminary schedule and defined general scope of work and budget. The mechanism for adjusting these fees for changes to scope, schedule and budget can be predetermined. Once the project has been sufficiently well defined, the contract can be converted to a stipulated price form, if so required by the owner.

Involving the contractors in the risk evaluation and quantification process helps to identify and apportion these risks.

Mentioned in the summary of the bidding process is the option to put bid documents into escrow. The reason for this, in Canada, is to protect both the owner and the contractor from the worst impact of the Ron Engineering case. Ron Engineering established, in simple terms, the following legal situation within the bid process in Canada. Invitations to bid a project are considered to be offers which are accepted by companies who submit a bid, creating a unilateral contract (referred to
as Contract A). Essentially, Contract A obliges the owner and the low bidder to enter into a contract to perform the work that has been tendered. This second contract is referred to as Contract B. To avoid its obligation under Contract A, a bidder must be able to demonstrate that there was a mistake in the bid that is clear on the face of the bid. This is not always easy to prove. Documents that set out the contractor's position, if they could not have been tampered with because they were in escrow, will help to clear up such a situation. For an Owner to select a bidder other than the low bidder, it must clearly state the basis on which the contract will be awarded, and the evaluation will be made. Bid documents held in escrow will help to protect owners from claims by unsuccessful bidders.

A further application of the bid documents held in escrow is during the administration of the contract. The successful bidder may wish to have its bid documents held after the selection process. Should a problem arise involving interpretation of the contract documents, the contractor may, at its sole discretion, call on these documents in support of its interpretation of the contract at the time of bid.

STEP 3: PROACTIVE MEDIATION DURING CONTRACT ADMINISTRATION

The principal recommendation of NCCM for the contract administration phase is the use of a Mediator from the outset of the project. The mediator becomes involved immediately and remains involved in the contract administration process. The extent of involvement will vary, depending on the duration and complexity of the project. The intent of this novel approach is to allow an independent third party to review events and potential problems and identify them as such as they arise, rather than waiting until a problem becomes so serious that outside intervention is the only possible way to resolve the problem.
The mediator will typically be invited to the project kick-off meetings (for design and for construction). After that, the mediator will regularly join the progress meetings. It is recommended that the mediator take minutes of meetings that are attended. Often, minutes may be biased or may tell one parties' story better than the other's. The proposed process will help to avoid this type of situation. Key correspondence may also be sent to the mediator, at the discretion of the project participants. The intent of this is that the mediator is kept in touch with the development of the project. As issues arise, they are negotiated and resolved by the participants. Where there appears to be conflict, the mediator may prompt the participants to negotiate a solution, or may formally mediate where this is proving difficult.

The mediator, therefore performs three roles:

- neutral record-keeper;
- observer;
- mediator.

In fulfilling these roles, the mediator is placed to identify and assist in the resolution of disputes or potential disputes between the parties. To be effective in such a role, the mediator should be experienced in the construction process, so that the significance of events may be recognized in sufficient time to avert as many potential problems as possible.

The mediator is appointed for the duration of the contract, but this should not restrict one or more of the parties from requesting a change in mediator if they feel that there is bias in the mediation process. The mediator is paid equally by both parties to the contract. [Ultimately, as with all things, the owner pays for this service. However, by the owner paying the contractor, and the contractor paying the mediator, the mediator is placed in a neutral position of being employed by both parties.] Where the mediator is called upon to act on a dispute between the contractor and a subcontractor, both parties will contribute to the cost of that mediation. Subcontractor mediations are expected to be relatively simple, and the marginal cost of addressing them should be relatively low.
In discussion of the mediator's role, startup and progress meetings were mentioned. A number of suggestions are made to help ensure that these meetings are as productive as possible. These practices are already in common usage with many people.

**Startup Meeting:**
The startup meeting sets the tone for subsequent administration of the contract. The terms of the contract are not always clear on all issues. Even if they are clear, the expectations are different from the wording. A good example of this is in the timing and processing of change orders. On many projects the contract will require that the contractor take no action on a change order until the formal change order documentation is complete. However, because of the need to maintain construction schedules, the work is often done ahead of the documentation. This practice should be discussed, together with other practices where participants are in disagreement with the requirements of the contract. The expectations of the participants should be reaffirmed as correct, brought in line with the contract terms or the contract terms amended (by mutual consent) if there is no expectation that these terms will be followed in practice. Procedures of concern to the participants, such as shop drawing processing and payment processing should also be discussed and agreed at this meeting. A sample checklist of topics to be discussed at this meeting may include the following:

- processing of progress payments,
- changes by owner, consultant, contractor and subcontractor,
- notice requirements for delays, stoppages or other cost-impact events,
- common record-keeping,
- the role of the mediator,
- management of shop drawings, samples and other technical approvals,
- work inspection and testing,
- communication between parties.
Progress Meetings:
Progress meetings represent an excellent opportunity to explore both current and perceived future problems. They benefit from the application of good practice which includes doing the following.

- Use a standard agenda. This acts as a checklist and helps the participants prepare more effectively for the meetings. As a consequence, they tend to be more productive.

- Review current problems and solutions. Encouraging the suggestion of solutions with the presentation of problems will help to create a constructive atmosphere. The mediator can play an effective role in encouraging this type of activity, and making it work.

- Review outstanding disputes or issues, and set dates for their resolution by negotiation, after which mediation will occur. Suggest possible resolution options.

- Include a proactive process for approval of minutes.

Effective meetings, with well prepared and timely minutes can save significantly on paperwork, problems and administrative time.

STEP 4: CONTRACT CLOSE-OUT PROCEDURE

This final step allows all parties to the contracting process to complete their obligations effectively, and then cooperatively learn from the experience.

There are three components to this step.

Completion Agreement:
One of the most difficult phases of any construction contract is its completion. A significant part of the difficulty relates to acceptable completion of deficiencies. Reasons for this vary, and include reluctance to release contract payments, a wish to extend
warranty periods, contractors or subcontractor's reluctance or inability to perform the remedial work, and so on. The intent of the completion agreement is to simplify contract close-out by eliminating the issues of the parties and dealing with their needs. The issues will relate to positions taken on deficiencies, "favours" done by one party for the other, uncertainty on contract requirements and so on. The needs are for the owner to take over the facility and to start benefitting from its use and for the contractor to complete contractual obligations and get paid. Extending the completion date serves only to add costs for all participants.

All deficiencies and other outstanding work are listed. This list is reviewed by both parties. Agreed items are confirmed. Disputed items are negotiated or mediated if necessary, and a final agreed deficiency list is established. These deficiencies are categorized as fixable or repairable. The ones which cannot be repaired, or that can be fixed by the owner are then reviewed and a value is attached to each one. This value, once agreed is credited to the owner by the contractor. The fixable deficiencies are then reviewed and the owner and contractor agree on who should repair them. The owner prices the repairs it is willing to undertake, and the contractor may elect to pay the owner (also through a contract credit) to do the repair or may elect to do it themselves. Subcontractors would be part of the process too, with similar credits being negotiated between the contractor and the subcontractor, using the same principle.

A change order is then issued formalizing the agreement. When the contractor has completed its agreed deficiencies the contract is complete. Completion of the contract will signal start of the contract warranty period, and will be the date on which insurance and bonding obligations for the contractor terminate.

**Final Account and payment release:**
The final payment under the contract will become payable upon completion as defined above, and subject only to the lien or other legislation requirements of the jurisdiction under which the contract falls.
As a further option, and subject to the agreement of the owner and the contractor(s), a second agreement may be made to review the contract. The reason for this agreement is that this ensures that the follow-up meetings do occur, as there may be little reason for the contractors to attend otherwise. This agreement may be a contractual requirement in the original contract, or it may be a new agreement that was budgetted for by the owner as part of the cost of the project. The prime reason for using a separate agreement is to avoid complications with the close-out of the primary contract.

Review:
The purpose of the review is to benefit from the learnings of the project. Both the owner and the contractor(s) can identify areas where improvements may be made on the next occasion that they work together, or even for the next project done with another team. Such a review meeting is an opportunity to develop and improve the business relationship between the contracting parties, and to improve the construction process generally through a better understanding of the issues.

CONCLUSION
The Canadian Contracting Method is aimed at reducing conflict and confrontation in the construction process. It is based on the principle that risk equity will reduce the potential for disputes and mediation will reduce or eliminate the conflict that occurs as a result of disagreements.

By allowing reasonable feedback to the owner on the cost of risks and, where appropriate, different contracting strategies, more astute decisions may be made by the project owner and its investors and financiers.

The process allows flexibility to use the form of contract and the bid process that is most appropriate to the project, or preferred by the owner (not necessarily the same). It allows
fast-tracking of design and construction as well as the full spectrum of contract packaging options.

Planning of projects, constructability and teamwork are enhanced, resulting in the potential for substantial savings to be achieved in both schedule and cost. In the short term, the following can be expected:

- risk premiums are reduced,
- planning is improved (fewer delays, cost over-runs, disputes),
- designs can be more efficient through effective constructability programme implementation,
- contract administration costs are reduced as a result of improved cooperation.

This process provides many advantages of the Strategic Alliance or Partnering process, but is applicable where Partnering is not. It can be used by the public sector. It may be used by occasional builders (for whom the continuity of a partnering relationship is inappropriate), and it can be used by owners who build regularly, but whose construction projects are widely spread geographically.

Implementation will require development of an effective procedures manual and training of the mediators who will help to implement the process.
CHAPTER C 3

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

C3.1 Summary of Findings and Conclusions
C3.1.1 Research Aims Achieved
C3.1.2 Confirmation of Hypothesis

C3.2 Conclusions

C3.3 Recommendations:
C3.4.1 Further Research.
C3.4.2 Contribution of the thesis to understanding risk management and the contracting process.

OLIVIER'S LAW
Experience is something you don't get until just after you need it.
CHAPTER C 3

CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the findings of this research. The research has clarified important issues relating to contracting practices in North America generally, and specifically in Canada. The major contribution to the construction industry lies in the potential for substantial savings which could result from effective implementation of the NCCM. The steps planned for field testing and implementing the process are described in this chapter.

In the spirit of continuous improvement, the process has built into it a mechanism to improve the methodology as a result of learnings from its application. In addition, two major thrusts are recommended for additional research.

The chapter concludes with a summary of the contributions to the existing body of knowledge that resulted from this work.
C3.1 Summary of Findings and Conclusions

C3.1.1 Research Aims Achieved

This research has led to quantification and a better understanding of the process used for contracting in Canada. It has also quantified the cost impact of disputes and contract changes. As part of the original survey, preferences for different contracting approaches were identified. This led to development of a new way of contracting for construction that took advantage of current trends in the industry to address recognized problems of dealing with change, and corporate inertia.

The new contracting method that was developed was tested through the use of a modified Delphi method. The testing procedure was designed to maintain a degree of anonymity for participants. As a result, additional information was obtained that has quantified a number of paradigms prevalent in the industry. This additional information was useful in further development of the NCCM. Generally, the aims of the research were met.

More specifically, the aims of this research were addressed as follows.

1. **Determine if risk allocation was recognized as a cause of construction disputes.** It was found that other published research has identified that many disputes are associated with items that may be classified as risks. The dispute arises because responsibility for that risk is either not clearly defined in the contract, or is questioned by one of the parties because of the circumstances prevailing at the time. [See Chapters A2 and A3.]

2. **Evaluate the extent and impact of disputes.** Because of the sensitive nature of this type of information, it is difficult to obtain accurate and complete data. The preliminary survey performed in this research captured useful data which identifies that a substantial portion of construction payments (between 30% and 40%) were
made as a result of changes, claims and litigation. The overall impact of this was generally consistent with the findings of the American Society for Civil Engineers as quoted by Rose [1991]. [See Chapters A.5 and B.1.]

3. Identify possible causes of disputes related to the construction contracting process, as opposed to contract documents. Two points emerged from the research. First, there has been a growing number of new variations of contract introduced over the past two decades. The incidence of litigation has continued to grow and the clear preference of owners and contractors has remained for price-based contracts, specifically, Stipulated Price Contracts. This suggests that changes to contract documents (terms and conditions) by themselves do not impact significantly on the incidence of disputes. Second, a relationship was established between attitudes (as demonstrated by a reluctance to change, preference for "low risk" contracts, employment of legal counsel in-house, use of open tenders . . .) and a high incidence of disputes. [See Chapters A4 and A5.]

4. A prototype new contracting process was to be developed. This was done by the writer, with input from industry. [See Chapter B1.]

5. The viability of the new contracting process was to be verified using industry input. Using an innovative process, strong support for the NCCM was indicated. Constructive suggestions were also obtained from the validation process, together with useful and revealing insights to the paradigms of the construction industry. [See Chapter B2.]

6. Industry paradigms were to be evaluated in order to more effectively evaluate comments, suggestions and other feedback required to meet Aim 5. This was effectively achieved through a survey which was integral with the review and evaluation process used to meet Aim 5. [See Chapter B3.]
The new contracting process was to be revised to address concerns raised by industry. The New Canadian Contracting Method was produced using the draft contracting process as a basis, and incorporating changes which reflected the concerns of industry. [See Chapters C1 and C2.]

Additional significant findings are summarized below.

1. There is a clear preference for the use of price-based contracts. Only the most sophisticated owners and contractors recognize the advantages of cost-based contracts. This was quantified in the results of the first survey.

2. Precise data on the subject of claims is not easily obtained. Particularly owners and consultants are reluctant to deal with the issue. It was possible to quantify the impact of changes, claims and litigation: they are the basis of between 30 and 40 percent of the payments made to contractors for construction work.

3. A number of significant relationships were determined:

   - Most construction participants were risk averse.
   - The greater the construction volume done per year, the greater the defensiveness of the respondent. This defensiveness was measurable in the type of contract used (price-based rather than cost-based), the expertise used (an increase in the direct employment of lawyers), the bidding process used (open bid rather than invited or negotiated)
   - The defensive nature of the bidding and contracting types tended to increase the incidence of disputes. Claims and litigation was higher with price-based contracts than with cost-based ones (as a percentage of the construction volume). Claims were more frequent with open bids than
with invited bids, which in turn, were higher than with negotiated contracts.

- Research by others into contractor response to risk in Canada suggests that their response is irrational. This research suggests that the response of all participants is irrational, tending to use contracts and processes that are more prone to dispute as their caution increases.

4. There was a very distinct pecking order for preferences in dispute resolution methods. A clear preference was for negotiation, followed by mediation. Arbitration was a third choice and litigation was the last choice of virtually all respondents to Survey B. Interestingly, the tendency in industry appears to be to use litigation more frequently than either arbitration or mediation. Again practice and preferences do not coincide.

5. There was a strong interest in the Proactive Mediation process presented in the NCCM. This is consistent with finding 4 above.

6. There was a strong interest in the risk apportionment process described in the NCCM. This suggests that all participants were supportive of the process of assigning risk, but that the mechanisms used currently were too sophisticated for most people. The proposed process allows the participant to use any process it wishes to, but does not preclude the use of less rational means than those which have been developed and used in other sectors, and on very large construction projects over the past twenty years.

7. A number of key findings emerged from the modified Delphi method used to test the viability of the New Canadian Contracting Method. These opinions were common amongst many of the participants in the laboratory sessions.
(a) There was an identified need to develop teamwork as a critical requirement for cost effective construction.

(b) There was a need for better training in the industry. Specifically, this training need was related to developing different attitudes and improving "people skills".

(c) If price-based construction contracts are used, a lot of effort needs to be devoted to developing a mutually clear set of objectives between the parties to that contract.

(d) Risk apportionment between the contracting parties needs to be addressed effectively, if costs are to come down through reduced premiums, and fewer disputes with the associated lost time and costs.

(e) A process that will allow more effective planning to take place will receive industry support. Many respondents identified inadequate planning by owners, designers and contractors as being responsible for significant waste.

8. The analysis of Survey B revealed that the following strong and industry-wide opinions existed:

(a) Using Contractor's expertise during the design process increases the opportunity to reduce costs.

(b) Contractor input to design does not tend to reduce quality.
(c) Many contract disputes are known about (by at least one party) for a long time before they are dealt with.

(d) Contractors do not save claims until the project is complete or almost complete because they do not want to spoil their relationship with the owner. This was also the opinion, though not as strong, for relationships with the consultant.

(e) Construction contracts apportion risks unfairly to the contractor and to subcontractors. They do not apportion risks unfairly to the owner or the consultant.

(f) Exculpatory clauses increase the likelihood of a contract dispute.

(g) Bid prices are affected by the bidder's expectations of fair contract administration.

(h) Consultants who act as contract administrators on behalf of their clients are not usually completely objective in making decisions about contract issues and interpretations.

(i) More efficient risk management will reduce the final cost of construction to the owner.

(j) Contractors should be screened and prequalified before being allowed to bid on a contract.

(k) A qualified, knowledgeable and experienced mediator, paid for jointly by both parties to a contract, could facilitate dispute resolution.

(l) A fair expectation of profit for a contractor (as a percentage of contract value) is between 0% and 6%.

22% felt it was below 2% profit.
69% felt it was between 2% and 4%.
5% felt it was between 4% and 6%.

Almost without exception, respondents ranked the following dispute resolution methods as follows (in order of preference):

1 - Negotiation,
2 - Mediation,
3 - Arbitration,
4 - Litigation.

C3.1.2 Confirmation of Hypothesis

Based on the above findings, the conclusions of the author are:

1. The construction industry recognizes that it can benefit from an effective and pragmatic approach to contract risk apportionment. The process included in the NCCM could achieve this. ASTUTE, COMMERCIAL SOUND RISK ALLOCATION BETWEEN CONTRACTING PARTIES WILL REDUCE DISPUTES AND CONSTRUCTION COSTS.

2. The tendering process will impact on the potential for disputes. Prescreening of contractors will reduce the incidence of disputes. Negotiated contracts (highest level of screening, lowest incidence of dispute) are better than those formed through an invited bidding process (lower level of screening, and higher incidence of dispute). The worst process is to use open bidding which has no effective screening process and which has the highest incidence of disputes. The screening of bidders is built into the New Canadian Contracting Method. SELECTION OF A CONTRACTOR CAPABLE OF MEETING THE OWNER'S EXPECTATIONS
IS A RISK THAT ONLY THE OWNER CAN TAKE. THE CONSULTANT MAY ADVISE ON THIS, BUT THE ULTIMATE DECISION RESTS WITH THE OWNER, WHO NEEDS TO RECOGNIZE AND MANAGE IT.

3. The choice of contract type will affect the incidence of dispute. Price-based contracts are more prone to disputes than cost-based ones. The NCCM does not recommend one type of contract over another as the behaviour of the industry in selection of contract types appears to be irrational. A rational explanation of why a different type of contract should be used will not only have a small chance of being heard, but will be perceived as prescriptive in nature. Prescriptive solutions have not succeeded in the past.

4. Constructability programmes require involvement of the contractor in the design process. Effective constructability programs are known to reduce the cost of construction. The traditional contracting processes do not permit this to happen. The NCCM includes a process which facilitates constructability. A TEAM APPROACH TO DESIGN AND CONSTRUCTION REDUCES THE RISK OF CHANGE AND REASONABLY DISTRIBUTES THE RISK OF MISINTERPRETATION OF DESIGN BETWEEN THE DESIGNER AND THE CONSTRUCTOR.

5. Inadequate planning by all participants is a recognized cause of problems. Better relationships between contracting parties will lead to better exchange of information and hence to better planning. The NCCM does not address this problem directly, but it is hoped that the process will lead to better relationships in the long run. INADEQUATE PLANNING LEAVES IDENTIFIABLE RISKS UNRECOGNIZED. UNRECOGNIZED RISKS CANNOT BE MANAGED. UNMANAGED RISKS ARE LIKELY TO COST MORE, AND BE HARDER TO ADDRESS THAN THOSE FOR WHICH A PLAN OR CONTINGENCY HAS BEEN PROVIDED.
6. The industry as a whole is slow and cautious in accepting change. It will respond to pragmatic solutions. It will use a proven technique in preference to a new one. Field testing and demonstrations of successful projects will help in making the proposed NCCM more broadly acceptable. THE N.C.C.M. IS GENERALLY ACCEPTABLE TO INDUSTRY REPRESENTATIVES WHO HAVE STUDIED IT.

7. The first draft of the NCCM received a very positive response from 62 senior industry representatives who are in a position to influence or make decisions on the use of such a process. DECISION MAKERS IN INDUSTRY SUPPORT THE PROCESS DESCRIBED IN THE N.C.C.M.

8. Presentations of the NCCM have led to unsolicited offers from Owners, Contractors and Consultants to participate in field testing of the new process. THIS IS HIGHLY INDICATIVE OF ACCEPTANCE THAT THE PROCESS WILL REDUCE COSTS.

A final conclusion may be drawn, based on the foregoing. The hypothesis that a new approach to the contracting process will reduce or eliminate additional costs attributable to misallocation of risk has been confirmed.
C3.2 Conclusions

The specific aims of this research included:
- to determine whether risk allocation was a recognised cause of construction disputes;
- to evaluate the extent and impact of disputes on the cost of construction;
- to determine potential causes of disputes as they relate to the contracting process;
- to develop the prototype for a new contracting process; and
- to verify, through industrial involvement, that the prototype process is viable and acceptable.

This chapter summarizes the conclusions reached in each of the above areas. This is followed by recommendations for further work and a statement of the contribution to knowledge made by the research.

Risk allocation was found to be a recognised cause of construction disputes. The number and frequency of disputes has risen as construction risks have increased over time with the increasing complexity of the construction product.

The impact of disputes within the Canadian construction industry was assessed at around fifteen percent of the total construction cost. This was comparable to the twenty per cent figure identified by the American Society of Civil Engineers for construction in the United States in the 1980's.

The potential causes of disputes as they relate to the construction process have been identified as the confrontational nature of the process and the roles of the parties to the contract. Price based contracts were found to be more prone to disputes than the less confrontational cost based ones.

A new prototype process was developed and tested. This process was named the New Canadian Contracting Method, (NCCM). The NCCM addresses four key problem areas in a non prescriptive way. These are:
- selection of contractors;
- effective allocation of risk;
- dispute incidence reduction and dispute resolution; and
- efficient close-out of projects.
This process has been validated by the review and input of sixty two senior construction industry executives using a novel modified Delphi Method. These executives concluded that the NCCM represents a significant step towards the resolution of costly conflict in the Canadian construction industry. This view has been endorsed by representatives of a number of highly prestigious forums including:

- the board of the Calgary Construction Association;
- the board of the Construction Owners Association of Alberta;
- Canadian Construction Research Board - Calgary Institute; and
- the Project Management Institute, Northwest Regional Symposium.

One feature of the NCCM that was particularly well received was the proactive mediation model which was based upon the one developed by the Alberta Arbitration and Mediation Society. This, in turn utilised the negotiating philosophy described by Fischer and Ury\textsuperscript{138} in 1983.

C3.3 Recommendations

To effectively implement the NCCM will require a paradigm shift by the participants. It is expected that the mediator will need to play a key role in this process. Possibly, the bidders will require some assistance in pricing of risks, and a detailed explanation of the bid evaluation process.

The NCCM has been presented to a number of audiences. Following each presentation, the questions and discussion have concentrated on the risk evaluation process and on proactive mediation. These two areas routinely require a detailed explanation that goes significantly beyond the description in the revised version of the NCCM that is included in Chapter C2. Interestingly, no objections to the process were raised at any of the

presentations made. A number of offers have been received of potential projects on which to test the process.

C3.3.1 Further Research

Actual implementation and field testing of this new process is the primary recommendation for further research.

Implementation of the New Canadian Contracting Method will require development of an effective procedures manual and training of the mediators who will help to implement the process. At the time of completion of this thesis, plans are being made to test the NCCM on up to three projects. All of the planned projects will be ones that are similar to others built by the same owner. The reason for this is that some measure of different performance may be made. Candidate projects include a compressor station on a natural gas pipeline (Nova and TransCanada Pipelines are considering the opportunity to participate), a hospital expansion (Alberta Ministry of Public Works) and a commercial construction project (a developer/operator of extended care facilities is considering this option).

Based on the experiences with these two projects, the NCCM will be revised and upgraded.

The NCCM will require a general guideline for implementation. This guideline should include recommended procedures and detailed instructions for all the key steps in the process. The two most important steps in the process are the two that are probably least understood by construction industry practitioners. The details of these procedures, and the basis on which the NCCM should be tested and results compared is an area for additional research.
The NCCM will be tested in Alberta in the first instance. Additional testing in different parts of North America, to check for sensitivity to geographical location (local practices, different legislation etc.). Adaptation if required, and subsequent testing outside North America is a further area for investigation.

The NCCM has been developed over a number of years. The cost of its development has been funded by a private company. The development of the detailed procedures required for its implementation are also being funded by this company that intends to market the application on a license basis. This will not only help to recover the cost of development, but will potentially provide the funding to continue work on supplementary research and development opportunities.

Two areas which have been identified for further research, and development of commercial products are briefly described below.

The first tool that would support the application of the NCCM is a knowledge-based system that will assist the mediator and project participants in completing the necessary documentation required for effective implementation of the process. Modules are envisioned for assistance in the following:

- selection or prequalification of contractors (design or construction);
- identifying potential construction contract risks;
- formulating effective clauses for reassignment of risks;
- assisting in resolution of disputes.

Some work has been done in the United States and elsewhere in the area of contractor prequalification.

The second tool to support the application of the NCCM is a relational database based system that will capture scanned images of all contract documents and allow for their efficient storage, cross referencing and subsequent access. This tool would serve not only to speed up communication during the design and construction of the project, but will assist in review of facts and documents in the resolution of a dispute.
C3.3.2 Contribution of the thesis to Knowledge on Risk Management and the Contracting Process.

The research undertaken to prepare for, develop and test the New Canadian Contracting Method investigated a sensitive area in the construction industry, namely that of contract failure. This failure was defined as the cause behind the symptoms of contract changes, claims and litigation. The author's twenty years in the industry, and extensive network of contacts facilitated the research which probed areas that have previously not been investigated in as quantifiable a way.

The research has provided the following insights.

1 A better understanding of the distribution of contract formation and contract type usage was obtained. This was compared to the preferences (as opposed to practices) of the respondents. The results were inconsistent, suggesting that rational preferences took second place to other forces.

2 Owners, designers and contractors can increase their awareness of the other two groups' understanding and opinion of the bidding and contracting processes that are now in common usage.

3 All participants potentially can gain from the learnings: all wanted better communication between parties, lower confrontation and a team approach to construction.

4 The thesis increases our understanding of industry paradigms as they relate to the contracting process. The significant amount of agreement on sensitive issues such as unfairness of contracts was particularly revealing.
Common interests of owners, designers and contractors were revealed against a background of practices which suggest that the same groups have been working at crossed purposes. These areas of common interest include:

- a shared need for better planning which requires sharing of information and expertise early in the project lifecycle;
- fairer risk apportionment as a potential starting point to reduce conflict on the project;
- a common interest in the constructability process; and
- an openness to the use of mediators generally, and more particularly to the process of proactive mediation.

A strong indication was obtained that innovative methods will be accepted by at least part of the industry provided it is pragmatic, addresses common concerns and does not restrict the participants in areas where other pressures dictate actions even if they appear irrational.

In completing this study, the following was done:

A Interviews were conducted with 155 senior practitioners in the construction industry. The basic data, presented in Chapter A5 was collected. This formed the basis for development of a new contracting method.

B The impact of construction disputes and some of the key factors which tended to increase the potential for their occurrence were quantified. This quantification served two useful purposes. Industry was able to identify the potential savings which may be achieved, and could identify the most obvious steps to be taken to help obtain some of the savings.

C A model for implementing cost saving measures was developed.
An innovative approach to collection of opinion was developed using a combination of survey techniques, the Delphi method and a computer tool. The combination proved effective as a data collection process and was very favourably commented upon by the participants. The 62 participants in this process felt that they had learned from others and were interested in future exercises. This is particularly interesting for other researchers in the area of construction management where obtaining valuable opinion from senior industry personnel is both important and difficult to achieve. All participants commented favourably on the process. The group of 62 participants included several company presidents, many vice presidents and a number of senior project managers. They were all asked to give about eight hours to the process: four to read the material and prepare, two for the laboratory session and two hours of travel.

A pragmatic model for more effective risk management through the use of contracts in the North American construction industry has been developed. This model has had formal input from over 200 industry practitioners and informal input from a further 30.
APPENDIX A

Pilot Survey - sample forms, tabulated and charted results.
Questionnaire for Course CIV 1279 "Construction Contract Documents"

DETAILS OF DATA SOURCE

Type of Company: Owner ☑ Consultant ☐ Contractor ☐ Other (specify) ☐

Name: Michael Wright Position: President Company: Forestrale

Annual construction volume ($ millions): N/A

Percent of jobs with claims: 0% Percent of changes: 0% Percent with legal action: 0%

Is the company Government owned? Government ☐  Publicly traded ☑ Private held ☐

Notes ☐

CONTRACT INFORMATION

Preferred type of contract: Unit Rate

Types of contract used (show approximate percentages by construction volume):

- Lump Sum ☐
- Unit Rate ☑ 100%
- Cost Plus ☐
- Other (specify) ☐

Method used for award: Open Tender ☐ Invited Tender ☑ Negotiated ☑

Comment on other types of contract used for construction (eg. Design/Build, G.U.P., etc)

- ☐

CORPORATE EXPERTISE

What expertise is available in-house: Lawyers ☑ Engineers ☑ Architects ☐ Other ☐

To what extent are outside specialists in Construction Contracts used. Percentage of Contracts signed 100% ☐ 75% ☐ 50% ☐ 25% ☐ 1%-25% ☐ N/A ☑

Why? ☐

ALL EXPERTISE WHICH COULD BE POSSIBLY REQUIRED IS AVAILABLE IN HOUSE (OR FROM PARENT COMPANY, CANADIAN FORESTERS)

Is there a trend to using more specialized expertise? ☐ NO ☐

Why? ☐ EXPERIENCE HAS INDICATED THAT SPECIALIZED EXPERTISE IS NOT REALLY REQUIRED

Other than lawyers, what external expertise is available? N/A

OTHER COMMENTS:

"A CONTRACT IS ONLY AS GOOD AS THE PEOPLE SIGNING IT"

"EVERYBODY HATES PAYING LAWYERS"

Intiaz Ibrahim Date: OCT 3/90

FIGURE AA1 - Sample Survey Sheet
UNIVERSITY OF TORONTO
DEPARTMENT OF CIVIL ENGINEERING

Questionnaire for Course CIV 1279 "Construction Contract Documents"

DETAILS OF DATA SOURCE
Type of Company: Owner [ ] Consultant [ ] Contractor [ ]
Name: Marvin L. Cumber Position: Vice President (Company Group) Life
Annual construction volume ($millions): $500 million
Percent of jobs with claims: 40% Percent of claims: 10% Percent with legal action: 5%
Cross government quasi government [ ] Private held [ ]
Sales Insurance Company: 94% Owner by Company Inc.

CONTRACT INFORMATION
Preferred type of contract: Construction Management
Types of contracts used (show approximate percentages by construction volume):
Lump Sum [ ] Unit Rate [ ] Cost Plus [ ] Other (specify): 25% Construction Management

Method used for award: Open Tender [ ] Invited Tender [ ] Negotiated [ ]

Comment on other types of contracts used for construction (eg. Design Build, G/ P, etc.):

From Owner Perspective, Construction Management:

The advantages that use only new buildings identified:

By means i.e., rapid, efficient, & cost-effective methods of construction.

CORPORATE EXPERTISE
What expertise is available in-house: Lawyers [ ] Engineers [ ] Architects [ ] Other [ ]
To what extent are outside specialists in Construction Contracts used: Percentage of Contracts
served 100% [ ] 75% - 99% [ ] 50% - 74% [ ] 25% - 49% [ ] 0% - 24% [ ]

Other than lawyers, what external expertise is available for: Consultants to Monitor
Vendor Impact & Development is Merger/Strategic?

OTHER COMMENTS

Signed by: Stuart Baird Date: Sept. 28, 1990

FIGURE AA2 - Sample Survey Sheet
UNIVERSITY OF TORONTO
DEPARTMENT OF CIVIL ENGINEERING

Questionnaire for Course CIV 1279 "Construction Contract Documents"

DETAILS OF DATA SOURCE
Type of Company
Owner [ ]
Consultant [ ]
Contractor [ ]
Other (specify) [ ]

Name: ELVER PIPPO
Position: SENIOR P.M.
Company: GLEN ROAD CO., INC.

Annual construction volume ($millions): 15 - 175
Percent of jobs with claims: 10%
Percent of changes requested: 60%
Percent with legal action: 5%

Notes: GLEN ROAD IS A CONTRACTOR BUT ACTS WITH THE CONSTRUCTION OF A LARGE DEVELOP.

CONTRACT INFORMATION
Preferred type of contract: COST-MATERIAL/ LUMP SUM
Types of contract used: (show approximate percentages by construction volume)
- Lump Sum: 50%
- Unit Rate: 10%
- Cost Plus: 10%
- Other (specify): 30%

Method used for award: Open Tender [ ] Invited Tender [ ] Negotiated [ ]

Comment on other types of contract used for construction (e.g., Design/Build, G.P., etc.): GLEN ROAD IS A CONTRACTOR BUT ACTS WITH THE CONSTRUCTION OF A LARGE DEVELOP.

CORPORATE EXPERTISE
What expertise is available in-house: Lawyers [ ] Engineers [ ] Architects [ ] Other [ ]

To what extent are outside specialists in Construction Contracts used: Percentage of Contracts
- 100%: 5%
- 75% - 99%: 30%
- 50% - 74%: 25%
- 25% - 49%: 15%
- 0%: 15%

Why? [ ]

Is there a trend to using more specialized expertise? [ ]

Why? [ ]

Other than lawyers, what external expertise is available? [ ]

DATE: SEPT 27/90

FIGURE AA3 - Sample Survey Sheet
<table>
<thead>
<tr>
<th>NUMBER OF RESPONDENTS</th>
<th>Private Ownership</th>
<th>Publicly Traded Stock</th>
<th>Government or Public Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>12</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td>Consultant</td>
<td>54</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Contractor</td>
<td>48</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

**TABLE A5.1 - NUMBER OF RESPONDENTS BY TYPE OF OWNERSHIP**

<table>
<thead>
<tr>
<th>CONSTRUCTION VOLUME</th>
<th>Private Ownership</th>
<th>Publicly Traded Stock</th>
<th>Government or Public Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>147.5</td>
<td>522.1</td>
<td>2,006.6</td>
</tr>
<tr>
<td>Consultant</td>
<td>3,322.5</td>
<td>84.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Contractor</td>
<td>5,777.6</td>
<td>261.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**TABLE A5.2 - ANNUAL CONSTRUCTION VOLUME ($millions) BY CATEGORY AND TYPE**
<table>
<thead>
<tr>
<th>AVERAGE CONSTRUCTION VOLUME</th>
<th>Private Ownership</th>
<th>Publicly Traded Stock</th>
<th>Government or Public Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>12.29</td>
<td>17.46</td>
<td>87.24</td>
</tr>
<tr>
<td>Consultant</td>
<td>61.52</td>
<td>42.30</td>
<td>0.00</td>
</tr>
<tr>
<td>Contractor</td>
<td>120.37</td>
<td>52.20</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**TABLE A5.3 - AVERAGE REPORTED ANNUAL CONSTRUCTION VOLUME ($millions) BY CATEGORY AND TYPE**

<table>
<thead>
<tr>
<th>MEAN PERCENTAGE USE OF CONTRACT TYPE</th>
<th>Lump Sum</th>
<th>Unit Rate</th>
<th>Cost Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>63.88</td>
<td>33.72</td>
<td>1.54</td>
</tr>
<tr>
<td>Consultant</td>
<td>53.56</td>
<td>25.84</td>
<td>16.01</td>
</tr>
<tr>
<td>Contractor</td>
<td>63.30</td>
<td>22.50</td>
<td>7.49</td>
</tr>
</tbody>
</table>

**TABLE A5.4 MEAN PERCENTAGE USE OF CONTRACT TYPES, BY RESPONDENT TYPE**
<table>
<thead>
<tr>
<th>MEAN PERCENTAGE USE OF CONTRACT TYPE</th>
<th>Lump Sum</th>
<th>Unit Rate</th>
<th>Cost Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>38.50</td>
<td>32.90</td>
<td>0.03</td>
</tr>
<tr>
<td>Publicly Traded</td>
<td>26.01</td>
<td>13.14</td>
<td>2.59</td>
</tr>
<tr>
<td>Privately Held</td>
<td>49.20</td>
<td>9.67</td>
<td>9.55</td>
</tr>
</tbody>
</table>

**TABLE A5.5 - MEAN PERCENTAGE USE OF DIFFERENT CONTRACT TYPES BY RESPONDENT TYPE.**

<table>
<thead>
<tr>
<th>VOLUME OF CONSTRUCTION</th>
<th>Lump Sum</th>
<th>Unit Rate</th>
<th>Cost Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change</td>
<td>2,214.71</td>
<td>868.78</td>
<td>293.64</td>
</tr>
<tr>
<td>Claim</td>
<td>1,734.08</td>
<td>333.82</td>
<td>114.94</td>
</tr>
<tr>
<td>Litigation</td>
<td>439.47</td>
<td>67.98</td>
<td>33.45</td>
</tr>
</tbody>
</table>

**TABLE A5.6 - AMOUNT ($ Million) OF DISPUTES BY CONSTRUCTION CONTRACT TYPE**
### TABLE A5.6A - PERCENTAGE INCIDENCE OF DISPUTES BY CONTRACT TYPE.

<table>
<thead>
<tr>
<th>VOLUME OF CONSTRUCTION</th>
<th>Lump Sum</th>
<th>Unit Rate</th>
<th>Cost Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change</td>
<td>31.80</td>
<td>41.44</td>
<td>25.86</td>
</tr>
<tr>
<td>Claim</td>
<td>24.90</td>
<td>15.92</td>
<td>10.12</td>
</tr>
<tr>
<td>Litigation</td>
<td>6.31</td>
<td>3.24</td>
<td>2.95</td>
</tr>
</tbody>
</table>

### TABLE A5.7 - CONSTRUCTION VOLUMES BY TYPE OF CONTRACT AFFECTED BY DIFFERENT IN-HOUSE PROFESSIONALS

<table>
<thead>
<tr>
<th>VOLUME OF CONSTRUCTION</th>
<th>Lump Sum</th>
<th>Unit Rate</th>
<th>Cost Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawyer(s) Employed</td>
<td>2,235.0</td>
<td>1,544.0</td>
<td>255.0</td>
</tr>
<tr>
<td>Professional Engineer(s) Employed</td>
<td>6,683.1</td>
<td>3,749.8</td>
<td>1,001.1</td>
</tr>
<tr>
<td>Architect(s) Employed</td>
<td>3,434.0</td>
<td>796.0</td>
<td>496.5</td>
</tr>
<tr>
<td>Other professional(s) Employed</td>
<td>2,756.0</td>
<td>1,786.5</td>
<td>574.5</td>
</tr>
<tr>
<td>AVERAGE VOLUME OF CONSTRUCTION</td>
<td>Lump Sum</td>
<td>Unit Rate</td>
<td>Cost Plus</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Lawyer(s) Employed</td>
<td>54.51</td>
<td>37.66</td>
<td>6.22</td>
</tr>
<tr>
<td>Professional Engineer(s)</td>
<td>56.72</td>
<td>30.99</td>
<td>8.27</td>
</tr>
<tr>
<td>Architect(s) Employed</td>
<td>70.08</td>
<td>16.24</td>
<td>10.13</td>
</tr>
<tr>
<td>Other Professional(s) Employed</td>
<td>51.04</td>
<td>33.08</td>
<td>10.64</td>
</tr>
</tbody>
</table>

TABLE A5.8 - AVERAGE VOLUME OF CONSTRUCTION AWARDED BY CONTRACT TYPE, BY RESPONDENTS EMPLOYING SPECIFIC PROFESSIONAL EXPERTISE

AA9
<table>
<thead>
<tr>
<th>PERCENTAGE OF COMPANIES WITH IN-HOUSE EXPERTISE</th>
<th>Annual Construction Volume $0.00-20.00 Million</th>
<th>Annual Construction Volume $20.00-50.00 Million</th>
<th>Annual Construction Volume $50.00-100.00 Million</th>
<th>Annual Construction Volume &gt;$100.00 Million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawyers</td>
<td>7.8</td>
<td>19.0</td>
<td>30.0</td>
<td>45.8</td>
</tr>
<tr>
<td>Professional Engineers</td>
<td>72.5</td>
<td>83.8</td>
<td>75.0</td>
<td>87.5</td>
</tr>
<tr>
<td>Architects</td>
<td>31.4</td>
<td>35.5</td>
<td>10.0</td>
<td>54.2</td>
</tr>
<tr>
<td>Others</td>
<td>29.4</td>
<td>19.4</td>
<td>30.0</td>
<td>54.0</td>
</tr>
</tbody>
</table>

**TABLE A5.9 - PERCENTAGE EMPLOYMENT OF EXPERTISE BY RESPONDENTS IN SPECIFIC ANNUAL CONSTRUCTION VOLUME CATEGORIES**
### TABLE A5.10 - PERCENTAGE OF RESPONDENTS BY TYPE EMPLOYING DIFFERENT PROFESSIONALS

<table>
<thead>
<tr>
<th>PERCENTAGE OF COMPANIES WITH IN-HOUSE EXPERTISE</th>
<th>Owner</th>
<th>Consultant</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawyers</td>
<td>53.19</td>
<td>9.09</td>
<td>20.75</td>
</tr>
<tr>
<td>Professional Engineers</td>
<td>72.34</td>
<td>72.73</td>
<td>88.68</td>
</tr>
<tr>
<td>Architects</td>
<td>36.17</td>
<td>49.09</td>
<td>9.43</td>
</tr>
<tr>
<td>Others</td>
<td>34.04</td>
<td>41.82</td>
<td>28.30</td>
</tr>
<tr>
<td>PERCENTAGE OF COMPANIES WITH IN-HOUSE EXPERTISE</td>
<td>Government</td>
<td>Publicly Traded</td>
<td>Privately Held</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------------</td>
<td>----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Lawyers</td>
<td>62.2</td>
<td>61.1</td>
<td>13.16</td>
</tr>
<tr>
<td>Professional Engineers</td>
<td>91.3</td>
<td>77.8</td>
<td>75.44</td>
</tr>
<tr>
<td>Architects</td>
<td>30.43</td>
<td>38.9</td>
<td>30.7</td>
</tr>
<tr>
<td>Others</td>
<td>34.8</td>
<td>44.4</td>
<td>33.33</td>
</tr>
</tbody>
</table>

TABLE A5.11 - PERCENTAGE OF RESPONDENTS EMPLOYING SPECIFIC PROFESSIONAL EXPERTISE, IDENTIFIED BY TYPE OF OWNERSHIP
<table>
<thead>
<tr>
<th>NUMBER OF RESPONSENTS STATING CONTRACT PREFERENCES</th>
<th>Lawyer(s) Employed</th>
<th>Professional Engineer(s) Employed</th>
<th>Architect(s) Employed</th>
<th>Other Professionals Employed</th>
<th>ROW TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum</td>
<td>21</td>
<td>63</td>
<td>34</td>
<td>27</td>
<td>145</td>
</tr>
<tr>
<td>Unit Rate</td>
<td>10</td>
<td>29</td>
<td>7</td>
<td>13</td>
<td>59</td>
</tr>
<tr>
<td>Cost Plus</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Other Form(s)</td>
<td>9</td>
<td>20</td>
<td>6</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>No Preference(s)</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>COLUMN TOTALS</td>
<td>41</td>
<td>121</td>
<td>49</td>
<td>54</td>
<td>-</td>
</tr>
</tbody>
</table>

TABLE A5.12 - STATED CONTRACT PREFERENCE OF RESPONDENT IDENTIFIED BY EXPERTISE EMPLOYED.
<table>
<thead>
<tr>
<th>CONTRACT PREFERENCES</th>
<th>Lawyer(s) Employed</th>
<th>Professional Engineer(s) Employed</th>
<th>Architect(s) Employed</th>
<th>Other Professionals Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum</td>
<td>51.2</td>
<td>52.1</td>
<td>69.4</td>
<td>50.0</td>
</tr>
<tr>
<td>Unit Rate</td>
<td>24.4</td>
<td>24.0</td>
<td>14.3</td>
<td>24.1</td>
</tr>
<tr>
<td>Cost Plus</td>
<td>0.0</td>
<td>1.7</td>
<td>2.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Other Form(s)</td>
<td>22.0</td>
<td>16.5</td>
<td>12.1</td>
<td>18.5</td>
</tr>
<tr>
<td>No Preference</td>
<td>8.3</td>
<td>5.7</td>
<td>2.1</td>
<td>5.5</td>
</tr>
<tr>
<td>COLUMN TOTALS</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

TABLE A5.13 - PREFERRED CONTRACT TYPE AS A PERCENTAGE OF EXPERTISE EMPLOYED
<table>
<thead>
<tr>
<th>CONTRACT PREFERENCE</th>
<th>Lawyer(s) Employed</th>
<th>Professional Engineer(s) Employed</th>
<th>Architect(s) Employed</th>
<th>Other Professionals Employed</th>
<th>ROW TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum</td>
<td>14.5</td>
<td>43.4</td>
<td>25.4</td>
<td>18.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Unit Rate</td>
<td>17.0</td>
<td>49.2</td>
<td>11.9</td>
<td>21.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Cost Plus</td>
<td>0.0</td>
<td>50</td>
<td>25</td>
<td>25.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Other Form(s)</td>
<td>20.0</td>
<td>44.5</td>
<td>13.3</td>
<td>22.2</td>
<td>100.0</td>
</tr>
<tr>
<td>No Preference(s)</td>
<td>8.3</td>
<td>58.4</td>
<td>8.3</td>
<td>25.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

TABLE A5.14 - PREFERRED CONTRACT AS A PERCENTAGE OF PREFERRED CONTRACT TYPE, FOR EACH TYPE OF PROFESSIONAL EXPERTISE EMPLOYED.
<table>
<thead>
<tr>
<th>BIDDING METHOD USAGE %</th>
<th>Lawyer(s) Employed</th>
<th>Professional Engineer(s) Employed</th>
<th>Architect(s) Employed</th>
<th>Other Professional(s) Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Bid</td>
<td>44.0</td>
<td>37.56</td>
<td>33.94</td>
<td>36.46</td>
</tr>
<tr>
<td>Invited Bid</td>
<td>43.78</td>
<td>47.54</td>
<td>54.22</td>
<td>47.23</td>
</tr>
<tr>
<td>Negotiated</td>
<td>12.22</td>
<td>14.90</td>
<td>11.88</td>
<td>16.31</td>
</tr>
</tbody>
</table>

**TABLE A5.15 - PERCENTAGE USAGE OF BIDDING METHOD BY PROFESSIONAL EXPERTISE EMPLOYED.**

AA16
<table>
<thead>
<tr>
<th>% INCIDENCE OF DISPUTES</th>
<th>Change</th>
<th>Claim</th>
<th>Litigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Volume &lt; $20 Million</td>
<td>8.84</td>
<td>16.11</td>
<td>1.30</td>
</tr>
<tr>
<td>Annual Volume &gt; $20 Million &lt; $50 Million</td>
<td>6.17</td>
<td>18.93</td>
<td>2.20</td>
</tr>
<tr>
<td>Annual Volume &gt; $50 Million &lt; $100 Million</td>
<td>17.60</td>
<td>14.60</td>
<td>6.43</td>
</tr>
<tr>
<td>Annual Volume &gt; $100 Million</td>
<td>17.80</td>
<td>20.3</td>
<td>3.13</td>
</tr>
</tbody>
</table>

TABLE A5.16 - DISPUTE INCIDENCE (% of construction volume) BY CONSTRUCTION VOLUME CATEGORY.
<table>
<thead>
<tr>
<th>% INCIDENCE OF DISPUTES</th>
<th>Change</th>
<th>Claim</th>
<th>Litigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum</td>
<td>16.06</td>
<td>20.29</td>
<td>3.16</td>
</tr>
<tr>
<td>Unit Rate</td>
<td>19.85</td>
<td>13.54</td>
<td>1.14</td>
</tr>
<tr>
<td>Cost Plus</td>
<td>36.20</td>
<td>25.00</td>
<td>8.67</td>
</tr>
</tbody>
</table>

**TABLE A5.17 - DISPUTE INCIDENCE AS A PERCENTAGE OF ANNUAL CONSTRUCTION VOLUME, BY RESPONDENT'S PREFERRED CONTRACT TYPE.**

<table>
<thead>
<tr>
<th>VOLUME INCIDENCE OF DISPUTES</th>
<th>Change</th>
<th>Claim</th>
<th>Litigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Bid</td>
<td>1,127.27</td>
<td>960.20</td>
<td>151.62</td>
</tr>
<tr>
<td>Invited Bid</td>
<td>1,571.22</td>
<td>1,221.64</td>
<td>280.43</td>
</tr>
<tr>
<td>Negotiated</td>
<td>914.98</td>
<td>246.93</td>
<td>174.95</td>
</tr>
</tbody>
</table>

**TABLE A5.18 - INCIDENCE OF DISPUTES BY TYPE OF BIDDING METHOD**
### TABLE A5.19 - PERCENTAGE INCIDENCE OF DISPUTES BY TYPE OF BIDDING METHOD.

<table>
<thead>
<tr>
<th>Bidding Method</th>
<th>Change</th>
<th>Claim</th>
<th>Litigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Bid</td>
<td>26.56</td>
<td>22.62</td>
<td>12.16</td>
</tr>
<tr>
<td>Invited Bid</td>
<td>29.42</td>
<td>22.88</td>
<td>5.25</td>
</tr>
<tr>
<td>Negotiated</td>
<td>44.06</td>
<td>11.89</td>
<td>8.43</td>
</tr>
</tbody>
</table>

### TABLE A5.20 - INCIDENCE OF DISPUTE BY TYPE OF EXPERTISE EMPLOYED.

<table>
<thead>
<tr>
<th>Expertise Employed</th>
<th>Change</th>
<th>Claim</th>
<th>Litigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawyer(s)</td>
<td>2,332.62</td>
<td>1,416.78</td>
<td>373.5</td>
</tr>
<tr>
<td>Professional</td>
<td>3,459.23</td>
<td>2,326.82</td>
<td>584.77</td>
</tr>
<tr>
<td>Engineer(s)</td>
<td>645.96</td>
<td>884.63</td>
<td>87.95</td>
</tr>
<tr>
<td>Architect(s)</td>
<td>2,646.67</td>
<td>1,275.39</td>
<td>419.56</td>
</tr>
</tbody>
</table>

AA19
### TABLE A5.21 - PERCENTAGE OF CONSTRUCTION VOLUME INVOLVING DISPUTES, BY TYPE OF EXPERTISE EMPLOYED.

<table>
<thead>
<tr>
<th>Expertise Employed</th>
<th>Change</th>
<th>Claim</th>
<th>Litigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawyer(s)</td>
<td>44.88</td>
<td>27.26</td>
<td>7.19</td>
</tr>
<tr>
<td>Professional Engineer(s)</td>
<td>32.20</td>
<td>21.66</td>
<td>5.44</td>
</tr>
<tr>
<td>Architect(s)</td>
<td>18.87</td>
<td>25.84</td>
<td>2.57</td>
</tr>
<tr>
<td>Other Professional(s)</td>
<td>41.95</td>
<td>2.57</td>
<td>6.65</td>
</tr>
</tbody>
</table>

### TABLE A5.22 - PERCENTAGE OF CONSTRUCTION VOLUME INVOLVING DISPUTES, BY RESPONDENT OWNERSHIP.

<table>
<thead>
<tr>
<th>Respondent Ownership</th>
<th>Change</th>
<th>Claim</th>
<th>Litigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>12.83</td>
<td>20.50</td>
<td>3.72</td>
</tr>
<tr>
<td>Publicly Traded</td>
<td>18.48</td>
<td>14.16</td>
<td>1.52</td>
</tr>
<tr>
<td>Privately Held</td>
<td>18.32</td>
<td>18.97</td>
<td>2.89</td>
</tr>
</tbody>
</table>
### TABLE A5.23 - PERCENTAGE OF CONSTRUCTION VOLUME REPRESENTING CHANGES.

<table>
<thead>
<tr>
<th></th>
<th>Private Ownership</th>
<th>Publicly Traded Stock</th>
<th>Government or Public Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>8.31</td>
<td>20.01</td>
<td>12.83</td>
</tr>
<tr>
<td>Consultant</td>
<td>18.51</td>
<td>17.50</td>
<td>N/A</td>
</tr>
<tr>
<td>Contractor</td>
<td>20.83</td>
<td>15.50</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### TABLE A5.24 - PERCENTAGE OF CONSTRUCTION VOLUME REPRESENTING CLAIMS.

<table>
<thead>
<tr>
<th></th>
<th>Private Ownership</th>
<th>Publicly Traded Stock</th>
<th>Government or Public Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>19.99</td>
<td>8.93</td>
<td>20.5</td>
</tr>
<tr>
<td>Consultant</td>
<td>19.35</td>
<td>14.32</td>
<td>N/A</td>
</tr>
<tr>
<td>Contractor</td>
<td>18.27</td>
<td>25.6</td>
<td>N/A</td>
</tr>
</tbody>
</table>
### TABLE A5.25 - PERCENTAGE OF CONSTRUCTION VOLUME REPRESENTING LITIGATION.

<table>
<thead>
<tr>
<th>LITIGATION average %</th>
<th>Private Ownership</th>
<th>Publicly Traded Stock</th>
<th>Government or Public Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>2.92</td>
<td>1.03</td>
<td>3.72</td>
</tr>
<tr>
<td>Consultant</td>
<td>1.06</td>
<td>1.98</td>
<td>N/A</td>
</tr>
<tr>
<td>Contractor</td>
<td>4.91</td>
<td>2.40</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### TABLE A5.26 - PERCENTAGE DISTRIBUTION OF CONTRACT PREFERENCES BY RESPONDENT TYPE

<table>
<thead>
<tr>
<th>CONTRACT TYPE PREFERENCE BY RESPONDENT TYPE</th>
<th>Owner</th>
<th>Consultant</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum</td>
<td>55.32</td>
<td>50.91</td>
<td>54.72</td>
</tr>
<tr>
<td>Unit Rate</td>
<td>23.40</td>
<td>20.00</td>
<td>20.75</td>
</tr>
<tr>
<td>Cost Plus</td>
<td>0.0</td>
<td>1.82</td>
<td>3.77</td>
</tr>
<tr>
<td>Other</td>
<td>21.28</td>
<td>20.00</td>
<td>11.33</td>
</tr>
<tr>
<td>No Preference</td>
<td>0.0</td>
<td>7.27</td>
<td>9.43</td>
</tr>
</tbody>
</table>

AA22
<table>
<thead>
<tr>
<th>ANNUAL CONSTRUCTION VOLUME AWARDED</th>
<th>Lump Sum</th>
<th>Unit Rate</th>
<th>Cost Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum Preferred</td>
<td>5,781.60</td>
<td>855.90</td>
<td>440.64</td>
</tr>
<tr>
<td>Unit Rate Preferred</td>
<td>86.60</td>
<td>849.65</td>
<td>112.15</td>
</tr>
<tr>
<td>Cost Plus Preferred</td>
<td>64.26</td>
<td>13.55</td>
<td>80.11</td>
</tr>
<tr>
<td>Other Type Preferred</td>
<td>889.67</td>
<td>316.20</td>
<td>491.40</td>
</tr>
<tr>
<td>No Preference Stated</td>
<td>142.26</td>
<td>61.27</td>
<td>11.23</td>
</tr>
<tr>
<td>COLUMN TOTALS</td>
<td>6,964.39</td>
<td>2,096.57</td>
<td>1,135.53</td>
</tr>
</tbody>
</table>

TABLE A5.27 - CONSTRUCTION VOLUME AWARDED UNDER A SPECIFIC CONTRACT TYPE AGAINST THE PREFERRED CONTRACT TYPE OF THE RESPONDENT
<table>
<thead>
<tr>
<th>ANNUAL CONSTRUCTION VOLUME AWARDED</th>
<th>Lump Sum</th>
<th>Unit Rate</th>
<th>Cost Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum Preferred</td>
<td>82.03</td>
<td>40.82</td>
<td>38.80</td>
</tr>
<tr>
<td>Unit Rate Preferred</td>
<td>1.25</td>
<td>40.53</td>
<td>9.89</td>
</tr>
<tr>
<td>Cost Plus Preferred</td>
<td>0.92</td>
<td>0.65</td>
<td>7.05</td>
</tr>
<tr>
<td>Other Type Preferred</td>
<td>12.77</td>
<td>15.08</td>
<td>43.26</td>
</tr>
<tr>
<td>No Preference Stated</td>
<td>2.04</td>
<td>2.92</td>
<td>1.00</td>
</tr>
<tr>
<td>COLUMN TOTALS</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

**TABLE 4/28 - PERCENTAGE CONTRACT TYPE PREFERENCE DISTRIBUTION FOR EACH TYPE OF CONTRACT USED.**
### Table A5.29 - Volume of Construction Awarded by Specified Tender Method Broken Out by Preferred Contract Type

<table>
<thead>
<tr>
<th>Contract Type</th>
<th>Open Bid</th>
<th>Invited Bid</th>
<th>Negotiated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum</td>
<td>2,509.4</td>
<td>4,132.1</td>
<td>1,658.8</td>
</tr>
<tr>
<td>Unit Rate</td>
<td>1,579.0</td>
<td>1,463.0</td>
<td>257.0</td>
</tr>
<tr>
<td>Cost Plus</td>
<td>75.0</td>
<td>170.0</td>
<td>55.0</td>
</tr>
<tr>
<td>Other</td>
<td>936.4</td>
<td>1,411.1</td>
<td>354.1</td>
</tr>
<tr>
<td>No Preference</td>
<td>345.0</td>
<td>281.0</td>
<td>274.0</td>
</tr>
</tbody>
</table>

### Table A5.30 - Percentage Distribution of Contract Type Preference by Tender Method Used

<table>
<thead>
<tr>
<th>Contract Type</th>
<th>Open Bid</th>
<th>Invited Bid</th>
<th>Negotiated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum</td>
<td>59.1</td>
<td>77.4</td>
<td>97.9</td>
</tr>
<tr>
<td>Unit Rate</td>
<td>37.2</td>
<td>27.4</td>
<td>12.4</td>
</tr>
<tr>
<td>Cost Plus</td>
<td>1.8</td>
<td>3.2</td>
<td>2.6</td>
</tr>
<tr>
<td>Other</td>
<td>22.1</td>
<td>26.4</td>
<td>20.8</td>
</tr>
<tr>
<td>No Preference</td>
<td>8.1</td>
<td>5.3</td>
<td>13.2</td>
</tr>
</tbody>
</table>

TABLE A5.29 - VOLUME OF CONSTRUCTION AWARDED BY SPECIFIED TENDER METHOD BROKEN OUT BY PREFERRED CONTRACT TYPE.

TABLE A5.30 - PERCENTAGE DISTRIBUTION OF CONTRACT TYPE PREFERENCE BY TENDER METHOD USED.
<table>
<thead>
<tr>
<th>CONTRACT USAGE AS A PERCENTAGE OF CONSTRUCTION VOLUME RANGE</th>
<th>Lump Sum</th>
<th>Unit Rate</th>
<th>Cost Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$20 Million</td>
<td>17.6</td>
<td>79.6</td>
<td>2.8</td>
</tr>
<tr>
<td>$20-$50 Million</td>
<td>67.5</td>
<td>24.9</td>
<td>7.6</td>
</tr>
<tr>
<td>$50-$100 Million</td>
<td>56.5</td>
<td>31.5</td>
<td>12.0</td>
</tr>
<tr>
<td>&gt;$100 Million</td>
<td>73.2</td>
<td>15.0</td>
<td>11.8</td>
</tr>
</tbody>
</table>

**TABLE A5.31 - PERCENTAGE DISTRIBUTION OF CONTRACT TYPE USED BY ANNUAL CONSTRUCTION VOLUME CATEGORY.**
<table>
<thead>
<tr>
<th>CONTRACT PREFERENCE AS A PERCENTAGE OF CONSTR’N VOLUME RANGE</th>
<th>Lump Sum</th>
<th>Unit Rate</th>
<th>Cost Plus</th>
<th>Other Form</th>
<th>No Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$20 Million</td>
<td>40.1</td>
<td>20.9</td>
<td>2.9</td>
<td>26.9</td>
<td>9.2</td>
</tr>
<tr>
<td>$20-$50 Million</td>
<td>58.6</td>
<td>19.4</td>
<td>3.8</td>
<td>14.9</td>
<td>3.3</td>
</tr>
<tr>
<td>$50-$100 Million</td>
<td>44.1</td>
<td>25.1</td>
<td>4.9</td>
<td>21.0</td>
<td>4.9</td>
</tr>
<tr>
<td>&gt;$100 Million</td>
<td>71.1</td>
<td>4.3</td>
<td>0.0</td>
<td>21.5</td>
<td>3.1</td>
</tr>
</tbody>
</table>

TABLE A5.32 - PERCENTAGE DISTRIBUTION OF CONTRACT PREFERENCES BY ANNUAL CONSTRUCTION VOLUME CATEGORY.
### Table A5.33 - Percentage Use of Tender Method by Construction Volume Category

<table>
<thead>
<tr>
<th>Tender Method as a Percentage of Construction Volume Range</th>
<th>Open Bid</th>
<th>Invited Bid</th>
<th>Negotiated</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$20 Million</td>
<td>29.9</td>
<td>61.5</td>
<td>8.6</td>
</tr>
<tr>
<td>$20-$50 Million</td>
<td>28.4</td>
<td>54.3</td>
<td>17.3</td>
</tr>
<tr>
<td>$50-$100 Million</td>
<td>38.4</td>
<td>52.1</td>
<td>9.5</td>
</tr>
<tr>
<td>&gt;$100 Million</td>
<td>36.3</td>
<td>42.2</td>
<td>21.5</td>
</tr>
</tbody>
</table>

**TABLE A5.34 - Volume of Construction Awarded by Tender Method for Different Respondent Ownership Types**

<table>
<thead>
<tr>
<th>Volume of Work Bid</th>
<th>Open Bid</th>
<th>Invited Bid</th>
<th>Negotiated</th>
<th>ROW TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>1472.9</td>
<td>173.7</td>
<td>0.0</td>
<td>1,646.60</td>
</tr>
<tr>
<td>Publicly Traded</td>
<td>92.1</td>
<td>639.1</td>
<td>36.6</td>
<td>767.80</td>
</tr>
<tr>
<td>Privately Held</td>
<td>2680.0</td>
<td>4527.0</td>
<td>2039.7</td>
<td>9,246.70</td>
</tr>
<tr>
<td>COLUMN TOTALS</td>
<td>4,245.00</td>
<td>5,339.80</td>
<td>2,076.30</td>
<td></td>
</tr>
</tbody>
</table>

AA28
<table>
<thead>
<tr>
<th>Respondent Ownership</th>
<th>Open Bid</th>
<th>Invited Bid</th>
<th>Negotiated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>89.5</td>
<td>10.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Publicly Traded</td>
<td>12.0</td>
<td>83.2</td>
<td>4.8</td>
</tr>
<tr>
<td>Privately Held</td>
<td>29.0</td>
<td>49.0</td>
<td>22.0</td>
</tr>
</tbody>
</table>

TABLE A5.35 - PERCENTAGE OF CONSTRUCTION VOLUME Awarded, By Tender Method
### Table A5.37 - Percentage Distribution of Preferred Contract Type by Respondent Ownership

<table>
<thead>
<tr>
<th>% Distribution of Preferred Contract Type</th>
<th>Government</th>
<th>Publicly Traded</th>
<th>Privately Held</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum</td>
<td>47.83</td>
<td>44.44</td>
<td>56.14</td>
</tr>
<tr>
<td>Unit Rate</td>
<td>34.78</td>
<td>16.67</td>
<td>19.30</td>
</tr>
<tr>
<td>Cost Plus</td>
<td>0.00</td>
<td>0.00</td>
<td>2.63</td>
</tr>
<tr>
<td>Other Type</td>
<td>17.39</td>
<td>33.33</td>
<td>14.91</td>
</tr>
<tr>
<td>No Preference</td>
<td>0.00</td>
<td>5.56</td>
<td>7.02</td>
</tr>
<tr>
<td>COLUMN TOTAL</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

### Table A5.38 - Percentage Distribution of Contract Type Usage by Type of Respondent

<table>
<thead>
<tr>
<th>Bid Type Used by Respondents</th>
<th>Open Bid</th>
<th>Invited Bid</th>
<th>Negotiated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>48.6</td>
<td>40.5</td>
<td>10.9</td>
</tr>
<tr>
<td>Consultant</td>
<td>29.7</td>
<td>53.9</td>
<td>16.4</td>
</tr>
<tr>
<td>Contractor</td>
<td>29.4</td>
<td>49.9</td>
<td>20.7</td>
</tr>
</tbody>
</table>

TABLE A5.38 - PERCENTAGE DISTRIBUTION OF CONTRACT TYPE USAGE BY TYPE OF RESPONDENT
Charts of selected information in Tables A5.1 to A5.38
Chart A5.1 - Respondents by Type and Ownership
Chart A5.2 - Annual Construction Volume ($Millions) Surveyed, by Respondent Type and Ownership
Chart A5.3 - Average Volume ($Millions) of Construction by Respondent Type and Ownership
Chart A5.4 - Contract Type Used by Respondent Type
Chart A5.5 - Mean Percentage Use of Contract Type by Respondent Ownership
Chart A5.6 - Value of Disputes by Contract Type Used
Chart A5.6A - Percentage Incidence of Disputes by Contract Type Used
Chart A5.7 - Contract Type
Construction Volume by Expertise Employed
Chart A5.8 - Percentage Contract
Usage by Expertise Employed
Chart A5.9 - Expertise Employed by Construction Volume Category
Chart A5.10 - Expertise Employed by Respondent Type
Chart A5.11 - Expertise Employed by Respondent Ownership
Chart A5.12 - Contract Preferences
by Expertise Employed
Chart A5.13 - Percentage Preference of Contract Type by Expertise Employed
Chart A5.14 - Percentage Expertise Employed by Contract Preference
Chart A5.16 - Dispute Incidence by Construction Volume Category
Chart A5.17 - Dispute Incidence by Contract Type
Chart A5.18 - Dispute Volume by Bid Method Used
Chart A5.19 - Percentage Disputes by Bid Method Used
Chart A5.20 - Dispute Values by Expertise Employed
Chart A5.21 - Percentage Incidence of Disputes by Expertise Employed
Chart A5.22 - Dispute Incidence by Respondent Ownership
Chart A5.26 - Contract Preferences by Respondent Type
Chart A5.27 - Contract Preferences by Contract Type Used
Chart A5.28 - Contract Preferences as a Percentage of Contract Type Used
Chart A5.29 - Contract Preferences by Bid Type Used
Chart A5.30 - Contract Preference as a Percentage of Bid Type Used
Chart A5.31 - Percentage Use of Contract Types by Construction Volume Category
Chart A5.32 - Contract Preferences by Construction Volume Category
Chart A5.33 - Percentage Bid Type Used by Construction Volume Category
Chart A5.34 - Bid Type by Ownership (Construction Volume)
Chart A5.35 - Percentage Respondent Ownership by Bid Method Used
Chart A5.36 - Percentage Bid Method Used by Respondent Ownership
Chart A5.37 - Contract Type Preference by Respondent Ownership
Chart A5.38 - Percentage Use of Contract Types by Respondent Type
Chart A5.40 - Dispute Incidence by Respondent Category
APPENDIX B

Proposed New Contracting Method - original documents issued to participants
CANADIAN CONTRACTING METHOD - LABORATORY SESSION

AGENDA

3rd, 5th and 10th November 1992

07:45 - 08:00    Registration, Coffee and doughnuts.

08:00 - 08:15    Welcome and Introduction:
                 - Overview of how the proposed Canadian Contracting Method was developed.
                 - What we are looking for.

08:15 - 08:20    How to use the technology.

08:20 - 09:50    Commentary/input by participants.

09:50 - 10:00    Close and wrap-up*.

* If you have completed all your comments and wish to leave before this time, you should feel free to do so.

If you wish to continue your participation after this time, this is also possible. The laboratory has been booked until 11:30 to allow for a possible over-run in time.

PLEASE REMEMBER TO BRING YOUR COMPLETED QUESTIONNAIRE AND YOUR COPY OF THE CANADIAN CONTRACTING METHOD DOCUMENT.

THANK YOU.
**BACKGROUND DATA QUESTIONNAIRE**

Please take the time to complete this questionnaire. The data in questions 1 to 22 will be used in an attempt to further understand some of the issues which relate to improving the Construction Contracting Process, and may, therefore be published. WE DO NOT ASK FOR YOUR IDENTITY. WE VALUE YOUR CONTRIBUTION.

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Using Contractor's expertise during the design process increases the opportunity to reduce costs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2. Contractor input to design tends to reduce quality.</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>3. Legal council should always be consulted before signing a contract.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4. Legal council should always be consulted before agreeing to any change to a contract.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Advice of legal council should always be followed.</td>
<td></td>
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</tr>
<tr>
<td>6. Many contract disputes are known about (by at least one party) for a long time before they are dealt with.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7. Contractors save claims until the project is complete or almost complete because they do not want to spoil their relationship with the (a) Owner</td>
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<td></td>
</tr>
<tr>
<td>Question</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neutral</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
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<td>---------</td>
<td>----------</td>
<td>------------------</td>
</tr>
<tr>
<td>8. Construction contracts apportion risks unfairly to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Owner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Consultant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) Contractor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d) Subcontractor</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>9. Exculpatory clauses increase the likelihood of a contract dispute.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10. Use of 'standard' contracts (such as CCDC2 - stipulated price contract) reduces the potential for dispute.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Bid prices are affected by the bidder's expectations of fair contract administration.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Consultants who act as Contract administrators on behalf of their clients are usually completely objective in making decisions about contract issues and interpretations.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>13. More effective risk management will reduce the final cost of construction to the owner.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Competitive tendering is the most effective method for ensuring that the owner obtains the best return on construction capital.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Question</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neutral</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
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<td>------------------</td>
</tr>
<tr>
<td>15. Contractors should be screened and prequalified before being</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>allowed to bid on contract.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>16. Once prequalified, consultants should be selected solely on</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>price.</td>
<td></td>
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</tr>
<tr>
<td>17. A qualified, knowledgeable and experienced mediator, paid for</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>jointly by both parties to a contract, could facilitate dispute</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>resolution.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>18. A fair expectation of profit for a contractor (as % of contract</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>value) is</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>19. In order of preference, rank the following dispute resolution</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>methods: (1 = Highest, 4 = Lowest)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Which of the following most closely describes ownership of your</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>business.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>21. What type of Business are you in? Please select ONE of the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>following:</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;2%</td>
<td>2-4%</td>
<td>4-6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
22. Which sector of the construction industry most closely describes the one you work in.

- Commercial Construction
- Residential Construction
- Heavy Engineering
- Resource Development
- Institutional /Government

ABOUT YOU: THIS SECTION IS OPTIONAL.

Education (Tick highest)
- Secondary School
- Technical/Community Coll. Diploma
- University Degree
- Graduate degree

Experience (years)
- Owner
- Designer
- Contractor
- Other (specify)

Position/Function (select closest definition):
- General Manager
- Technical
- Executive
- Administrator
- Project Manager
- Accountant
- Estimator
- Other
- (Specify)
PROJECT MANAGEMENT SPECIALIZATION

Introducing the CANADIAN CONTRACTING METHOD

A INTRODUCTION

The most common type of construction contract in use today is Lump Sum (or Stipulated Price). Yet, based on a recent survey, this type of contract has the highest incidence of disputes (claims and litigation) per $ contracted. Changes, claims and litigation are all symptoms of the risk inherent in the construction process. A recent survey of 155 Owners, Consultants and Contractors shows that between 30% and 44% of the volume of construction (measured in contract payments) is processed through changes, claims and litigation.

Many commonly used construction contracts use terms and conditions which date back to the 1950’s. These factors have one thing in common: Risk. Construction processes and methods, regulatory requirements, design codes, technology, materials and the economy have all changed significantly since then. THE WAY WE CONTRACT FOR CONSTRUCTION SERVICES AND, THEREFORE, THE WAY WE MANAGE RISK, DOES NOT REFLECT THIS CHANGE.

In today’s fragmented construction industry we face many problems related to this issue.

John’s Problems: (1) Potential for litigation/confrontation; (2) Inadequate communication; (3) Expectations of: schedule, cost, and quality are not being met.

The cost of these problems? The American Society of Civil Engineers suggests we are paying a 20% premium and the Business Roundtable Report on Cost Effectiveness in the Construction Industry suggests “at least 5%” due to the way we contract for construction. In 1990, the American Consulting Engineers Council and the Associated General Contractors of America Inc. published a booklet entitled "Owner’s Guide to Saving Money by Risk Allocation". This booklet presents some general approaches to more effective risk apportionment in contracts. But it does not present a process for implementing effective risk apportionment. In our fragmented industry, an acceptable and pragmatic process is key to effective implementation of better risk apportionment. The process will not be perfect, nor will it address all concerns. What is important is that it can be implemented efficiently by using pre-determined rules and guidelines.

John’s Challenge: (1) Reduce waste (2) Reduce premiums (3) Reduce costs.

Note: (1) Reduce waste through better design & teamwork (2) Reduce premiums through better risk allocation (3) Reduce costs through more effective planning.

Note: Following is a description of the proposed "Canadian Contracting Method".
B. BACKGROUND:

Today's construction contracts are based on a confrontational system which precludes a number of opportunities for specialists to pool their expertise to produce a better product. Confrontation has also led to mindsets which are based on mistrust and which will not allow owners, designers and builders to work closely towards a better product. Owners and their consultants produce contracts which are intended to eliminate their risks. Consequently, to stay in business, contractors assume substantial (and often inappropriate) risks which they, in turn, pass on to subcontractors and suppliers. These risks translate into premiums which are ultimately paid for by the Owner.

The tendering process requires a degree of confidentiality to maintain competitiveness. This, in turn, leads to an inability or reluctance to effectively pre-plan projects in any detail.

A study of 155 organizations representing construction contractors, owners and designers has identified some interesting relationships:

- Contract types ranked in order of incidence of dispute (change, claim or litigation)
  1. LUMP SUM (most likely)
  2. UNIT RATE
  3. COST PLUS (least likely)

- Contract tendering methods ranked in order of incidence of dispute
  1. OPEN TENDER (most likely)
  2. INVITED BIDDERS
  3. NEGOTIATED (least likely)

A second study of some 20 actual construction claims has identified a relationship between exculpatory clauses and the existence of the claim. This relationship is also supported by other studies.

The vast majority of construction contracts are competitively tendered and contracted on a lump sum basis. This includes any contracts that appear to be on a different basis.

Most of today's strategic alliances (partnerships) are between an owner and an engineering contractor. Payment is usually on a cost-plus basis. The construction portion is subcontracted by the engineering contractor to trade contractors and suppliers. The vast majority of these subcontracts are competitively tendered, lump sum contracts.

Project and Construction Management contractors may enter into subcontracts for construction or may manage trade contracts between numerous Contractors and the Owner. Again, the vast majority of these contracts are competitively tendered, lump sum.

Another common form of agreement is the Guaranteed Upset (or Maximum) Price (GUP or GMP) contract. These are frequently negotiated between an owner and a general contractor. The general contractor then subcontracts the majority of the work. The preferred method of sub-contracting? Tendered, Lump Sum.

A significant exception to this is the use of Unit Rate contracts for linear or repetitive work. Pipelines, roads, sewer mains, power lines and other similar projects lend themselves to unit rate contracts, as actual quantities of work or amounts and the conditions under which the work is to be done cannot be readily measured.

We can conclude from all this is:

1. The Construction Industry is conservative;
2. Contracting problems are universal and well known;
3. All participants in the process are risk averse;
The existing contracting methods are less effective than they could be.

C. PROCESS:

A simple process has been developed over the past four years to address this set of issues and permit a more effective contracting method. "More effective" is defined as being able to do more, better and faster (for a given cost).

The process involves three major steps:

1. CONTRACT FORMATION
2. CONTRACT ADMINISTRATION
3. CONTRACT CLOSE-OUT.

C.1 CONTRACT FORMATION:

The intent of the process, summarized in chart 1, is to:

(a) Identify and correctly apportion risks to REDUCE PREMIUMS AND CONTINGENCIES.
(b) Develop a team approach to FACILITATE BUILDABILITY REVIEWS, ENHANCE SAFETY, IMPROVE COMMUNICATIONS AND REDUCE DISPUTES.
(c) Permit more effective planning TO FURTHER REDUCE CONTINGENCIES AND TO ELIMINATE WASTAGE, DUPLICATION OF EFFORT AND OTHER INEFFICIENCIES.

Design and Construction contracts should be awarded at the same time. The form of contract (Lump Sum, Unit Rate, Target Cost, Cost Plus etc.) will depend primarily on the degree to which the work to be done has been defined. The Scope of the contract (design, construction, supply of materials, combinations etc...) will be largely dependent on the nature of the work (complexity, innovation, timing).

Contracts can be written such that they may be converted from one type to another. For example, a construction contract may be awarded on a cost plus basis, and converted to a guaranteed maximum price contract when design reaches a predetermined degree of completion.

Early award of a Lump Sum contract for construction is not necessarily precluded. Many construction projects are defined in terms of general scope (eg: class A office tower of 'x' floors and 'y' square feet with 'z' levels of parking below grade at a specific location), budget and overall design and construction timing. This type of project is substantially subcontracted typically 85% to 95%.

An experienced General Contractor can price the General Conditions of Contract, profit and overhead fairly accurately with primary information such as that just listed. The call for bids should ask the general contractor to submit a preliminary outline schedule, list key personnel and quote a fixed price, with assumptions, for General Conditions, overhead and profit. Selection should be based on the overall quality of the proposal, not just the price.

Design and Construction work should be contracted out at the same time so that both types of expertise may be fully utilized through both design and construction phases. This offers the following advantages:

1. Buildability issues may be addressed.
2. Cost saving options may be considered while design is still "fluid" and such changes can be cost effective.
(3) The contractor obtains a better understanding of the design intent with the potential for a better quality end product.

(4) The designer obtains a better understanding of potential construction problems, thus making cost and schedule predictions more accurate.

Traditional construction tendering often precludes effective planning as general contractors are reluctant to plan construction in detail until they have been awarded the work. Alternatively, where a detailed plan is needed for bidding purposes, there is a reluctance to share the information with subcontractors in order to preserve its confidentiality and any attendant potential competitive advantage. The result? Subcontractors are left to bid on insufficient information and must guess at timing of their work, ease of access, crew sizes, material deliveries and so on. Such guesses involve unnecessary risks and their associated premiums (or contingencies).

The revised approach addresses this by staging the selection process for the general contractor and the trade contractors. This is more clearly illustrated in the flowchart in figure 1. An alternative process is illustrated in figure 1A. Selection of the general contractor prior to selection of trade contractors achieves the following:

(1) Trade contractors know who the general contractor will be, and need therefore to bid to only one contractor.

(2) The general contractor can release information normally not provided to trade contractors because of confidentiality/competition concerns.

(3) Typically 80% of trade contractor quotes are received by the general contractor in the two hours before tender closing. The proposed new method allows time to assess such submissions properly, resulting in more appropriate decisions and elimination of the premiums associated with the traditional process.

(4) Because a similar process of risk apportionment is used between contractor and subcontractor as was used between owner and contractor, risk is more equitably distributed.
C.2 NEW TENDERING STEPS:

1. Pre-select/prequalify consultants and general contractors.
2. Issue proposed contract to prequalified bidders for design and construction services.
3. Request all bidders to review documents and identify risks which they feel should not be passed to them under the terms of the proposed contract (ie ones they do not wish to assume).
4. Meet with all bidders who intend to bid, to solicit a comprehensive list of risks which they would prefer not to assume.
5. Develop a comprehensive list of risks to be excluded from the bid or to be re-assigned to another party and issue to bidders.
6. Solicit bids based on the original contract or on a modified contract reflecting re-assigned risks. In addition to the base bid, request premiums which may be added to or deducted from the base bid should a listed risk be re-assigned to another party. IF THE BID IS TO BE AWARDED ON ANY BASIS OTHER THAN PRICE ALONE, THE ANALYSIS/SELECTION CRITERIA MUST BE DETAILED IN THE CALL FOR BIDS (REQUEST FOR QUOTATION).
7. The owner prices the listed risks at the same time as the bidders and submits a sealed "bid" on the listed risks of premiums it is willing to pay to divest itself of each risk.
8. Bidders submit sealed bids.
9. Bidders are permitted, within 24 hours of tender closing, to submit bid preparation documents in sealed containers to an independent holder who will retain such documents in escrow until a bidder is successfully appointed. In the event of an error or a dispute over the bid process the bidder may allow these documents to be released in order to demonstrate an error or assumption or otherwise support its position in the dispute.
10. Bids are analyzed and the successful low bidder is either: (a) the one whose base bid plus additions or deductions for reassigned risks is the most competitive IF THE AWARD IS BASED ON PRICE ALONE or (b) the best combination of project execution plan, staffing, price and other criteria as laid out in the request for quotation [see step 6].
11. Final terms, wording of amended clauses are negotiated. If successful, the contract is awarded. If not, the second bidder [from step 10] is selected and this step is repeated.
12. After award, all contract administration personnel from Owner, Consultant and Contractor meet to review and agree on processes for key activities: payment processing, change processing, notices under the terms of the contract and who has authority to issue instructions to whom. Detailed minutes are distributed to all parties.
13. Administer the Contract.
14. Subcontractors are appointed using a similar process, but with the Owner, Consultant and Contractor jointly evaluating in steps 10 and 11. (The Owner retains the right to veto a decision).

C2 CONTRACT ADMINISTRATION:

A number of guidelines are offered for more effective contract administration. These guidelines are intended to foster effective communication, fair business practices and optimal record keeping.

(i) Set-up meeting: All participants should meet to discuss and finalize agreed procedures for dealing with:
   (a) Processing of progress payments.
   (b) Changes by Owner, Consultant, Contractor and Subcontractor.
   (c) Notice requirements for delays, stoppages or other cost-impact events.
   (d) Common record-keeping (diaries, weather reports etc.).
   (e) Management of shop drawings, samples and other technical approvals.
   (f) Work inspection and testing.
   (g) Communication between parties.
II) Regular meetings: Progress meetings benefit from good practice. This includes:
(a) A standard Agenda or format for such meetings.
(b) Review of problems and solutions.
(c) Review of outstanding disputes/issues and resolution or dates and methods for resolution.
(d) Proactive process for approval of minutes.

EFFECTIVE MEETINGS with well prepared and timely minutes can save significantly on paperwork, problems and administrative time.

a) Safety Valve: A formal (written into the contract) or informal mediation process should be established to deal with disputes or issues which have taken longer than (say) 2 weeks to resolve.

This process will use established contract procedures (change orders, site instructions etc) to resolve problems with a potential for filing a claim or starting litigation.

Alternatively, a third-party moderator or mediator* is retained. The role of this moderator is to stay current with the contract, and to act as an impartial mediator in disputes as they arise. (*May be an individual or a panel appointed jointly by the parties to the contract but will not be the Consultant).

II. CONTRACT CLOSE-OUT:

This final Step allows all parties to the contracting process to complete their obligations effectively and then cooperatively learn from the experience.

(i) Completion Agreement: In most cases, completion of contractual obligations are clearly defined. However special circumstances regularly preclude such a straightforward close-out.

Changes, site conditions, delays and other causes may have impacted on the work to such an extent that exact compliance to the terms of the contract may not be to the advantage of both or either the Owner and Contractor (or Contractor and Subcontractor).

In such circumstances, a change order listing what is still to be completed together with any appropriate price adjustment may be issued.

When a Contractor (or Subcontractor) approaches completion or is having problems achieving completion, a review of status and issue of an agreed schedule of activities to complete will expedite the process and allow for effective planning to ensure completion of the overall project. This completion agreement should be established for all contracts.

(ii) Final Account and Payment release: A final account for each contract should be prepared in conjunction with the completion Agreement, clearly identifying any actual or proposed changes to the value of the contract. The intent here is to identify all outstanding issues that may not have been dealt with so that their resolution can become part of the contract close-out process and not an extended negotiation or dispute.

Final payments (progress and holdbacks) should be scheduled, subject only to specific performance by the Contractor.

(iii) Review: After complete discharge of all contract obligations, the parties to the contract should meet to discuss how a future contract could be more effectively written and administered.

D. CONCLUSION:

The proposed "Canadian Contracting Method" is aimed at reducing confrontation by promoting a cooperative business environment based on risk equity. By allowing reasonable feedback to the owner on the cost of various contracting options,
more astute decisions may be made by the Owner and its investors or financiers. Wastage in the design and construction p30C
rocess is reduced by encouraging effective cooperation between design and construction professionals, based on the sound p301
ess principles of total quality management and obtaining repeat business as a result of good performance.

Wasting can be more effective because stakeholders become involved in, and committed to, the process at the right time, p302
ther than too late using traditional methods. The “bottom line” is lower construction costs because of:

- reduced risk premiums;
- more effective planning (fewer delays, cost over-runs, disputes...);
- more efficient design and construction;
- lower contract administration costs as a result of a potentially more cooperative relationship.

THE NEXT STEP:

Implementation of the proposed or modified system will require the support of the industry. And the construction industry p314
is both fragmented and busy trying to survive in continuing difficult times.

The following steps are proposed.

Manuall:

Produce and issue a manual that describes the process in a detailed "cookbook" format to allow for clear understanding and p321
effective implementation of the proposed process.

Enforcement:

A formal endorsement of support for the process should be obtained from professional and business associations at the p326
ational, regional and local levels such as:

- Architects
- Specialist technical groups such as Specification Writers Association, PMI, AACE, CSCE, CCE, CEA and other p330
nterest groups.
- Professional Engineers,
- Construction Associations such as CCA, ACA,
- Standards organizations such as CCDC
- Owner groups such as BOMA and COAA

Trial Implementation:

Use the proposed methodology to determine whether the proposed contracting method will yield the anticipated results. p339
al projects must be undertaken and monitored, as varied degrees of success will be achieved.

Reform:

Gain experience with the method to continuously improve on it.

ADDITIONAL QUESTIONS:

Please add your name and any comments to list in the appropriate file folder if you:

I WISH TO RECEIVE ALL THE COMMENTS MADE IN THIS SESSION

I WOULD LIKE TO RECEIVE A COPY OF THE REVISED "CANADIAN CONSTRUCTION METHOD" p350
ICH RESULTS FROM THESE ADVISORY SESSION
F.1. Are interested in participating in a future session on this topic where the objective will be to obtain consensus on the final "Canadian Contracting Method".

F.4. Would be prepared to financially support future development of this concept?

F.5. Have any comments on this process, or suggestions on how to improve it.
C) CONTRACT FORMATION

DESIGN CONSULTANT

OWNER

CONTRACTOR

ASSESS PROJECT RISKS 1

CONTRACTING STRATEGY TO APPORTION RISKS COST EFFECTIVELY 2

ASSESS RISKS 4

REQUEST FOR PROPOSAL OR BID 3

PRODUCE BASE BID & ALT. BID WITH DIFFERENT RISK OPTION(S) 5

EVALUATE BASE BID(S) + OPTIONS 6

CONTRACTOR ASSESS RISKS 4

PRODUCE BASE BID & ALT. BID WITH DIFFERENT RISK OPTION(S) 5

ADJUST CONTRACT STRATEGY 7

NEGOTIATE CONTRACT 8

NEGOTIATE CONTRACT 8

ADJUST CONTINGENCIES 8A

ADJUST CONTINGENCIES 9

PROCURE INSURANCES 10

ADJUST CONTINGENCIES 8A

SUBCONTRACT(S) 8B

FINAL CONTRACTS 11

FINAL CONTRACTS 11

A) JUST CONTRACT STRATEGY 7

B) ADJUST CONTINGENCIES 8A

I) U) SUBCONTRACT(S) 8B

Figure 1
C.4 ALTERNATIVE CONTRACT FORMATION

OWNER  PRIME CONTRACTOR  TRADE OR SPECIALTY CONTRACTORS

PREPARE BID PACKAGES 1

SELECT PRIME CONTRACTOR(s)
(based on predetermined performance criteria, unit rates for Supervision etc.) 2

DEVELOP A LIST OF RISKS WHICH COULD AFFECT CONSTRUCTION PRICES 3

PREPARE FINAL CONTRACT: CONTRACT PLUS LIST OF RISKS TO BE PRICED BY CONTRACTOR 4

EVALUATE RISKS ON LIST & ASSESS PREMIUM TO RETAIN THESE RISKS 5

COMPARE OWN PREMIUMS WITH CONTRACTOR'S QUOTE 8

QUALIFICATION STATEMENT OR PROPOSAL 2

INPUT TO RISK IDENTIFICATION 3A

OBTAIN TRADE QUOTATIONS 5

PREPARE FINAL PRICE ON BASE CONTRACT WITH SEPARATE PRICES (PREMIUMS) FOR RISKS 7

*QUOTE ON BASE CONTRACT, WITH SEPARATE PRICES FOR IDENTIFIED RISKS 6

contractor uses lower of subcontractor's premium and own assessment of risk.

NEGOTIATE FINAL CONTRACT WITH OPTIMAL RISK APPORTIONMENT 9

NEGOTIATE FINAL SUBCONTRACTS WITH OPTIMAL RISK APPORTIONMENT 9A

Figure 1A
CONTRACT ADMINISTRATION: CHANGE/DISPUTE MANAGEMENT.

<table>
<thead>
<tr>
<th>OWNER</th>
<th>MEDIATOR/FACILITATOR</th>
<th>CONTRACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSIDER &amp; EVALUATE IMPACT 2</td>
<td>DISPUTE ARISES 1</td>
<td>CONSIDER &amp; EVALUATE IMPACT 2</td>
</tr>
<tr>
<td>IDENTIFY ISSUES &amp; FACTS 3</td>
<td>HELP SORT FACT FROM OPINION 3A</td>
<td>IDENTIFY ISSUES &amp; FACTS 3</td>
</tr>
<tr>
<td>IDENTIFY OPTIONS FOR ACTION 4</td>
<td>AGREE ON COMMON GROUND 5</td>
<td>IDENTIFY OPTIONS FOR ACTION 4</td>
</tr>
<tr>
<td>ISSUE 3 CHANGE ORDER/TAKE ACTION 8</td>
<td>DOCUMENT AGREEMENT 7</td>
<td>TAKE ACTION 8</td>
</tr>
</tbody>
</table>

DISPUTE RESOLVED 9A

A or B

UNRESOLVED DISPUTE 9B GOES TO MEDIATION/ARBITRATION

CONTRACTOR MAY BE FOR ANY SERVICE OR SUPPLY (incl. design, materials only, construction)
Fisher & Ury's "Principled Negotiation" method (from "Getting to Yes") is recommended.
NEED NOT INVOLVE MONEY!

Figure 2.
APPENDIX C

Comments on first draft of the proposed New Canadian Contracting Method
EXTRACT OF LABORATORY SESSION
COMMENTS ON THE NEW CANADIAN CONTRACTING METHOD

All comments are presented unaltered, as entered by participants in the laboratory sessions.

I. A. Introduction

1. This is an excellent introduction and this comment covers my opinion down to 38.

1-11 Agree with general comments. The solutions include better design-unbuildable designs and poorly coordinated drawings are too frequent scope of work. is often too vague. Agree that contracts contain too many weasel clauses and owners still try and keep too much into secret. Good effort of Parking can always be improved.

1. I was interested in Mr. Hartman’s comment that the preferred contracting method in the industry is the lump sum contract. From a contractors point of view, I would question this. Most contractors would prefer to negotiate some form of contract with a guaranteed return, even if it is lower than the potential return on a successful lump sum contract. The risk involved with getting a potentially higher return is generally high enough that in most cases it does not materialize, and a lower, or negative, return is received.

1-14 A good review of the problem. I might have expanded a bit to include what is going on in the rest of the world.

1. The largest problem today in my company is dealing with outside contractors through contracts that seem once they have been signed leave us, the client totally at the mercy of the contractor. To help alleviate this problem, we have preselected bidders, awarded limited open contracts, and formed alliances. None of which solve all of the problems. We welcome your efforts here to help in this dilemma. I’m sure the contractors and designers will also welcome your efforts.

1-22. THIS seems very high does it include planned extras?

1. Schedule expenditures are often determined without due consideration for actual construction time requirement.

5. Working with many different contractors in the insurance and surety business, I see many ways of contracting. Some of my clients negotiate all of their work while others bid competitively on each job. It seems that the way contractors and owners undertake the tendering and contracting of projects depends on their backgrounds, technical abilities, and personalities.

5. The root of the problem may not be the contract form but rather the expectations of each party involved in the process. In most cases, in the present construction scenario, the owner relies on the consultant for advice in most areas of the construction process. The owner regarding consulting services is just as competitive as the building services sector and as a result consultants are creating unrealistic expectations for owners. The lack of the owner’s direct involvement does nothing to change those false expectations. The result is often conflict with the consultant taking an obvious side notwithstanding the merits of their position. I have a number of cases which exist merely as a result of this very situation. The contract form has to somehow get parties more involved with an emphasis on having expectations into a more realistic and practical framework.

5-15 The lump sum contract is popular with owners as an easy way in which to tender construction. The contract is usually set up to accommodate changes, and all parties should be aware of this. Fair resolution of changes and their cost can minimize claims.

5. I doubt that lump sum is the most common type of construction contract - unit price is a far more equitable method, particularly on heavy civil projects, and provides greater flexibility to deal with unforeseen changes on a fair basis to all parties.

5. The list of risks to be excluded is sent to bidders for what purpose? Information only or for the bidders to price? 7 suggests the latter. Should this be rephrased to “list of risks which may be excluded” Line 7 should elaborate on how the risks are reassigned.

CC2
LUMP SUM GOOD FOR WELL DEFINED PROJECTS. GOOD PROJECT DEFINITION IS VERY HARD TO OBTAIN. REQUIRES EXPERIENCE, DISCIPLINE. SUBSTANTIAL PORTION OF RISK IS FROM-definition problem.

My experience is that far less than 30 to 44% of construction costs are through changes. A more likely figure is 10 to 15%.

I found the introduction to contain fairly sweeping general statements which for the purposes of this session may have been necessary. Any formal introduction to the program, depending upon use, will require more specific references. For example, the reference to the use of contract in use today based on concepts from the 1950's has not been altered to reflect significant changes in the economy. Economic circumstances have changed dramatically cyclically since the 50's and the difficult times in the early 90's have been duplicated over this period. The contract model will have to be adaptable to all economic circumstances. This is where I view the model as very workable as the less that economics influences the negotiating process the better. The Courts are presently interpreting construction contracts on the assumption that each party is negotiating from equal bargaining positions. With the present day tendering systems and the various economic influences driving contractors to compete for project work, the Court is, in my opinion, operating under a grave misconception.

- Lump sum contracts by definition are for complete work. When does, are not complete or unclear there is no way to make changes except by ESP.

- Factors are not simply symptoms or risk but also the result of the contracting strategy and short cuts in the front end of the project i.e. design.

- The idea of requiring bid docs to detail the selection is good as it still reigns in some woolly thinking in owners organisation as to what the object of the exercise is.

- I agree that lump sum contracts usually experience the highest incidence of claims and disputes specially when design is not complete or the scope of the work is not properly defined.

- The competitive bid process by its very nature lends itself to disputes, particularly when pricing is lump sum.

- IMPORTANT TO DIFFERENTIATE BETWEEN DESIGN RISK (IE INCOMPLETE DESIGN OR NOT WELL THOUGHT OUT) AND CONSTRUCTION RISK (IE UNKNOWN SOIL CONDITIONS)

- It would be interesting to have a break down as to what are the percentages for changes, claims and litigations.

- Changes will most alwais occur, claims and litigation most often arise from the attitudes and expectations of the parties.

- Survey by whom?

- and 8 - This range is surprisingly high. Does survey include Oil & Gas Industry?

- Symptoms: this is often an attitude of the parties unrealistic expectations from either party is the root of most symptoms.

- I believe that the 30-40% is certainly from our experience a higher % than any amounts we experience.

- I think that you are mixing apples and oranges to lump changes, claims and litigation into one category, changes and claims may be completely unrelated to litigation matters, while litigation may be unrelated to changes and claims in the wide sense. In my limited experience I find that a lot of changes arise solely because of poor or incomplete design. I am not certain if transferring the design function to the contractor will eliminate poor or incomplete design.

- My experience is that disputes and extras are not as high as 50% and 40% I would estimate nearer to 25%

- The 30-40% figure is high in our sectors of construction. Maybe they should be sorted by type of construction.

- FIND THE 30-44 % TO BE UNBELIEVABLE - CERTAINLY BASED UPON OUR EXPERIENCE IS MUCH TOO HIGH

- This seems very high does it include extras as opposed to unit prices for additional work.

- what do you mean by changes?

- I would like to comment on the reference to terms and conditions that relate back to the 1950s. I agree that often these terms are outdated and should be changed. However one must remember that often these terms and conditions have been judicially interpreted and thus have a special meaning to the construction industry and to the legal profession. In the legal profession presently there is a movement to use plain and simple language. One tends to forget however that use of different terms and
conditions means the loss of the sure-prudence developed as to the meaning of those terms and conditions. Thus with the use of
new terms and conditions the certainty of meaning of those terms and conditions will be lost. I would expect that the
construction industry will demand certainty of meaning with new contracts and this certainty will not necessarily be there. Only
time, experience and judicial interpretation will provide that certainty. There seems to me the scope definition is the major problem with any type of contracting strategies and that the lump sum method is
the one that portrays the problems in dollars the other types are harder to measure or

11 I question that statement as the CCDC documents and the Federal Government Contracts have all been revised several times
since 1950

11 The Federal Govt has historically based there contracts on past experience. Therefore we can't just ignore the past. Technology
has changed but human beings haven't. My experience is that contractors are not after doing the best job. They are after getting the
most money. No offence we all are.

12 I agree methods have changed dramatically over the years. I've been involved in the construction industry for 20 years and
have seen a real increase in the sophistication of the contractor and owner. I often hear the question “How do they do it?” from the
contractor still working with antiquated systems and trying to compete with more innovative contractors.

13 I agree.

12 Risks are so hard to define. Without some considerable experience, many risks are also unknown in the sense that they are not
even thought of. The challenge is to devise a system to handle the unknowns

12 The construction process has become more sophisticated so the separation of design and construction has increased. The study of
constructability highlights the inherent problems in the current form of construction procurement which suggests that the traditional
separation of design and construction is responsible for some of the problems at current projects and for less efficient
performance. Constructability studies also suggest that a new approaches for the design and construction processes are needed.

13-14 Who should it? The only thing that has changed is that 1) money is tighter 2) Contractors are more knowledgeable of rights
3) Documents are poorer

13 Whose fault is this? The industry's or the individual participants in the industry? Presumably the latter since the industry is
merely the compilation of its participants

13 The risk associated with any project whether it be a lump sum project, unit price or otherwise will always be present unless there is a desire by all parties to be open and
honest in the preparation of documents and the resolution of disputes. A lump sum contract can be successful if this openness and honesty exists. Owners need to ensure that all
information possible is provided to the bidders even if it will alter the price of the project unfavourably. Many of the risks built into a project exist from the outset because the
owner does not include vital information in the tender documents. Consultants are reluctant to alter designs when a problem exists as there is a perception that admission of
error may open them to subsequent claims. The contractors, in the manner in which they deal with extras and credits create a feeling amongst the owners that they are not
offering reasonable sums and this affects the relationship detrimentally. These practices combined with the acceptance of the lowest tender, which frequently is the contractor
who forgot something, contribute to the unsatisfactory conclusion of a project. A lump sum contract can be successful if these situations are resolved.

13-14 The way we contract work for construction must reflect the present market situation, that being global and very competitive.

14 I agree with comment that documents are poorer. Successful bidders find loopholes that they believe they can exploit after
award through claims—how else would they win the contract?

14 This general statement implies that the way construction risk is managed has not changed. However I understand that firms
moving in large high risk projects have already implemented risk management policies in response.

14 It seems that at the end of this process you have hired a construction manager and not a contractor. Not necessarily bad but
lave not merely pushed the disputes down one level?

14 We generally use lump sum bids even though there may be insufficient definition perceived as best chance for clean project.
18 I agree with the comments 17-21

18 I agree.

18 I agree. the potential for litigation is very high.

18 Good thorough documentation might eliminate this problem.

18 Agree

18 Litigation will continue to increase in tough economic times. Contractors price at low or non-existent margins, architects are producing poor documents because of low fees, yet owners are still expecting the same quality & in many cases, unrealistic completion dates.

18 My experience is that much of the potential for litigation is created at the bidding stage by the failure to interpret the contract requirements correctly or by errors and omissions causing the submission of an unrealistic bid. This results in the Contractor seeking ways to recover losses by compiling claims for delays or whatever in the hope that in the litigation (or arbitration) process he will succeed in getting sympathetic consideration. In addition many litigation claims arise because of the disorganization and the mismanagement of the construction project which results in excessive costs and financial losses which the Contractor attempts to recover by frivolous claims, often prepared by private Claims Consultants with no actual knowledge of the project history. This requires the Owner having to spend considerable time and cost in refuting the claim without the opportunity to recover this outlay.

18 The potential for litigation/confrontation always exist

18 - 22 I agree

18 I would like to comment on Todays Problems ... often problems arise not because of the three problems listed but arise because engineers architects contractors and subcontractors do not read the tender packages and the draft contract forms before putting the project out for tender or in the case of contractors and subcontractors tendering on these projects. I suggest that a lot of the confrontation would resolve itself if everyone read the documents before tendering.

18-21 Points are on the mark. An additional comment on #3 is that expectations are not clearly outlined or expressed in the contract documents. Which leads to meeting of specifications rather than client requirements.

19 I don't agree. I believe that communications are very good.

19 Agree

19 Inadequate communication on the part of the owning company remains a significant cause of many so called cost overruns. i.e. when a contractor believes he understands what the owner wants, he estimates in accordance with his understanding. The second most common problem is that of contractors who, despite the owners efforts to ensure clarity, bid in accordance with their perception of what is needed. Usually the perception is based on information other than that relating to the current situation. i.e. typical comments from contractors include, "What do you mean that's not what you wanted?" My other clients all accept this.

Finally, events not directly controlled by either contracting party are seldom handled in a fair and equitable manner in most contracts. In my experience, it is not possible to be fair, as fairness is almost always judged at the time of the situation. i.e. a weather clause in a pipeline construction contract might favour the owner, the contractor or distribute the cost consequences between the two parties. One could suggest that the shared scenario is fair. However if there was an inordinate amount of rain on the project, the contractor would complain that his half is unfair even though it is exactly the same as the owners costs.

20 problem is really the difference between what is contracted on a solid basis and the expectations.

20 Agree.

20 In some cases this may be true, however in the majority of our projects these expectations are realized.

20 Expectations must be reasonable and defined. Schedule and cost are easy to define - quality is not. Quality must be specified. Not "best" or "good", but carefully, completely and concisely delineated, only then can it be "free". Most problems arise as a result of poorly defined scope and at the interfaces between contracts, subcontractors and trades.

21 A lump sum contract often provides considerable incentive to execute the work economically and to get it done "right the first time". There is a danger that if you remove the incentive complacency may develop that may actually negatively impact cost and quality.

CC5
2. B. Background

44-50 I recognize that there is some risk sharing, it seems to me that the risks should be quantified and paid for. The owner in many cases has some dollars and wants to build something, unfortunately, he rarely has the skills to execute the project. Let alone administer the terms of a contract. Also, the question of trust is a major consideration that will require a great deal of consideration.

44 As general comment, systems such as the one you are proposing have been used successfully for many years.

45-52 This depends on the abilities of the engineer and the contractor’s superintendent, but generally, I agree. Any design done by consultants without input from the general contractor will involve the assumption of risk. Presently it is up to the contractor to determine how much risk.

45-51 In a survival market there is little financial penalty paid by the owner. All the risk is absorbed by the contractors. The premium can only be recovered through claims.

46 Your explanation of today's system is too simplistic. It is not based on confrontational contracts. The process only becomes confrontational when the administration of the contract becomes biased, or when either party to contract looks for unfair advantages under the contract. I don't care how perfect the contract is; if there is no cooperation or trust, then problems will result.

46-50 I agree that subs are inheriting risks & the associated costs which are assumed by the contractor.

46-51 I agree that a fairer and more practical system of risk allocation will result in a more efficient and more profitable project for all parties. However, I feel the degree of confrontation among the parties is dependent upon a number of other factors including the relative strengths and degree of sophistication of the parties, the state of the economy, and the degree of knowledge and experience of the parties and individuals involved. I think you have overstated the extent of confrontation generally.

46 Disagree in our business.

46-50 I agree with your statement although there some contractors who have already seen the light and do mostly negotiated work. And I always amazed at how successful these people are and their financial statements prove their success consistently year to year. To do this all parties to the contract must be committed to the process and be willing to work together as a team.

46-50 The most important role of the project manager is to identify the areas of risk and attempt to reduce these areas (1) during design stage (2) during tendering and (3) during construction. By reducing risk, the cost will be reduced and so will the potential for confrontation, extra, and litigation. The contract alone cannot compensate for a poorly organized or badly designed project.

46-50 Teamwork is a better approach.

46 In today's market-driven industry, especially the gas industry, is there time for the specialist to pool their expertise?

46-51 This statement certainly sums up the current malaise. The key words here are "system" and "mistrust." The current system does not and never will work to the benefit of all. There always has to be a loser. Only if a "Win - Win" situation is achieved can there be any lasting improvement to the process. Anything less can be described as "tampering." Deming and any positive effects.
45-51 Confrontation ultimately exists on all levels of the relationships regardless of all good intentions to avoid it. Cost though ultimately may be considered has having been paid by the owner, all parties actually share in the cost.

46-98 What kind of risk are we talking about? There may be different ways to quantify different kinds of risks. Somehow the risk of an early spring breakup (destroying the contractor’s workbridge) is a different kind of risk than the owner changing his/her mind about floor finishes, which again is a different kind of risk than one involving trade union alterations.

46 Contracts are not based on a confrontational system and does permit opportunities for pooling expertise although the use of specialist is not used as frequently as possible, confrontation need not always occur therefore it cannot be said that the bases of contracts is such.

46 Not necessarily a confrontational system

46-51 This is one of the main problems with the existing system. A simple change to the existing system would correct the problem. For example, the risk associated with unforeseen soil conditions could be apportioned in the fixed price contract with unit price items for different types of soils.

46 I do not blame the system as the cause of the confrontation, but the attitude, wisdom and skill of the originator of the tender and contract document.

47 Specialists should pool their expertise before the tender document and contract is finalized. This could be solved in the present contract procedure if the client was willing to pay for contractors consultation the same way as he pays for design consultation.

47 Strongly agree

47 Agree mind sets are a problem but mistrust only if you or one party has a bad attitude or unrealistic expectation of the other.

48 It is not the privilege of the owner to determine the amount of risk which he is prepared to accept on a particular project or which he may be able to accept having consideration for the constraints which are imposed upon him by his lenders, insurers and other third parties. Having knowledge of the owner’s requirements, are the contractor and his subcontractors not capable of determining whether or not they choose to accept the risks which the owner has asked them to undertake and if the entire construction industry is not prepared to accept such risks is the owner therefore not forced to reexamine the risks which he must accept in order to complete the project? The owner prices the premium he pays into project and the market determines whether or not such a price is acceptable. If the market’s response is negative then the owner must reevaluate the project and the risk sharing or abandon the project.

48 I agree that owners & consultants are producing contracts that shift more of the risk to contractors. The consultant has the role of interpreting this contract & it is unlikely he can remain impartial as the owner’s agent.

48 I believe that the majority of the risk is and should be carried by the Owner. It is the Owner who pays for the extras (at sometimes very inflated cost), and often pays more when a claim is launched.

48-49 Any risk transferred by an owner will only come back to haunt them in the form of subsequent claims if they are mindful of this when in the preparation of the documents steps can be taken to correctly apportion the risk and thereby use the lump sum method to successfully complete a project at reasonable cost.

49 On the contrary, I believe that Contractors are not prepared to, and don’t assume any risk.

49 Risks will not be eliminated. They can be identified and the consequences and responsibilities determined before tendering.

49 Re elimination of risks, this may be true but the owner pays any way.

49 I think it is worthwhile mentioning that although contractors often assume substantial risk on a project, the greatest risk is still borne by the Owner especially if he chooses play any active role in managing the project.

50 In a competitive market this last statement is only partially true. Although recognized by the contractors, many times the risk are not priced at their true assessed cost during the bidding process. In many cases this ultimately results in the failure of the contractor when the risk is fully disclosed.

50 The risks associated with being a subcontractor would seem to be enormous. There are financially sound subcontractors who are very competent at what they do. Are they also very competent at assessing risk or are they lucky more often than not?
6. This may be true for the present status of the industry, but not representative of what was happening in the late 70s.

5. This line seems to assume that contractors are generally able to pass risk on to subcontractors. In our case this is not true. The general has to assume just about all risk as there are few subcontractors.

5-51 I question whether the transfer of risk does relate to increased premiums. There is no doubt it should but given the current bidding practices this is unlikely. Owner do not believe the transfer of risk results in more costly projects, hence, they will be reluctant to change.

5-51 I do think the contractor meets to undertaking defined and reasonable risks. The objections is blanket clauses that cover risks that would be greatly reduced if the designer did more investigation or analyzing.

50 Risk premiums are not always reflected in the bid document. Some are system costs represented by bankruptcies, systems wide higher insurance costs.

50 There is a perception in the owner and engineer ranks that most contractors identify all the risks they can imagine and put premiums into their bids. When the risk does not materialize, the contractor makes a windfall profit. This is not true. Most contractors do not do a good job of risk identification, and when they do spot one, they are unreasonably optimistic about the potential impact, so they underprice the necessary premium. Contractors have to be optimistic by nature, or they wouldn't be in the business. I don't know of many instances of windfalls arising from known risks. If they do occur, it is more likely from a pricing error, or an unknown (to all parties) condition which presents an unexpected opportunity.

50 Owner achieves lower costs in short term on his project owner doesn't recognize higher costs on next project due to diminished number of effective contractors.

50 Contractors may want to pass risk to subcontractors, but this is often not practical. A general contractor relies heavily on subs to formulate its bid. Onerous terms, poor payment & unreasonable site requirements by the contractor will result in a lack of future prices.

51 Change premiums to read rework!

51 Paid for by the owner and the "end user" - consumer.

51 A method will need to be found to persuade/educate/ assure owners that the partnership/alliance of designers and constructors is intended to reduce costs and improve quality. There is a good chance that owners will fear collusion.

53-54 I don't agree with this comment.

53 Agreed Pre-tender meetings, for example, do not work because contractors do not want to divulge their gameplan.

53 I agree there is a reluctance to preplan work mostly because trades do not wish to spend unless there is some indication of success.

53-54 Totally disagree.

53-54 I believe the reluctance or inability to pre-plan is more than just a function of confidentiality. There are still many who just pay lip service to the benefits of pre-planning.

53-54 Confidentiality exists only between the contractors in their efforts to find the best and most efficient way of working, this will always be the case during bidding.

53 I agree Part of the problem we have now is that there is no trust between the subcontractors and general contractors and owners. Too often prices are traded to obtain favours from one trade to another. Bid pedalling breaks down the integrity of all parties to the tendering process. If there was a way to maintain the trust and integrity of all parties to the tendering process then we would definitely be on the right track.

53 In preparing a quotation for a lump sum tender, the contractor generally prepares a fairly detailed plan. The potential for problem arises when the owner/engineer later imposes conditions which prevent the contractor from executing the work according to his plan.

53 Preplanning can still be done.

53-54 I do not understand this statement. Further, the ability to pre-plan effectively is vital to the process and a lack thereof is indicative of bad business practice rather than a flawed contracting system.
3. Contract Formation

The premise here is that it is necessary to have a "contracting method". While it is necessary, in the interim to have contracts, it may not be necessary for all the steps to be specifically tied to the contract. The steps proposed may not always be relevant. The business processes should be separated out.

"More Effective: starting sooner should be added.

The assumption that this process is new is wrong. Having been in the industry for over 35 years the very first contract I was involved in was based on this concept.

Not a new process. This method is a hybrid of construction management & management contracting that have been around for many years.

Process should also define "more effective" as also more profitable for all concerned.

Oil industry/Mobil 10-12 years.

Define as valuable, quality, schedule, cost.

Reasonable

Good plan. do not exclude use of PDSA several times, when more information and/or more people are involved. Do not set in concrete

There must be a minimum upset figure for which this process will be effective as all parties will have to commit to a substantial initial investment of time and money in order to make it work. On a $1 million contract the risk is probably low and therefore the investment in time may not be worthwhile. This of course would also depend on the complexity of the project.

This process described under the heading C1 is basically the used used as Construction Management.

Intent of the process is good: bring in appropriate team with all skill sets required on cost plus or similar arrangement (convertible contract) for the planning functions. Determine correct contract type or strategy for particular situation. Bring in actual contractors as soon as possible under appropriate contractual arrangements. Engage actual contractors into project team during detail design or sooner, while design is still fluid enough to incorporate changes but fixed enough to prevent conceptual wheel spinning

On chart c4, where is consultant?

Should be fig 1

There is a step prior to the formation step called qualification of contractor and this step is based on the quality of people available for a given type of work. This is a very important step if all the rest are to work. While we are at it what about the owner how is he prequalified to be able to execute a contract.

This will involve some tough decisions as the owners views of the risk may differ from the contractors views. Will this eliminate all claims for the items discussed?

I agree with the stated objectives.

There is an assumption here that a bidder will include "premiums and contingencies" in his bid. If he did he would be too expensive. In practice he will omit such risks and claim for them as he spends the money later.

The word contingencies must be defined. Contingencies are added for unforeseen work.

I would like to comment on the team approach concept suggested though I am not certain if this is the proper place. The team concept approach contemplates that the contractor, consultant and owner will all work together. Will the consultant allow the contractor to have input into an area that traditionally has been a consultant domain for years. That has always been one of the problems with a true project management project. Also if only contracting companies with engineering experience are allowed in
this area does this not eliminate a lot of true-contractors which have no engineering capabilities in their organization? I often have thought that if an owner could get a true and realistic pre-construction estimate from the engineer there may be no real advantage to the owner to go to the tendering process rather than negotiating with the contractor that the owner wants to a price that the owner knows is realistic. How often have disputes arisen because the contractor or the subcontractor forgotten an item eg. labour from its tender. be caused by the Ron Engineering case, and be forced to perform knowing it will suffer a loss and try to eliminate or lessen the loss by extra or damage claims through or at the conclusion of the project? These problems would not arise if the owner was given a realistic pre-construction price by the engineer and then negotiated a realistic contract price with the contractor of the owner's choice.

A high proportion of the total project cost (70%) is determined at the completion of the early design phase. As the design is developed, decisions are made which lock the design into a certain set of relationships. These relationships become so complex that any subsequent change is virtually impossible or insignificant. Therefore, if there is any benefit to be derived from construction planning, contribution must be made from day one of the design process.

Team approach, who is on the team?

Improved communications will definitely reduce claims.

Stress team approach

How is a construction contract awarded without there being at least some preliminary design. Generally the design team is utilized to provide some guidance in establishing the relationship with the construction stage.

I agree that an early relationship between the Owner Consultant and the Contractor should be encouraged, however I don't believe that the contractor should be brought on stream at the same time as the Consultant. The very early planning stages of main projects is to simply determine what it is that is to be built. Is it a combination of residential, commercial or office space? These considerations are best dealt with between the owner and the consultant. After the project has been defined, and the general direction has been determined, then it is appropriate to bring on the contractor, but not before.

"Design and construction contracts should be awarded at the same time." This is not perceived to be workable. How would you eliminate or determine who could best perform these two phases at this point?

Award of design and construction at the same time implies that the owner knows what he needs/wants. This is not a criticism of the owner. He frequently retains an engineering contractor for early studies, preliminary designs, etc.. It is only after a sometimes considerable period that the owner can make the decision to proceed. When should the construction contract be awarded? Should there be a time after the preliminary design when the construction and engineering contractors are matched? How would this process be handled?

It is not clear how the Design and Construction contracts can be awarded at the same time. If there is no design or could an contractor determine accurately the Cost of the General Conditions profit and overhead, duration of project etc and quote a fixed price without building in risk factors for the unknown. I can understand this being done on a quoted fee percentage of the construction cost or similar arrangement as I have used on Construction Management Projects.

Not mandatory or always preferable

Can not figure out how we could chose a contractor before the design is complete. At this stage we would be inviting contractors to propose work that they may not be qualified to do in the end. All the planning done by contractor X may be wasted as he can't do the work. How do we pay him. Contractor Y may be the best for the job but we rejected him because we had the scope of work all wrong at the conceptual stage. What is the liability of the project is not funded at the construction stage. Governments and business change priorities. Does the contractor get paid for loss of work. This could be a good law suit. Does the contractor have to be bonded at the beginning to ensure that they don't just leave the project.

The Canadian Contracting Method is essentially a Design - Build system ultimately leading to a system of the type used in Germany where there are no consultants, only contractors with design shops. This would begin with alliances between contractors and consultants. Whether this is good or bad is for the industry to judge but it would require a massive change in the completion of the Canadian construction industry.

Disagree as it would be more effective to obtain input from Contractors when the detailed design is well advanced to insure the contractor is fully aware of the design intent during design a complex facility goes through several evolutions particularly if it involves process and instrumentation elements and it would therefore not be cost effective to involve a contractor too early in the design phase.

With the problems identified in lines 5-9, there should be some guidelines (educational material, etc.) to help alert owners to those problems.

CC10
The issue of profit I believe is not very well covered. When the construction contract is awarded at the same time as the design work, how do you determine how much profit the contractor is going to make or how much the owner is willing to pay?

It is not always possible to award design and construction at the same time nor is it advisable in every project. Often, contractor input can be secured without a commitment during the design phase. However, no matter how contractor input is obtained, it should be utilized extensively during design.

There is an inherent problem in implementing this process for projects funded by the public (Government) due to the accountability factor. Public Projects in this scenario would have to be let on a design build basis with the contractors including the design aspect in their bid.

Do not necessarily agree—awarding design and construction at same time suggests turnkey projects where there may be a forced marriage between. Would agree that bringing in a good contractor into the design process has increasing merit as the experience of the designer becomes less experienced/poorer—one protection is not to hire consultants who have had no field experience.

Designers usually have the lowest financial risk. They will be the losers in any change in contracting strategy and will therefore want financial compensation for the increased risk.

Awarding of design and construction contracts at the same time poses the problem of timing. Design often proceeds years ahead of construction. Appropriation of funds by government and industry usually requires design to have been completed to a stage where a reasonably accurate estimate of final cost can be prepared.

To establish the team is the most important decision in the project. Appointing the designer & construction partners at the same time may be a very difficult task for an owner. It may be better to select either the contractor (in a design/build scenario) or the consultant first.

Public works Canada the federal government requires that the design be approved and funds allocated before tendering is allowed.

I do not agree that design and construction contracts should be awarded at the same time, particularly on government-funded projects. The owner should select on the basis of his qualifications, including his experience in addressing the question of buildability and his record in reducing scope changes and claims and in dealing with disputes. A consultant engaged on this basis rather than on a low bid basis will serve the process more competently and fairly and not be seen by the contractor as serving only the owner's interest.

The ability to award both design and construction at the same time is in part dependent on the owner's capacity to manage the process. If the owner is devoid of construction expertise he must rely on consultants who may wish to do the work themselves. Alternatively, the owner may have to phase the design, which favors the party who wins the initial phase in the final bid phase.

Design and construction cannot be awarded at the same time in many cases. Some idea of the type of structure required by the owner has to be developed by the consultants so that the appropriate type of contractor may be sought.

It will be difficult to develop a level of comfort when tendering general conditions so early in the process. See comments on 134-137.

It would be very difficult to establish a realistic scope if the design and construction contract were awarded at the same time. Design requires some lead time to establish the concept. Providing there is sufficient flexibility for input from the contractor and subsequent change.

Do not agree that it is desirable to award design and construction contracts at the same time, unless the construction contract is cost plus in which case why not simply hire the construction expertise from the contractor at a consulting basis? If sufficient is known about the project to define it functionally, then a single EPC contract can be awarded. If there is insufficient info then bring the contractor on board at this time.

CANNOT AWARD AT THE SAME TIME UNLESS PRICE FOR PERFORMING THE WORK (BOTH ENGINEERING AND CONSTRUCTION) IS COST PLUS FEE. OTHERWISE PARTIES WORKING AGAINST EACH OTHER FOR THE BENEFIT OF THEIR OWN INTEREST ALSO CONTRACTORS CANNOT APPRECIATE THE QUALITY THAT THE ENGINEER/OWNER WANTS

I agree with the approach outlined in this section.

Awarding design and construction contracts at the same time, in what way would this differ from "fasttracking" contracts which have been used with varying degrees of success in the past.
Awarding design & construction contracts together is not new. EPC type work has been successfully used in the resource industries for a long time. We have tried to capitalize on the advantages of an EPC contract in our client company while maintaining a little more control over the design/engineering. This seems like a method that will allow us both a few companies are able to handle design and construction could be problems here with collusion between design and construction firms if contracted separately. I do not think it is practical to award design and construction contracts at the same time. The constructor needs proper information to formulate an appropriate bid and this suggestion would lead to substantial amendments and variations. However, your paper seems to have overlooked the well established concepts of "design-build" contracts and "design-construction management" contracts, which incorporate many of the advantages you have identified. Some companies are able to handle design and construction at the same time under a construction management system. Design and construction contracts are often awarded at the same time. disagree with design and construction needing to be awarded at the same time. Although these contracts are awarded at the same time, how much lead time is required before the construction work begins. This may not be attractive to owners if it commits them to formal contractual obligations with contractors before other project requirements are met (ie financing-occupancy targets etc.) An escape clause will be required. Design and construction contracts need not be awarded at the same time but in close time frame. Choice of type of contract is extremely important and a lot of problems are the result of attempting to use the wrong form of contract. Equally important is having the scope of work, responsibilities, risks and consequences defined. A contracting strategy is an essential part of an execution plan; this includes type of contract, timing, pricing, type of contract, etc. The contractor needs to be based on the definition available. I think this would generate conflict. Owners would be skeptical. It is good to be able to revise contract format as a project unfolds. This is much like the new architects agreements however the owner must have sufficient funds at the start of a job. Normally not acceptable as it tends to change the flow of things and opens the door to further misunderstandings. This is not a sharing of the risk (of end cost) as far as an owner is concerned, everything is in the contractor's favour. It is absolutely critical that the contract documents be flexible in their application to differing types and levels of projects. The document cannot apply to all areas of construction ie residential would not use this form. VERY DIFFICULT TO CHANGE - IMPLIES NEGOTIATION WHICH IN TURN IMPLIES UNDERSTANDING, KNOWLEDGE AND REASONABLENESS ON PART OF BOTH PARTIES - ELEMENTS WHICH ARE FREQUENTLY LACKING IN THE CONTRACTOR/ENGINEER/OWNER NEGOTIATION PROCESS. This is not a sharing of the risk (of end cost) as far as an owner is concerned, everything is in the contractor's favour. It is absolutely critical that the contract documents be flexible in their application to differing types and levels of projects. The document cannot apply to all areas of construction ie residential would not use this form. VERY DIFFICULT TO CHANGE - IMPLIES NEGOTIATION WHICH IN TURN IMPLIES UNDERSTANDING, KNOWLEDGE AND REASONABLENESS ON PART OF BOTH PARTIES - ELEMENTS WHICH ARE FREQUENTLY LACKING IN THE CONTRACTOR/ENGINEER/OWNER NEGOTIATION PROCESS. This is not a sharing of the risk (of end cost) as far as an owner is concerned, everything is in the contractor's favour. It is absolutely critical that the contract documents be flexible in their application to differing types and levels of projects. The document cannot apply to all areas of construction ie residential would not use this form. VERY DIFFICULT TO CHANGE - IMPLIES NEGOTIATION WHICH IN TURN IMPLIES UNDERSTANDING, KNOWLEDGE AND REASONABLENESS ON PART OF BOTH PARTIES - ELEMENTS WHICH ARE FREQUENTLY LACKING IN THE CONTRACTOR/ENGINEER/OWNER NEGOTIATION PROCESS.
A guaranteed maximum price is unrealistic sharing of risk.

A GMP contract can generally be negotiated once the design has been completed to the 75% stage. Up to this point the design-builder contractor should be engaged on a cost-plus basis. Such a contract would require that specific conditions be met before the contract was executed. What are these conditions?

The language and the approach in this proposal seem to be slanted toward the building construction industry, where the General contractor handles only a small portion of the work with its own forces. The situation of heavy engineering construction in which the contractor handles the vast majority of the work with its own forces is somewhat different. These contracts cannot be priced until design is substantially done.

From the owner’s perspective, the majority of projects fall into this category; they identify a particular need and the process of the specifics are turned over to the designer.

I disagree. General scope as presented on line 135 is not sufficient to get the right price unless it’s a design-build which would limit its effectiveness to be used over a large range of projects.

Not all costs are directly related to quantity. Awarding a LS contract without having all the info is creating a situation with a significant risk. It's difficult avoiding this situation even when all the info is supposedly present and available.

Early award of lump sum may not be precluded but will certainly suffer from all the ills previously described - disputes as to what can have been reasonably expected etc.

If this type of project is 85 to 95% subcontracted, how have we introduced buildability into the design process by bringing the general contractor on board up front?

I think it’s more like 70% to 85% in Western Canada.

This would certainly be advantageous to all.

Do not agree with comment that all Public Work has to be awarded on lowest price. Many consulting contracts are awarded on sole source or even a “your turn” basis - why not do the same for construction contracts? The issue of public accountability is a red herring - if you can justify other factors than price for consulting, then you can do the same for construction.

This allows too much subjectivity on selection of the contractor which would be very impractical especially for Public work.

Experience in using this "Brooks" type rule shows that price is all important. It is too easy to persuade yourself that other less easily defined parameters are equal.

Depends what your bidding.

Selection should be based on quality every time, but very rarely is it difficult to persuade an owner that he should award the tender to a bidder who is 10% higher initially when the low bidder is also a reputable contractor.

Consideration is going to have to be given to the role of Surety in this arrangement. If a Lump Sum approach is to be used the standard Bid Bond form will need to be revised to recognise that some time will elapse between Bid Date and the date the contract is finalised. What will happen if after a contractor and consultant is selected it becomes apparent that they have concepts that are incompatible? The owner will have to be able to deal with this early. Also, currently the Bid Bond is intended to force a contractor to enter into a contract at the price quoted. Since we are now dealing with a "best guess" does the Bid Bond become redundant?

A general contractor’s major risks will come from the general conditions of the contract. Therefore, there is no advantage in the contractor taking these risks. If part of the selection procedure, it should receive a low weighting.

Assumes experienced contractors, there are only few of those

If How realistic is it to expect a contractor to quote a fixed profit without knowing the full design requirements, the full design and what for all intents and purposes is a completed project? Suppose that contractors will not take that risk!!! Again
this concept seems to put some of the items for design on the contractor and as stated above many contractors do not have this experience and most consultants would not agree to this intrusion into what has been their domain for decades. I have a further problem with this concept. There seems to be an unlettered discretion in the owner to accept which submission he wants because it is so difficult if not impossible to arrive at a common criteria to evaluate all tenders. There seems, though not always and not always uniform, to be a trend in the courts to require an element of fairness imposed on the owner in awarding contracts. With respect, to evaluate the 'overall quality of the proposal' really leaves a lot of discretion in the owner to pick and choose what he wants. This is against the whole concept of the tendering process concept to require a contractor to spend time and money on developing a tender on the assumption that if this is the lowest valid tender he will be awarded the project contract. What incentive will there be to the contractor to spend this time and money but not really know the areas that the owner will consider in awarding the contract. Will the owner pay each of the contractors for the time and effort each spends to prepare the bid...wouldn't this increase the total overall cost to the owner and thus defeat this new construction method concept?

139-142 I believe that the method stated here offers the greatest opportunity to develop a modern contracting method. This was the method used on most of the major buildings constructed in Calgary from '78-85.

139 Agreed. The description from 139 to 192 is the undertaken by "Construction Management". This is working very well for our organization with the present options of tendering and contracting. The only thing missing for me is I haven't found a CCDC form for construction management, relating to client, contractor, designer and project manager.

139-142 This paragraph implies that contractors will be selected on the basis of a variety of item - not just price. This goes against protection of the integrity of the bidding system. Selection of contractors must be seen to be fair. Public bodies would have to put strict selection procedures in place to minimize any claims of unfair practices.

139 I am a little apprehensive when we continue to use the term "experienced" especially in this type of contracting. I would like to see somewhere or somehow a method of continuing to allow new contractors into the process. The relationships needed to successfully achieve the goals of this method may tend to form a special group or "club" of contractors and as an owner we would fear a loss of competition and the new ideas we expect from the "new kid on the block".

139-142 are you suggesting a General Contractor provide a fee for management of the project, on what bases could an owner particular a public owner evaluate on bases other than price. Clear sets of criteria would be required prior.

140 DO NOT THINK THIS IS A GOOD IDEA. PARTICULARLY FOR ENGINEERED CONSTRUCTION - WHERE THE CONSTRUCTION PLAN AND METHOD OF EXECUTION ARE SO IMPORTANT AND DICTATE THE PRICE OF THE PROJECT IN LARGE PART. WOULD FEEL UNCOMFORTABLE IN PROVIDING THIS INFORMATION DURING A "PROPOSAL" PROCESS AS COULD BE USED BY OTHERS (EVENLY SUBCONSCIOUSLY) WITHOUT BENEFIT TO THE PROJECT IN LARGE PART WOULD FEEL UNCOMFORTABLE IF THE ORIGINATOR APPEARS THAT A LOT OF THE ASSUMPTIONS USED IN PROPOSING THE "NEW METHOD" ARE BASED UPON A RELATIVELY NARROW FOCUS OF THE BUILDING SEGMENT OF THE INDUSTRY.

141 The reference to "quote a fixed price, with assumptions, for the General Conditions" seems to be a key concept and perhaps needed more elaboration. I suspect as the design becomes finalized the Contractor is revising price and the reliability of the initial quote may be in effect, nil.

141 It also may be worthwhile considering specifying in the contract precisely what project administration staff (in keeping with the nature of the work) are to be established at site and the amount of overhead dollars per unit time will paid under the contract. This is because most contractors must try to minimize their overhead staff in order to provide competitive bids.

141 Important to list key personnel

142 Agreed. Qualities must include the qualified personnel, quality of workmanship, safety record & commitment, previous experience, financial strength & fair name in industry.

142 Qualities would be difficult to determine objectively versus subjectively.

142 I can see this costing much more than a current quotation and using much more time which is short as it is.

142 Selection based on overall quality. This is a vague and unmeasurable concept. Every bid I have ever put together has been of higher overall quality than the competitors...in my opinion. Unfortunately an opinion not shared by the evaluators. Chart 1 goes on to say that selection criteria must be detailed in the bid. If criteria other than price are used how are they "detailed"? If they can be detailed at the bid stage then likely they could have been detailed at the PQ stage thereby saving everyone time. If contracts are awarded on key personnel it won't be long before contractors discover the consultants game of "bait and switch".

142 I repeat my comments at line 139 above and suggest that if the owner is to have this unlettered discretion there should be a listing of the criteria, with if possible a dollar amount beside each criterion, so that the contractor may have some better ideas as to how the owner is to arrive at his decision. I realize this is impossible with such things as a unique design which may be appealing to the owner.
Lowest price is the normal way most procurers of construction services wish to go. It takes a very naïve owner to turn the lowest bid.

The owner will always be influenced by the cost and will try to get the lowest bid to agree to do the job using the better proposals.

What guarantees are there for the Contractor with respect to the ownership of its design concepts provided at the initial stage?

This will be a hard sell to municipalities and governments where the political nature of the organizations favour award of a contract to the lowest bidder.

In public corporations price is generally the determining factor for contractor selection barring glaring errors in the tender.

The assumption here is that the statement "quality of the proposal" means the quality of the personnel provided, the schedule etc. not the wrapping on the package.

Given large proportion of overall project costs related to construction early input by the Contractor has much potential to reduce cost and schedule.

I agree with this concept. Most owners and designer-engineers do not realize what a technical resource they have in a competent contractor. In the areas of constructability, cost savings and scheduling concerns, no one is better qualified to comment and input than the contractor who makes his living by optimizing these factors.

Having the designer and the contractor work together is beneficial but this does not require both contracts to be let at the same time.

I agree that there are many advantages in having a contractor work with the design team including those listed.

This will work only if the project is one that has been built before. It will work if an engineering and construction contractor have done the specific type of work before. I wonder how it would work if there was a new type of work where both the engineering and construction contractor hadn't done the type of work before? There would be a recognized risk in adopting this strategy but there is also the potential reward of having a cooperative addressing of the joint issues as they arise.

This method seems to be an effective way to plan and to build larger projects which require a high degree of expertise on the contractor's side and the design consultant's side of the work. The owner also has a great interest in the upfront planning process.

I agree. This is totally dependant on the senior people to work towards the same goal.

Contractor design and construction work at the same time poses one of the basic problems in the new strategy. How can a construction contractor be selected when the project designs haven't been completed to the stage that a construction contractor knows what will be built?

I disagree. If you are a professional you get the expertise up front, and the contract at the time the scope is defined and in the manner that best fits the end objective including negotiating as appropriate.

A major omission in this area is the opportunity of preselecting the major subcontractors and thereby utilizing their expertise at the design stage.

Agree. This does offer the best of both worlds. However there will still be disputes on what is the best design. The chosen contractor may not want to use a specific type of technology or building process because he lacks the expertise. Can he be forced to do it? More courts. Does the designer change the design against his better judgement? What procedure do we have to fire the contractor if the owner needs to get a new contractor.

I believe this idea should be extended to specialist trade subcontractors and specialist or custom design equipment suppliers, where they are involved early. Most general contractors and designers do not have sufficient in-house expertise to know all areas of construction or design.

Totally agree.

Several large projects that our firm has been involved with have been very successfully delivered using the process described in lines 125 through lines 158.

It has been my experience that the knowledgeable personnel from the contractor's shop are out in the field where the contractor can make the most or lose the most cost in the office.
144-145 I do not agree that this should always apply. I agree that contractors should be allowed to influence design but this could occur after concept design or after design development---it should occur at an early stage of detailed design. One aspect is that an owner may cancel a project after concept design.

144-158 Should be done on a "teamwork" basis, not contractual.

144-158 I assume by construction work the intent is to involve the services of a general contractor. This may not suitably address problems as in many instances their expertise is in the area of concrete work and to a much lesser extent scheduling much of which can be overcome by the owners and designers during the design stage. In process-related projects the main problems occur in the areas of mechanical, electrical and instrumentation all foreign to a general contractor.

144 As stated above, I don't think the contractor should be brought on board until after the basic project objectives have been defined.

144 The proposed process assumes that the owner may be a little more sophisticated than they are in all situations, and to a great extent, the owner will continue to rely on the consultant for advice, for example, with respect to risk allocation. The appearance remains the owner and the consultant against the contractor. Once the negotiations have concluded perhaps then the relative positions of each participant will not be so marked.

144-158 Many general contractors have become construction managers with the result that they don't have the expertise that you are looking for. This expertise now resides with the subcontractors who are not yet involved.

147-151 I think most owners think to do this by hiring consultants with construction experience.

147-158 For larger projects this would be a benefit to all concerned. It is much easier to address the buildability of the project while still in the design phase rather than changing it during the construction process.

147 I generally agree, however I have had experience where a contractors advice on buildability was simply an attempt to direct the basic structural design into a form he was more familiar with and felt he could realize more profit with. If the contractor is to influence the fundamentals of the building design, then the owner and consultant must be prepared to trust the input they are getting from the contractor.

147 Contractors, surprisingly enough are not good at advising on buildability issues. They are not good at starting with a blank sheet of paper and designing. That's why designers design and builders build. Stangely, the industry always believes the opposite - probably because contractors normally feel obliged to criticize the design of projects that they are working on.

147 I agree.

147-158 Also other benefits of integrating design and construction are. -Lowering both design and construction cost -Decreasing the project schedule by better integrating design and construction schedules and shortening both -Improving quality by better defining requirements and planning the most efficient way to meet them. -Building a team with a commitment to meet project objectives by mutually agreed upon plans -Increasing innovation in both design and construction. -Transferring construction experience gaining competitive advantages for the firm.

149 This is very important if this method is to be successful.

149 Getting the contractor involved in the design will result in substantial cost savings.

149-158 What incentive would a contractor have to look for cost savings if he has a contract in place.

149 Again, the input from the Contractor on cost savings will be crucial to the success of the project, and his motives in providing this input must be to the benefit of the project [the owner] and not to himself.

149 I often see cases where the owner and designer have put their project out for tender and have a set budget in mind. The bids come in substantially over budget. Then the project has to be redesigned, re tendered and construction is delayed which may affect the economics of the project.

150 It's very important to limit preconceived concepts being fixed, esp. by designers.

CC16
152 Not an important consideration

152 This comment would apply to big projects where new technology is being implemented but for most small projects where
design is simple and straightforward this might complicate the execution of the project and add time and cost.

152 Clearly the encouragement of this working relationship is a real positive step and should result in a dramatic improvement if
it can be put into practice. It will be difficult however to overcome existing perceptions by design personnel as to the relative
capabilities of contractors. Designers seem to have a certain superiority complex which colours their view of the utility of
Contractors comments. This will in time dissipate but not doubt as it has clearly been a result of the adversarial position designers
and consultants have been placed in as Owner's representatives.

152 I agree. This also makes the contractor more innovative in working with the owner.

155 Does this comment infer that the designer is responsible for cost and schedule predictions? If a contractor is "on board" he
should lead these two aspects.

155 See line 117

155-158 The building round table identified a number of problems and I am not sure these can
be overlooked in trying to improve the contracting method.

155 This is very important - sometimes a 'great design' on paper may just not be practical in the application and needs of the
owner.

157 allows early design options.

160-165 I am not sure that I wholly agree with this statement. The subcontractors are aware of the overall schedule, site
configuration etc. and I suspect that the majority of disputes on construction contracts arise from the general contractors own
work, rather than the work done by the subcontractors. (delay claims, subsurface conditions etc.)

160 Agree with the principle of early involvement of the contractor.

160 I take exception to the premise that the present system precludes effective planning. The methods we use today may not be
perfect, but the very large and complex projects that our practice has managed to be successful with, could not have been achieved
without effective planning. Let's not throw out the baby with the bath water. Having said that, I agree that significant
improvements can and should be made to the way in which we design and construct projects.

160-165 This statement is also true.

160-161 Some general contractors are even reluctant to plan in detail after they have been awarded the work.

160 Traditional contractors could be viewed as bringing the problem on themselves if they don't adequately assess or plan the
details of the job. Is there a method in this 'madness', in that it may provide opportunity for claims? Or is the way things are done?

160 If I wonder if a consequence of this consultant and contractor working together and then the contractor and subcontractors
working together on the design etc won't result in some larger general contractors doing a lot of the 'sub-trade' work with their
own forces since the contractors will be required to retain large or larger engineering personnel on staff. It would be easier for
large general contractors to justify the higher internal expense by doing more of the work in house and thus having access to what
formerly were sub-trade profits.

160-165 This is a problem but I'm not sure how this contracting method would solve it. Perhaps some effort could be made in
correcting the existing system.

160-165 Detailed planning by the contractors in many instances does not occur even at this late stage. However, I agree that a system which would provide the sub-trades with
scheduling information would be of significant benefit. However, the general contractors would not necessarily be able to provide the required information on complex projects
involving emphasis on mechanical, electrical and instrumentation sub-trades.

160 Traditional is undefined. Mine is very different from what you see as traditional.

160-165 One way to handle this approach competitively is to tender for the services of a GC asking for fixed costs, fee, and
project methodology, but leaving sub-contractor costs to be tendered until the future as design is completed. This should give you
access to design input without compromising competitive bidding on future work.
I certainly agree with this. Don't confidentiality agreements work?

I suggest the "Alliance" Relationship between Contractor and Sub Contractor will allow more effective planning. Wins tender each job

Agree with these comments

the subs should also be selected at this point

Agree.

WOULD AGREE WITH THE POSITION

Regardless of the contracting process you will always have some subs guessing when preparing their bid. Hopefully by forcing them to assess risk in the tendering stage the amount of guessing will be reduced.

With the existence of ACTS information is available to all interested subcontractors.

Again what is the definition of contingencies versus prime cost sums and cash allowances?

At what time is the contractor to provide a Performance Bond? This bond is a guarantee that the contractor is financially able to complete the contract. Either a new form of Performance Bond will be required or the owner will have to wait for this document until the design has gelled and a firm contract to build can be issued. Perhaps this risk for the owner could be addressed by an appropriately worded Bid Bond.

The down side of staging the selection process for the general and the trade is the elimination of a vested interest between the general and the trade to cooperate in order to achieve a better price or an improved method for the work.

I agree with the revised approach, but again this would apply to only larger projects. For smaller projects, I wonder if sub contractors would be willing to make the time investment in this process. Traditionally on the open tendering market sub trades win one in fifteen bids. The other consideration is that the sub trades would have to be sophisticated enough to deal on this level. There are many subcontractors who have started off as a tradesman and operate from their home. They can do a good job within limitations, but I think these types of contractors may be precluded from participating in this type of negotiation. I think we have to be realistic about the many different types of contractors and individuals there are in the construction industry. Contractors have become much better businessmen over the last ten years. In order to survive they have had to learn skills other than what is required to do on the job site. The key to building a successful construction methodology is that all participants must be more aware of negotiating skills and teamwork.

Makes sense to me

Selection of a general prior to selection of subs is worthwhile. Owner, consultant and general should have input into selection of subs. Prequalification of sub is an option.

A definite advantage to a sub trade

This can work two ways as some subcontractors bid high or refuse to bid certain general contractors. I don't believe that it makes a significant difference to a sub price or approach.

There is no doubt that the sub trades could also aid in the design and buildability of projects, even the tradesmen themselves. We all know that the more we know in the beginning, the better the work is "scoped", the better the end product, the closer the schedule, and the lower the costs. In our company where things are engineered to death, front end costs were in excess of 20% of overall job costs. Sure the jobs were well executed, on time and within budget but the overall results were not ideal high cost Cadillacs. So one must ask oneself where does it end from a practical point of view? I would suggest that the "method" here has the client/designer/general on the front-end team but there may be other combinations depending on the type of project to be undertaken. Perhaps some formulae as to the level of involvement of outsiders could be beneficial.

Some good points & valid arguments. This conceptually boils down to dealing with a "Soul source". However, these results can be achieved equally by allowing sufficient time for the bidding process to evolve and having a well designed scope of work, contract terms and conditions and good commercial approach.

I agree

THE GENERAL CONTRACTOR COULD BE ONE THE SUBTRADES MIGHT NOT WISH TO DEAL WITH EXCEPT AT A PREMIUM

I suggest that a subcontractor would bid substantially different knowing exactly who will be the contractor. He would have

CC18
more time to prepare a more detailed proposal and may have developed a better understanding of how this contractor would handle the project if the sub would have more time and resource to devote to the one proposal than if he was submitting proposals to many contractors.

171-173 The GC will play subcontractors off against each other. Evidence for this is what happens now when a GC has been awarded a job and they are finalising their subtrades. Can the leopard change its’ spots.

171 THE GENERAL CONTRACTOR WILL HAVE TO MUCH POWER AND MAY TAKE ADVANTAGE OF THE SITUATION

171 To what advantage? All this works when all the work is subcontracted and it's just like a Management Contract.

173 important due to gen contractors reputation influencing price

175 I agree.

175 agree

175 See comment on line 163

175 - 177 WILL LEAD TO PREFERENTIAL TREATMENT OF SUB TRADES UNLESS A MECHANISM IS IN PLACE TO DEAL WITH THIS POTENTIAL PROBLEM

177 The fact that sub trades do not get quotes in until the last gasp is not a fault of lump sum tenders. It is the fault of the contractors. Poor planning by them does not invalidate lump sum contracts.

179-185 Alberta Construction System of bids causes all general to receive subs bids 2 days ahead of general bid close—not an ideal solution but still has benefits—realise that there are mixed opinions with the generals on the use of ACTS.

179 totally agree This is a key factor in the success of this system

181 This is because general contractors have a bad habit of peddling trade contractors prices. This doesn’t give them time but it is a major problem for the sub trades

182 ARE THEN ACCUSED OF “BID SHOPPING”

184 I’m not sure that there are premiums that can be identified with the traditional system. The rest of this para is correct though.

184 I don’t believe that simply providing more time to assess quotes will result in the “elimination” of premiums associated with the traditional process. I believe that it will certainly reduce them, however I contend that risk is inherent in the construction process and that stripping away one layer of risk will simply cause another to surface

185 agree - minimise rush errors

187 This is already established by the ACTS process/documents.

187 Agree If risk was better distributed every one would be better off.

187 appears to be fairer

187 agree

187 If this new construction method concept is adopted will the general contractors really assume some of the risks that they presently pass down to the subcontractors?

187-192 The entire team must be preselected for any revised system to have a chance.

194 STEPS SEEM RELATIVELY ONEROUS BEST TO ENSURE THAT THE PROPOSED SCHEME IS SIMPLE BASED ON RELATIONSHIP AND NOT STRUCTURE OR CONTRACT AND LAWYERS ROUTINE ELEMENTS LIKE PAYMENTS, SHOULD BE HANDLED ROUTINAELY AND NOT ADD TO THE COMPLEXITY FOR LARGER PROJECTS WITH POTENTIAL FOR SIGNIFICANT UNDERSTANDING PERHAPS SEALED BIDS ARE STILL APPROPRIATE AGAIN IT DEPENDS ON LEVEL OF DEFINITION.
I agree, except the Consultant should be selected, and the basic project defined before the Contractor is brought onto the team.

You are suggesting a basic change to the way consultants are retained. You would have them bid on projects in much the same way as contractors do. Can you imagine the quality of service you would get if you retained all your professionals this way? Would you select your Doctor or your Accountant, or Lawyer this way? I suggest that the Consultant be retained in much the same way as he is now, based on reputation, design ability, and proven record with the type of project being considered. The apportioning of risk should be a matter of negotiation between the Consultant and the Owner.

I don't agree the Owner should not make his decision based on risk to be assumed by the Consultant or the Contractor. Inherent in the quality of services that an Owner is entitled to, are the various standards established by the professional organizations, and of course the reputations of the firms involved. The Owner should be prepared to assume the risk for unknowns. If the Consultant or the Contractor were to assume these risks, then their compensation would have to reflect this. The Owner would then be paying a premium based on assumption, and I don't know how one would be able to accurately calculate what the premium should be. I can envision a much more confrontational environment within a contract where an attempt has been made to identify and apportion risk. How would you resolve events which were not predicted?

The assumption of risk seems to be the cornerstone of the proposed new tendering system. I don't think that risk can be equitably apportioned between the various team members, other that of course for the problems arising from the quality of their services. Risk for other events such as unforeseen subsurface conditions, code changes, products which have gone out of manufacture or cannot be delivered on time to meet schedule, or a host of other events which seem to crop up on most projects, should be at the Owner's risk. After all, he is going to pay for them anyway, either in premiums to his consultant or to his contractor. Why not pay these costs when and if they are incurred, and in quantifiable amounts.
4. C.2 New Tendering Steps

This strikes me as an approach that would be quite time consuming.

This may have merit where your consultant is working within an "alliance" arrangement. Where he is not, I would see the consultant exerting an inordinate amount of influence over the contracting and bidding process (not acceptable). If he does not have final cost accountability, this would be a major concern and even a showstopper in the process.

CONCERN: Who keeps consultant in line w/ company values, standards, concerns, etc? Unless consultant shares and understands these concerns, he may easily overdesign, overbuild, overspec etc to reduce "risks". These are some of the factors we try to guard against now.

Formal contract terms and conditions, if properly maintained, represent a company's operating philosophy. Negotiating these for every project is a time consuming redundant task. This may be useful on major EPC type projects but otherwise I question the wisdom of the approach.

I Owners must be prepared to carry out a fair & honest prequalification of consultants & contractors.

There are a lot of steps in this process. Most contractors do not have a pool of people they could dedicate to the various meetings and risk reviews. They are all busy just pricing work.

I support this concept. It would be beneficial if there were more flexibility in accepting "Proposals" rather than straight bids which may result in more innovation and possible cost savings.

The establishment of the necessary working relationships to achieve these goals is going to take much time and effort. The results will be beneficial if not only because of the closer relationships established with client/designers/contractors.

The establishment of the necessary working relationships to achieve these goals.

The process seems extremely long and intricate, especially for smaller jobs. A large portion of the initial work will be getting the "pre-selected" contractors to understand the methodology required. It will also take time and usage to earn his trust.

The concept seems fairer but more complex and costly. Do estimates on the increased cost and time exist? It would appear that selling this process to contractors will be much easier than to owners. Particularly those owners who create much of the problem by trying to take shortcuts in the design stage. I will be curious as to how the design consultants will react to this concept. Presumably the involvement of others besides the General) when tendering subcontract work will reduce his shopping.

The proposed new tendering steps assume a substantial degree of sophistication among all parties. I do not think this is a valid assumption generally. The model also seems to overlook the demands of lenders in respect of the owner's allocation of risk, and the attitude of lenders is to protect their investments by assuming minimal risk, whether fair, reasonable or otherwise. In addition, because many contractors are risk-taking entrepreneurs they are prepared to gamble on accepting more risk to win the tender.

I agree with the new Tendering Steps, but not the timing. This should be done in the prequalifying stage where the client defines the eligible bidders and the bidders define the client and the designers and their design and contract concepts. Most of my objections to unfair risk factors for contractors are in designers "standard formats". In practice there is inadequate opportunity to prequalify owners and designers. HOW DARE THEY ???

This whole section is quite confusing. I get the idea but the mechanics are vague.

The tendering steps which require the owner to assess risk cost will create the most problems as I don't believe they have the expertise required. Who will be responsible for risk which cannot be assigned or assumed. Will the process proceed? Will the owner approach the second bidder and so on until he veins himself of the problem? I also do not think the consultant will be of any assistance as he has no experience in costing risk. I also believe that getting concenses on risk items will be difficult. Typically disputes come from items which are not easily identified.

It would appear that much of the risk, if not all, that this procedure is designed to eliminate can be overcome without the development of a new contracting method. By careful definition of the design requirements utilizing functional design documents and detailed standards the owner could improve upon the current situation by tendering projects as design and construct or by negotiating a similar arrangement with a contractor.

CC21
This is the main problem. How do I give all taxpayers a chance for the job yet do a pre selection? Pre selection of consultants is a political football and at best a guess. Pre selection of a contractor before the design is complete would create a whole new process. In a perfect world we would have no political interference. However, the politicians would be very influential in at least a situation of tendering lump sum after the design is complete. We can tell the politicians that the lowest qualified tender was not his highest contributor to his re-election fund.

Where are the key sub trades?

The concept of "pre-selection" may be impossible in the public sector. It will be necessary to convince the public of the cost-effective method of spending public funds.

Prequalification is not possible with many government contracts. Government work is a big part of the construction business. Are they willing to buy into the new system — or can the process be modified to allow open bidding? The essence of contract is the competitive nature, which causes the formulation of new ideas and methods.

Is it intended to pre-select designers and constructors separately? It seems to be the intent that they are selected as teams, the present view of "project managers".

Not just the GC.

Once upon a time we used to do this. I believe the first project may have taken a somewhat greater time in the front end. I also believe that later projects took less time and that we were charged a lower price and received a better quality. The manufacturer of large equipment and the construction firms came to know what we needed, knew that we would not accept a lower quality and also that we didn't need or want gold plated features. We streamlined the bid process, shortened the bid process, reduced the number of bidders, knew that we would be content with any of the firms on the bidders list, and concentrated on making sure that the solution (awarded contractor) would functionally meet our requirements over the total life of the project.

This is the most important step and I would like to know how this would be done and what owners feel that they can really do this in a way that identifies the strengths and the weaknesses of the various contractors.

This could lead to the exclusion of "new" firms or at least make life very difficult for them.

This is absolutely necessary if this method is going to work. Contractors will only get involved in, or dedicate resources to, this type of contracting if they know that they are part of a small, selected pool of bidders on a particular project. If there are wild card bidders out there who will bid erratically, the contractor will not reveal anything about what he thinks of the contractor or conditions. The time factor for pricing and submitting bids will have to be recognized by the owners and designers. We have to be able to take 2 or 3 years to go through all the steps to get a contract out to bid, and then expect the contractors to bid the work in two weeks.

I agree, but note governments are required to have open bidding.

Clan what a consultant is. Do you mean an engineering company for instance?

Add "construction managers".

The selection of consultants generally precedes the selection of contractors often as a result of the long approval process required to obtain municipal approval to proceed with a project. Also, financial and marketing concerns are dealt with during preliminary design and are not perceived to involve the contracting side of the equation.

Pre-select consultants, pre-qualify general contractor.

As separate entities? The intent has to be clarified.

Should not major sub contractors also be pre-qualified? On what basis is pre qualification granted?

Totally agree.

Comments accidentally inserted in C1 — good news is that line items are correct.

Pre-qualification of bidders is the first stage of risk reduction.

Why are governments required to have open bidding - but only for construction work which they choose not to do themselves?

CC22
It is often difficult, particularly if on a fast-track project to take the time and commit the resources to carry out such assessments. In larger projects such assessments would undoubtedly have a cost benefit, but highly unlikely to gain anything on small contracts.

In practice I would suspect that activities 1 & 2 would be a joint effort between the owner and his consultant.

I still have difficulty understanding how you will receive totally "honest" bids to do all this evaluation when you are still in a competitive bidding situation.

Fig 1 - In the public open tender process based on a completed design, contractors should submit their tenders based on the base bid and be allowed to submit bids on alternatives. However only the alternatives submitted by the low qualified bidder on the base bid should be opened and evaluated. Otherwise the base design will not be given serious consideration by the bidders, and there will be a perception of games played in the bid evaluation. Additionally the Owner is not entitled to the free ideas provided in the alternatives unless he is willing to pay the bidders for their alternative bids.

Not very useful. It is absolutely symmetrical so what is the point? Where are the subcontractors? I'd modify and keep. Charts are much more useful than verbiage.

Ref Fig 1 The owner (box 1) may not have the ability to recognise risks. At this stage (box 2) the risks may not be sufficiently identified or appreciated.

Risk assessment and its management is not precluded under existing traditional contracting arrangements. Value engineering and management techniques have been available if not employed by many firms for at least 2 decades.

Contractors are now frequently complaining as to the number of alternatives that they have to deal with in the tendering process. It would appear that this new process will exacerbate this problem. Given that the process will be more costly it would appear necessary that the owner prequalifies his/her contractor.

Coming from an Industry which has been hit heavily by downsizing, you guessed it (Oil & Gas), we would not be staffed to use this model. Don't see any opportunities for Contractor and Consultant to communicate formally early on in the process. It would be fatal for final contracts to be in place without direct link between design consultant and contractor.

C 3 ret comments on C 2

1 As an integral part of assessing risk the methodology for implementing the project is the overriding concern.

1-11 This process would add time to the front end of the project. The size of project requiring this analysis would have to be determined corporately in order that an economic benefit can be realised.

2 Agree BUT some owners are experienced and some are not. Some owners believe that a GMP contract actually has a fixed limit that stays fixed even if there are errors or scope changes. Some owners like GMP or lump sum because they feel it allows them tight budget control because they simply allocate a fixed amount to a particular project and the idea of paying for changes or the concept of contingency is foreign to them. A major education effort is required for senior administrators in owner organisations.

4-11 Agree but do not see that the process between owner/consultant and owner/contractor has to be at parallel. Design comes before construction and there should be overlap. I question whether the overlap needs to be 100% as a general guideline.

The negotiations might complicate the selection of the contractor and the design consultant in that the unsuccessful bidders might have the impression that the selection process was unfair.

The adjustment of contingencies would change dependent on the status of the industry, activity level, technology required/available.
10. Conclusion

It is to work there must be general agreement to keep away from litigation, the involvement of lawyers will not reduce the number of claims; only if the claims are settled at the engineering level will this work.

This process will fail if all parties are committed to it. Commitment will only be evident on a large complex project which will benefit all parties. From the owners concept claims should be reduced but not eliminated; will this be enough? The consultant will be more heavily involved in an area that may be unfamiliar and will undoubtedly increase costs, which the owner will have to pick up. Similarly the contractor will have a bigger investment of planning time. All these factors will lead to a substantial increase in initial cost for the owner. Owners will have to balance this against the estimate of possible claims.

Government organisations may run into problems in giving large contracts to one firm. In the past cities and provinces have supported the local construction industry by awarding contracts in smaller pieces to provide local contractors with work. Many cities have a good working relationship with contractors and the negotiation process, although not formally laid out is in place.

For some reason, I get the impression that this approach is targeting major projects in the building industry. While the approach may have merit for some projects (major) it may not be effective for others. I don’t think it is wise to approach all types/sizes of projects in various industries this way.

In conclusion - the concept of fair risk allocation, openly among all the interested parties is a desirable goal; however, it will be difficult to convince owners to buy into this concept. Designers will be reluctant as well. It will affect their role in the construction chain giving up some of their traditional authority. In many regards they consider themselves the protector of the owner.

296-110 Absolutely agree with this. When rolling this out the “principles” of TQM, and in fact what TQM is need to be spell out in detail. It is important to quantitatively mean what is meant. Precision leads to better communication. It is necessary to get buy on by all on the consent as well as the spirit of the “method”.

297-319 It is easier to pick holes in something than to create it but I was generally disappointed with this document and would not like to try and apply it in practice. Many of its initiatives are first rate but it attempts to change the whole industry with no proven advantage to anyone. If all parties were sophisticated it may have a chance but most owners want hard and fast budgets at project conception. They don’t want uncertainty. I suggest that the efforts spent should be diverted into improving the current system. Most of the good ideas described above could be incorporated in the current documents or alternative documents could be created.

There is no question that change is needed. Unfortunately, there is always reluctance to change. This new process has enough advantages over the old system that it warrants a try.

297 There exists a great difficulty in making a radical change to an industry that has it own entrenched “ways of doing things”. Should this process be directed to making improvements to some of the methods now used? How would contractors and especially subcontractors view this strategy? There may be a certain element of distrust at first which would be self-defeating.

297-310 It is important to put the entire team together from the start including subcontractors, general contractors, designers, suppliers and the owner. It is also important to identify the key people that will be involved with the project.

The “CCM” name is too broad as the contracting method proposed seems most suitable to the building sector.

Generally, administration and close-out may be areas that are too dependent on the “human resource” to be able to be dealt with in any detail.

I very much agree with the position that risk equity is an issue that stands out as a major impediment to the current lump sum tendering process. On the other hand, contractors tend by nature to be risk takers. If they are not, they would be doing other types of work. If you reduce their risks, you also remove the opportunity for those profits associated with being a risk taker.

Owning companies tend to be adverse to taking large risks. Hence, if the y are required to assume those risks related to contractor performance, they would simply look for a way to insure for them. Contractors on the other hand don’t always evaluate risk and insure against it. They simply ignore such risks on the assumption that they won’t get caught, i.e., they use the same rational as the speeder or drinking driver. In my opinion, both owners and contractors get into a situation having created expectations that are inappropriate for the situation as it actually unfolds. I.e., we lump sum tender without having a clear definition of scope. The owner believes he has provided a clear definition of the project requirements and the contractor believes he has understood the owner’s needs. Neither part has clearly established the “what if” scenarios in his own mind. Hence, risks associated with the concept that relatively long and complex efforts seldom end up exactly as planned are not accepted as such. Hence, your position that better identification of risk and better understanding of how such situations will be dealt with should they occur is a major step towards improving the relationship when the unexpected, which is really just the expected, happens.

CC24
The stated objectives are OK, they are those of the construction management approach.

Reducing confrontation in construction projects is an admirable goal. Perhaps a "new method" will bring about positive results. However, the real problems, which include fair and reasonable allocation of risk, a properly described scope of work which is sufficiently understood by all parties, practicality and reason in solving disputes and an effective means of communication among the parties will be the real factors in reducing confrontation. Whatever "method" is adopted.

Formalizing a process (short of litigation) for the resolution of conflict between parties is the second most important factor.

Using the contractor as "bridge" to accessing industry knowledge at the contracting and sub-trade levels will ensure a minimization of wasted resources.

A worthy goal! Get rid of the lawyers and let people get on with doing there job right.

agree entirely with these statements

There is a major education process required including owners, financial institutions, architects, engineers, and contractors in order to set the stage for team approaches to the design and construction of projects. The contract is simply a tool in the process, the appropriate methodology is the key and it must be appreciated and supported by all the players.

Does the contractor have to be involved in the process to get the same result? To what extent does the contractor have to be involved?

Having a contractor as a working member of the team coming on board early in the process is the most important factor presented in this new process.

This is all true but I don’t understand how this method will produce these results to a greater extent than present methods.

feedback to owner is usually a waste – it is mistrusted and seldom listened to

Effective cooperation between design and construction professionals is also achieved by utilizing existing principles of Construction Management or Design-build methods.

TQM is very effective in a shop but requires many hours of all staff involvement and months of communications. This is not economically possible due to constant changes of labour and job sites.

TQM is the latest BUZZ WORD. Many companies have tried it and dropped it due to increased expense vs. benefits. Including TQM as a part of this program will eliminate many qualified companies

The owner will get the advantage of a lower first cost but there is no incentive for him to cooperate at the conclusion of the project to settle outstanding issues.

Value engineering and value management principles can be employed from concept stage to final completion and beyond with all stakeholders involved. I'm not sure we really need a "new Canadian contracting method", but possibly a better understanding of the existing types of contracting and when to employ them.

A general observation, based on my 20+ years in project engineering/management, is that far too few organizations know how to properly plan projects, this holds true in most Owner companies and in virtually all construction contracting firms. Even some EPC companies are seriously deficient in this regard. This is a major underlying cause for poor project performance.

The conclusion is developed around the notion of lower construction costs which is a very noble concept, however it should also address profitability. It is difficult to differentiate between contingency and profitability. A contractor that can properly manage its risks stands to achieve greater rewards because it requires less of its contingency. If you reduce the contingency in the bid you certainly reduce the contractors potential to lose money, and the potential for litigation and the cost of the construction, but you may also reduce the well managed contractors ability to make a significant profit.

I am not convinced this process will lead to lower overall construction costs but it would certainly lead to a better finished product at approximately the same cost.
II. E. The Next Step

1. There may be some opportunities to find projects that already exist that have used various forms of the proposed new method. This information could help to establish credibility quicker and may assist in the quicker development of manuals and endorsements.

2. The Next Step. I think you are going in the right direction, but down the wrong road. All you are attempting to improve definitely needs improvement, but the answer is in education, not in contractual qualification at tendering time. My suggestion is to also have a technique where contractors can prequalify owners and their needs, designers and the design concept and the contract strategy and risk responsibilities. After this, a procedure where contractors objections and concerns can be reviewed. They will vary with the contractors. Then the confrontation can be greatly reduced, except for those who will find it to their advantage. There are those people who believe they can be successful in the confrontation technique. It may be prudent to limit bidding to only those that go through the prebidding qualifications. That is another story. My paramount rule for tenders is: KEEP IT SIMPLE.

3. The process described seems appropriate.

4. PART OF THE NEXT STEP WOULD BE TO SEE IF THE NEW CONTRACTING METHOD CAN BE STRUCTURED WITHOUT THE HELP OF THE SELF SERVING LAW PROFESSION.

5. Public tendering under the current rules would not allow this process. It also appears to be cumbersome for the smaller. routine contacts which make up the majority of construction volume recorded each year.

6. As project managers in the commercial construction and development industry we have always attempted to manage projects in a similar manner to what has been set out here. The road blocks have been set up as a result of ignorance, convention, or power and control on a project. These are difficult hurdles to overcome and will take time and education.

7. A study of the international conditions of contract to compare procedures would be beneficial. Industry support is mandatory.

8. There are many contractors who have found their niche in negotiated work. They are already on this path. I would suggest that you contact these types of contractors and find out what systems they already have in place and how they are working for them.

9. In considering the next step you have to consider the types of projects, commercial, civil etc., the size of project in $555. institutional. A contract form has to be developed for each of the different categories taking into account the differing approach required to compensate for the individual features. Special attention is required for institutional work as most levels of government are reluctant to consider any form of contract other than lump sum, the lowest price.

10. While this process is useful in theory does it not force participants to compromise their particular competitive advantages and therefore their profitability? This process requires a complete and total change in the mindset of all of the participants in the construction industry which is highly unlikely and an unrealistic goal.

11. Does industry include owners? If not include the word owners.

12. The most difficult aspect of implementation will be convincing owners, consultants and contractors that alliance if preferable to straight competitive bids.

13. - 315 ADD TO THIS GOVERNMENTS AT ALL LEVELS. THE SYSTEM IS NOT LIKELY TO BE SUCCESSFUL UNLESS FEDERAL, PROVINCIAL AND MUNICIPAL GOVERNMENTS BUY-IN.

14. I'm not sure the industry is fragmented.

15. Perhaps with a manual detailing the process it will become more clear. Frankly, the paper is generally difficult to understand because it seems to be a collection of ideals, with lots of "motherhood" statements and not much recognizable substance on the real issues. Sort to be so negative, but it seems to be pretty academic.

16. PROJECTS COME IN A MUCH TOO BROAD VARIETY OF SCOPES WITH WIDELY DIVERSE OBJECTIVES VERY DIFFICULT TO MAKE A GENERAL COOKBOOK PERHAPS IT WOULD BE BETTER TO FOCUS ON COMMON SCOPE PROJECTS WITH CLEAR OBJECTIVES TO START THE MAGNITUDE OF THE EFFORT WOULD BE LESS WITH FEWER PARTICIPANTS AND COULD REACT FASTER TO AN EVOLVING MANUAL. A PROJECT TEST COULD THEN BE COMPLETED ONCE A MORE FOCUSED DRAFT MANUAL IS AVAILABLE WITH FIRM POSITIVE ATTRIBUTES.
IDENTIFIED IE COST OR SCHED ENHANCEMENT THEN FURTHER COMMENTS COULD BE SOLICITED A SECOND PROJECT TEST COULD THEN BE COMPLETED ON A SIMILAR COMMON PROJECT IT MAY TAKE SEVERAL ITERATIONS BEFORE BRANCHING OUT TO MORE COMPLEX PROJECTS IS WARRANTED.

521 Good idea because many things are still unclear as to how this method is used.

521-322 Agree Document should be issues as series of drafts to all parties and a firm schedule produced and followed.

521-322 Agree on need for manual. It will take industry years just to understand what we are on about.

522 I believe that most contractors and subcontractors do not read the specifications thoroughly during tendering, nor do they fully understand their obligations in the contracts they sign. This is likely a result of poor time management. The manual must be written so that "any idiot" can read it.

524 Consider the inclusion of professional cost consultants.

524 Absolutely necessary.

524-335 How will this endorsement process be carried out - will it succeed?

526 No mention is made of the contracting method being adopted by government agencies.

526 governments are excluded from this list.

526 The people with the bucks are who will determine the future of this strategy. That means governments and large owners. Efforts have to be made to gain acceptance of this philosophy if it is to have a chance of success. The process must also be perceived to be fair to all stakeholders (including the public if the government is involved).

526 I doubt if government employees could officially support this process We could only do it through our own professional organizations.

526 Nothing significant will be accomplished unless there is agreement by the government agencies responsible for buying construction.

526-335 The difficult task of training contractors, clients, or designers, as to each other's standards that from within seem so logical and from without so ridiculous is a formidable one. Endorsed standardization in some ways, even as a loose framework will benefit all participants. A major drawback to standards is that they are outdated the moment they hit the printing press. A key focus for the department in the future may be a forum such as this to keep the Canadian Contracting Method "living".

526 to 336 These groups should meet together not in isolation. Suggest that TQM facilitators be used to ensure results. People buy benefits not qualities. It will be critical that the owner groups be sold on the benefits of this process. If the owners don't buy into the process, all the good work put into this process will not fly.

526 More marketing and discussion may be required before all participants are ready to make a formal endorsement.

528 I suggest that you can get support for this method from the Professional Liability insurance industry. The majority of their claims effort is directed in the area of Alternate Dispute Resolution. The carrier for the national programs for both Architects and Engineers is Encon Insurance Managers Inc. Their address is Suite 1200, 99 Metcalfe Street, Ottawa K1P 6L7. I have spoken about this plan to Ted Belanger, Assistant Vice President who has expressed an interest in working with you on this project. An endorsement from this area should be helpful.

529-335 Add trade groups to ensure the subcontractors point of view.

530 Reference to the Specification Writers Association should be - Construction Specifications Canada (CSC). Testing of this process is essential prior to being able to effectively evaluate the method.

530 Add construction specifications canada plus professional contracts management association.

530 Specification Writers Association is now called Construction Specifications Canada. You might also like to add the Professional Contracts Management Association (PCMA) to your list. There is a Calgary Branch, although I believe meetings were recently cancelled due to low attendance. CEA - Consulting Engineers of Alberta?

532 Add ACEC CEA

332 Add: APEGGA
12. F.1 Wish to Receive Comments?

I would like the comments. David Price, I of C.

George Jerges

Michael Hullah, Hanscom Consultants, 234-9490

Yes - Dave Chalcroft, UMA Engineering Ltd, 2540 Kensington Rd NW, Calgary T2N 3S1

Yes - W. Donald Goodfellow

Brian F. Thurgood, Please send me the comments.

Yes please, direct to The City of Calgary Purchasing Dept. 814-Attentions Joyce Ross, P.O. Box 2100 stn. M, T2P 2M5, Calgary, AB

Donald Hansen

Don Sang - Mobil Oil. Thank you for inviting me. I think your heading is in the right direction.

Don Lucas

STEVE REVAY

PHILLIP LOCKWOOD - SCI ENGINEERS & CONSTRUCTORS

Yes please - Dennis Looten

Simon Russell

Alan Findlay

YES I WOULD LIKE TO RECEIVE ALL COMMENTS MADE IN THIS SESSION. NAME IS JOE OLIVERIO WITH SCI ENGINEERS & CONSTRUCTORS INC. TELEPHONE 569-0780

YES JOHN G. CROSBY

Rick Solinger Alberta Energy Company 630 5th Avenue SW

Ron Kuczynski, Riddell Group Architects & Engineers Ltd, 6th Floor, 4 Ave SW, T2P 3T4

YES via norms c/o of calgary

YES ATCO INDUSTRIAL MAN AND LEASING, 5115 CROWCHILD TRAIL SW, T3E 1T9 ATTN: G. FISHER THANKS PS ALSO SEND DOCUMENTS ON F 2

Yes please. Derek Ethellington, Regional Director, Alberta Public Works Supply and Services, 10th Floor, John D' Bowlen Building, 620 7th Avenue S.W., Calgary T2POY8

Conrad Loban, Conrad Loban Consulting

IF POSSIBLE I WOULD APPRECIATE A SUMMARY OF THE COMMENTS. P. NIGHTINGALE

Yes I would like to receive the comments... P. Douglas McLeod, Imperial Oil Resources Limited, 237-4th Avenue S.W., Calgary, T2P 3M9

BOB MCTAGGIE, YES

Al Muller yes

A discette of this info. would be greatly appreciated.

CC28
John Wimbush wishes to receive all the comments made in this session.

Robert Peterson, I would like to receive all comments.

Yes, I wish to receive the comments made in this session, please send to: Peter Maidment, c/o Revay & Associates Ltd.

Bev Ostermann

Yes, I would like to receive a synopsis of all the comments made during all three sessions. Kerry R. Powell

Gerry Meyer, Reed Stenhouse Limited. 2700 One Palliser Square, Calgary T2G 0P9

W Flathem

Yes, I would like to receive a summary of all the comments made. Ken McWhinnie, CII2M Hill Eng. Ltd.

Yes W J (Bill) Bergman TransAlta Utilities Box 1900 Calgary, AB T2P 2M1

Please send me comments in this session

Please send a copy to Ann Thornton c/o Johnson & Higgins Ltd. 2910, 205 - S Avenue, S.W. Calgary, Alta.

Yes, please

Yes E G Watt

Please send a summary of all the comments made to Jon Matthews.

All please. Lou Delane, MonenanAGRA

Yes Rick Brandstaetter Expert Woodcraft 11 6229 centre st s t2h oc7

Yes W WARD

Yes Lou Delaney

Yes W J (Bill) Bergman TransAlta Utilities Box 1900, Calgary, AB T2P 2M1

Yes F2 Please send me a copy of the revised Canadian Construction Method

Yes!

Gray Waters

Yes!

Gray Waters yes if authority is granted

I would be interested in participating in a future session

I WOULD LIKE TO BE MADE AWARE OF FUTURE SESSIONS. I WOULD BE INTERESTED IN BEING INVOLVED IN THE TEST PROJECT IF IT IS APPROPRIATE. P. Nightingale.

Yes Lou Delanev

Yes W J (Bill) Bergman
13. F 2 Copy of Revised Method?

George Jergeas
Yes W Hergman
yes - D Chalerott
Don Lucas
Steve Revav
Alan Findlay
Dennis Looten

YES I WOULD BOB MCTAGUE
yes S R Sanford
yes

Yes please, to addressee on 1

349 Dale J Habala P Eng, Nova Corporation of Alberta, P O Box 2535, Station M, Calgary, Alta T2P 2N6. Tel. 290-6287, F2X, 262-1848

yes, ian norman city of calgary

Yes please to name and address as in Fl

John Ink
Don Stang Mobil Oil Canada- Yes.
Brian Thurgood - I would like a copy of the revised method.
Rick Solinger

YES JOHN G CROSBY

Michael Hullah, Hanscomb Consultants. 234 9490

Ron Kurczaba - Riddell Group Architects & Engineers Ltd. 6th Floor 744 4 Ave S.W. Calg AB T2P 3T4

PHILLIP LOCKWOOD - SCI ENGINEERS & CONSTRUCTORS

350 Simon Russell

352 Yes, Kerr R. Powell

352 W WARD.

352 Please send a copy to Ann Thornton c/o Johnson & Higgins Ltd. 2910. 205 - 5 Ave. S W Calgary, Alberta

352 Yes, P Snelgrove

352 Robert P Zacher, Associate Counsel, AGRA Industries Limited, #1900 - 335 8th Avenue S.W., Calgary, Alberta. T2P 1C9

352 I would like to receive this - Ker. McWhinney, CH2M HILL Eng Ltd.

CC30
14. F.3 Future Participation?

Brian Thurgood  I would be interested in future participation.

Don Lucas

Approach the Consulting Engineers of Alberta

Don Stang Mobil Oil Canada - Yes

PHILLIP LOCKWOOD - SCI ENGINEERS & CONSTRUCTORS

Ron Kureczka - Riddell Group Architects & Engineers Ltd. 6th Floor 744 4 Ave S.W. Calgary AB T2P 3T4

Yes, to addressee on F1.

Yes Derek Etherington

Yes S.R Sanford

Yes, interested in a program that can improve the contacting method - Dennis Looten

Michael Hullih, Hanscomb Consultants, 234 9490

George Jergeas

Rick Solinger And Ken Hornby (he was sick today)

Steve Revas

Yes

John Ink

Iheinrich-hansen

352 Simon Russell

353-355 Yes

354 Yes, P Snelgrove

354 Yes W Flathen

354 Yes see address in file F2

354 Bev Oltmann

354 Yes - Ken McWhinnie, CH2M HILL ENG LTD

354 YES BOB MCTAGUE

354 Ann Thornton would be pleased to participate further if you feel the input of the insurance and surety perspective will be beneficial. Since I deal with a wide range of contractor clients this may be helpful in some areas.

354 John Wimbush would be happy to participate in future sessions.

354 Yes Gerry Meurer

354 Yes, I would like to be involved in future sessions and further future developments of the process and forms.

354 Robert P. Zacher, Associate Counsel, AGRA Industries Limited, #1900 - 335 8th Avenue S.W., Calgary, Alberta T2P 1C9

354 Al Miller yes.

CC31
15.F.4 Future Financial Support?

This would have to be decided by the Government of Alberta.

Would be willing to put forth a request to management. Rick Solinger.

Don Lucas - no financial commitment at this point. I would be willing to approach my company (conservative as we are) to run test cases on some of our projects.

Ron Kurczaba - Riddell Group Architects & Engineers Ltd. 6th Floor 744 4 Ave S.W. Calg AB T2P 3T4

354 Yes W. Donald Goodfellow

358 I can not make this decision. Only National Defense Headquarters can.

358 I am currently being heavily solicited by the faculty of Project Management ($50,000) but would consider a small level of support for this project. I actually see this program as being of more potential value to us than the Faculty of Project Management program but I am already pretty well committed to that program.

358 YES OF COURSE WITHIN REASON MIND YOU BOB MCTAGUE

358 Please refer to my comments in file E

358 Due to the collective nature of your goal trade associations are probably the best source of funding.

358 maybe after we seen the report.

358 Assist in securing financing

PHILLIP LOCKWOOD - SCI ENGINEERS & CONSTRUCTORS - POTENTIALLY

358 Yes to the extent possible Kerri R Powell

358 Future financial support would be dependant on our firm's decision. You would have to contact Mr. Edmond Turcotte, Senior VP - Branch Manager Johnson & Higgins Ltd. 2910, 205-5 Avenue S.W. Calgary

358 The ACA or CCA Must be very involved in this effort and should be willing to contribute
More time is needed for this process to succeed. A second opportunity to make comments after having devoted more thought to the process would help. Seeing others' comments helps and will trigger many ideas (perhaps only later on).

The process is a good one. It allows for candid input and more valid conclusions.

Good Luck! 360 A discussion of the comments and possible results would be very useful.

I was glad to hear your opening comments. On first reading up on this exercise, I thought of something a history prof told us once about the Holy Roman Empire - it wasn't holy, it wasn't Roman and it wasn't an empire. Much of what is contained in the "New Canadian Contracting Method" isn't new, nor Canadian nor a method.

I enjoyed the entire process. It gives everyone a chance to simply ramble on and generate more and hopefully new and better ideas.

Very effective way of gathering information.

Very effective. Good technology.

Thank you for inviting me to participate. Ann Thornton.

Interesting process for encouraging response particularly from those that may be somewhat inhibited.

Forces one to respond to the matter in a focused environment without disruptions. I think the results will be more meaningful. Good work.

Glad to have been asked to participate. Commendable task. There is a fundamental flaw in how engineers are programmed to treat others engineers which lies at the roots of this contracting problem. The university has an important role to play in educating engineers in professional etiquette and the art of the win-win deal.

Not at this time however the present process seems productive.

Don Lucas - an excellent forum

Interesting discussions with owners and large contractors.

The art of seeing the others side of the issue and creating a win-win situation is fundamental to the success of this process.

Your opening comment regarding government involvement. They always go with the lowest bidder, but bid competitively. In Europe they often throw out the highest and lowest bid, average the remaining bids and accept the next lowest bid to the average. This would reduce if not eliminate claims and litigation.

I believe an important aspect of contracting is the prequalification of bidders - this needs to be expanded upon in the overall process as a phase all on its own.

These comments are from the point of view of a subcontractor and in the context of perception being reality. So here goes!

Many subs feel they have more at risk in terms of capital employed, key personnel, than does the General. They would see that this proposed tendering system does not allow for their quality input to the process except through the "filter" of the General. I do not have the total answer to how to accommodate this concern, but I feel it will be difficult to get the ownership of subcontractors until they feel they are part of the solution.

This looks like a very good program to me but I will be surprised if it can be implemented on a broad scale. I know from lots of experience that it is very difficult to convince owners that there is any other way of getting the best price or deal other than by fixed price contract.

NO SPECIAL COMMENT. THOUGHT IT WAS ON THE MARK. This process is an interesting one. Now that it has been experience, one will be better prepared for the next session. It is important that a dialog continue, despite the current results, as dialog will force people to think in terms of resolving the problem by wanting to contribute in resolving the issue. Resolution is only possible if the owner, contractors and engineers build into a new system and they will if they are part of the process. This is a good process. However to maintain interest, participants must see a change occurring or something exciting happening. Don't
be slow to react and inform individuals of results.

An imperfect process that does not follow current thinking, but having discussed it with you Francis, I understand why it is the best that can be attempted without a higher level of awareness of CI (and IUM) by those involved. Good Luck with your project. John Coppock. Petro-Canada

Some dialogue at the end or even at the beginning of the session would improve the process.

USE of computers is effective, but restricts me due to limited typing ability. FUTURE participants must be warned.

Your PC approach is efficient.

Feedback on the questionnaire response to all participants would be appreciated.

The attempt to make the suggested improvements to the industry is appreciated. The participants are representative of the whole industry. The process for input is efficient and enjoyable. Feedback to the whole group is important perhaps in 3-4 months. The graphs for the questionnaire are informative and should be distributed after analysis of the source of the input.

Have we got the basis right? Least first cost is not necessarily the right way to award.

The five major problems that should be addressed are:
1. Immediate binding arbitration
2. Direct involvement and approval by owners rep regarding payment they should dispute or approve subtrade invoices in front of subtrade. Once approved payment should be exact. 30 days. I cant stress this enough if you want to see cooperation nothing will facilitate this more than timely payment.
3. Timely process of change orders by all parties. Currently, architects say you must respond in 3 days yet they themselves take weeks. 4 subtrade input into schedule.
4. Regular mandatory site meetings with owner rep attending.

TO BEGIN PERHAPS JUST FOCUS ON THE BUILDING INDUSTRY. OTHER CONSTRUCTION SECTORS HAVE DIFFERENT REQUIREMENTS AND WILL BE VERY DIFFICULT TO HAVE ONE ALL-ENCOMPASSING DOCUMENT

Very well organized and presented. The only criticism would be that there are some people who remain computer illiterate who would otherwise have been able to make a meaningful contribution to the process and perhaps options should have been available to them to submit comments in writing. This may be available but was not made known.

Our company does about half our business using an informal application of this contracting method and the biggest roadblock is usually the ARCHITECT insisting on results that cant be achieved using our normal methods.

Care should be taken to ensure whatever comes out of this effort is "market neutral". In other words, it has to be fair and equitable in all market situations.

The types of work and size of contracts involved should be expanded upon because this new process will not likely be universal in its application.

Developing a level of trust between traditional rivals will be an area of much needed effort.

The process of industry and academic involvement in the solution of a very difficult problem is both refreshing and perhaps a breakthrough in community problem solving. This could be another success for the project management group and help focus the world on Calgary, Canada and the excellent project resources available here.

The instructors have just addressed my other comment relating to line 360 by stating that they would be pleased to receive comments in writing. Perhaps this could have been stated in the material distributed.

I think this is an idea way to get ideas out. It probably replaces a year of meetings where some people would escape providing their comments. I would be interested to know the name of this software because I can see uses for it in our business. Garry Meyer

BELIEVE THAT THE PRIMARY REASONS FOR HIGH NUMBER OF DISPUTES ARE:
- LACK OF KNOWLEDGE ON PART OF OWNER
- DESIGN CONSULTANT NOT WANTING TO SHOW THAT HAD MADE A MISTAKE
- CONTRACTOR TRYING TO RECOVER COSTS FOR BID SHORTCOMINGS WHICH POTENTIALLY DESTROYS HIS CREDIBILITY WITH OWNER ON OTHER ISSUES WHICH ARE TRULY VALID

It should be a CORNERSTONE principle that NO change orders will be started until all paper work is in order. to many times now, subcontractors are expected to actually build the change when the architect cant even get the paper work done. this is ridiculous.

The problems currently being encountered in the industry are evident in the comments being recorded. There is confrontation.
In the responses here is a significant lack of understanding of the roles played by other parties to the process. In order to gain understanding and agreement it is essential that the roles of others be understood. This lack of understanding creates misconceptions about what each party is attempting to achieve and what problems they face in doing so. WALK A MILE IN ANOTHER’S SHOES BEFORE YOU CRITICIZE.

I would prefer to see some more details on how the process is evolved the Contractor and Subcontractors participation on pricing etc.

A good working example of the ability of technology to speed the interchange of ideas.

I think your new contracting method has merit and will be of benefit to the construction industry. The computer input method you have devised is a great way of letting everyone speak their mind on the issues. This system would be good in many different applications. I don’t think you can change things overnight, but the needs of the construction industry are changing rapidly and this is one certain method to ensure survival to the industry.

This process should be more structured. A more detailed questionnaire format would be preferable and would solicit more particular and precise comments and responses from the participants and would presumably provide more structured and useful data. Believe that you will find great reluctance on the part of the design community to some of your proposals.
APPENDIX D

Survey of Participants in evaluation of first draft of the New Contracting Method

Charts of Results
Issue 1. Using Contractor's expertise during the design process increases the opportunity to reduce costs.

Chart B3.1
Issue 2. Contractor input to design tends to reduce quality.
Issue 3. Legal counsel should always be consulted before signing a contract.

Chart B3.3
Issue 4. Legal counsel should always be consulted before agreeing to any change to a contract.

Chart B3.4
Issue 5. Advice of legal counsel should always be followed.

Chart B3.5
Issue 6. Many contract disputes are known about (by at least one party) for a long time before they are dealt with.

Chart B3.6
Issue 7. Contractors save claims until the project is complete or almost complete because they do not want to spoil their relationship with the (a) Owner, (b) Consultant.

Chart B3.7
Questionnaire Responses

Issue 8. Construction contracts apportion risks unfairly to (a) Owner, (b) Consultant, (c) Contractor, (d) Subcontractor.

Chart B3.8
Questionnaire Responses

Issue 9. Exculpatory clauses increase the likelihood of a contract dispute.

Chart 3.9
Questionnaire Responses

Issue 10. Use of "standard" contracts (such as CCDC2 - Stipulated Price Contract) reduces the potential for disputes.

Chart B3.10
Questionnaire Responses

Issue 11. Bid prices are affected by the bidder's expectations of fair contract administration.

Chart B3.11

DD12
Issue 12.
Consultants who act as Contract administrators on behalf of their clients are usually completely objective in making decisions about contract issues and interpretations.

Chart B3.12
Issue 13. More effective risk management will reduce the final cost of construction to the owner.

Chart 3.13
Issue 14. Competitive tendering is the most effective method for ensuring that the owner obtains the best return on construction capital.

Chart B3.14
Issue 15.
Contractors should be screened and prequalified before being allowed to bid on a contract.

Chart B3.15
Questionnaire Responses

Issue 16. Once prequalified, consultants should be selected solely on price.

Chart B3.16
Questionnaire Responses

Issue 17. A qualified, knowledgeable and experienced mediator, paid for jointly by both parties to a contract, could facilitate dispute resolution.

Chart B3.17
Issue 18. A fair expectation of profit for a contractor (as a % of contract value) is...

Chart B3.18
Questionnaire Responses

Issue 19. In order of preference rank the following dispute resolution methods:

Chart B3.19
Questionnaire Responses

Issue 20. Which category most closely describes ownership of your business:

Chart B3.20
Issue 21. What type of business are you in? Select ONE of the following:

Chart B3.21
Issue 22. Which sector of the CONSTRUCTION INDUSTRY most closely describes the one you work in?

Chart B.3.22
APPENDIX E

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Glossary of Terms used in this Thesis
GLOSSARY OF TERMS
The terms defined here reflect the meaning of these words as used in the thesis.

ACCELERATION
Performance of construction work at a rate that exceeds that which was planned in the original schedule

ACCEPTANCE
Agreement to terms of an offer without change to the offer made by the other party. See also Contract Formation

ADR
A commonly accepted acronym for Alternative Dispute Resolution

AGENCY
A circumstance under which a third party acts on behalf, and with the full legal authority of one of the parties to a contract.

ALTERNATE DISPUTE RESOLUTION
A method of resolving a (construction) dispute without recourse to the law courts. Arbitration and Mediation are the most common examples of this.

ARBITRATION
A process wherein the parties to a contract allow pre-agreed specialist(s) to decide disputes between them, rather than go to court. Arbitration may be binding or non-binding.
AS-BUILD SCHEDULE
A time-scaled chart depicting the actual events, activities and progress on a construction project.

AS-PLANNED SCHEDULE
a time-scaled chart depicting the planned activities, and progress for a project.

ASSIGNMENT
In the context of contracts, it is the allocation of responsibility. It may, for example, be responsibility for materials to be supplied by a nominated supplier, or a pre-awarded sub-contract.

ASSURANCE
A term which implies a guarantee, often of performance or quality.

BID
An offer to do work, provide services or supply materials for a project,

BID BOND
A binding commitment by a surety to pay the difference between the amount bid by a contractor and the next lowest bidder in the event that the contractor fails to enter into a contract with the owner, after submitting a bid for the work in question.

BREACH (OF CONTRACT)
Conduct that is in violation of the terms or provisions of a contract

BUILDERS LIEN
See Construction lien

CAPACITY
The legal capability to enter into a contract.
CERTIFIER
The person or authority that is responsible under the terms of a contract to (measure and) certify the amount of work performed by a contractor as a prerequisite to payment of a progress billing.

CLAIM
A problem which has led to a dispute and request for payment, additional time to complete the work, or a change in the method of performance by one party to a contract against another.

CONCURRENT DELAY
The concurrence of one or more delays at the same time.

CONSIDERATION
The payment in money or in kind as compensation for benefits received or to be received under the terms of a contract.

CONSTRUCTION LIEN
A legal claim to real property resulting from an improvement to that property, such claim being removed through payment due under the terms of the contract or by a prescribed legal process. Where Lien legislation is in effect such a right is created automatically.

CONSTRUCTION MANAGER
A person or organization responsible for management of the construction portion of a project.

CONTRACT
A legally enforceable agreement between two parties under which one party agrees to provide a benefit to another party which it is not otherwise obliged to do, in return for a consideration.
CONTRACT FORMATION
The creation of a legally binding contract. The requirements for formation of a contract are: an Offer, Acceptance, Consideration, Legality and an Intent to be Legally Bound.

CONTROL
The ability to do something about the outcome of an event or situation.

COPYRIGHT
The legal protection of Written or otherwise documented original work that prevents its use by others without approval or payment to the author.

CORPORATE SEAL
The mechanical device used to make an imprint on a document to indicate a commitment to the contents of that document. See also Seal.

COST-PLUS CONTRACTS
A contract under which the contractor is reimbursed its cost of performing the work plus an additional consideration at a predetermined fixed or variable rate.

DAMAGES
Costs that result from problems and that are recoverable from the responsible party.

DEFENDANT
The party against whom or which a lawsuit has been commenced.

DELAY
An event or occurrence which results in the planned work of a project being started or completed later than was scheduled, or in affected or subsequent activities taking longer than planned.
DELAY CLAIMS
The request for compensation in terms of additional cost or time for performance of obligations under a contract resulting from a delay.

DISCHARGE (OF CONTRACTS)
The completion of all obligations under a contract

DISCOVERY
Formal process for obtaining information in the litigation process from the other party or parties to a lawsuit prior to the case being processed through the formal hearing in court.

DISPUTE
A disagreement in the interpretation of a contract.

DISRUPTION
Interruption in the planned flow of work of a contractor.

DRAWINGS
Graphical representations of the Work to be constructed under the terms of a contract. Drawings may include technical descriptions and specifications.

DURESS
Commercial, moral or other coercion under which one party is pressured to commit to something or make a decision. Such commitment or decision is not enforceable in law.

DUTY OF CARE
A responsibility to others to act with due responsibility and objectivity that is inherent in a profession or position of authority.
ECONOMIC LOSS
Losses including those beyond direct damages resulting from an incident which contravenes a contract or rights in tort, and which are payable by the responsible party.

ENGINEER
One who by virtue of their formal training and expertise is skilled in the art and science of analyzing, designing or building facilities or products. The term is typically restricted to those who are licensed to practice in the profession by a regulatory body or agency.

EQUITY (IN LAW)
A philosophy in legal judgement which places an emphasis on what is right and fair rather than an emphasis on precedent and the letter of the law.

ESTIMATES
Forecasts of the final cost. Estimates may vary substantially in accuracy depending on the information available and used in their preparation.

EXPERT WITNESS
A specialist used by one or more parties in a dispute to advise on the practice of the industry or on specialized technical matters.

FAST-TRACK
To start construction before the design is complete. This process requires careful planning and construction work packaging.

FRAUD
To deliberately mislead others for the purpose of gain at their expense.

FRAUDULENT MISREPRESENTATION
Deliberately presenting incorrect, incomplete or misleading information.
FRUSTRATION
Inability to perform obligations [under a contract] for reasons beyond the control of the responsible party.

GUARANTEE
A promise of performance, undertaking to make good in the event of non-performance.

GUARANTEED MAXIMUM PRICE
Type of contract in which a maximum price is agreed for a set scope of work before design is complete. This is normally used to gain constructability and value engineering from a contractor during production of working drawings.

HOLDBACK
Statutory percentage [varies by jurisdiction] of progress payments held by the payer in trust for payer's subcontractors, suppliers and labour in the event of the payee's default of payment to them. This is prescribed by Lien Acts.

IMPLIED TERMS
Contract terms which are not explicitly written into an agreement but which exist by virtue of common law precedent or because of local practices.

LABOUR AND MATERIALS PAYMENT BOND
An agreement by a surety to pay for labour or materials the contractor if the contractor defaults in its obligations to make such payments. This bond is usually requested by the owner, and paid for by the contractor.

LEGALITY
Compliance with legal requirements, including criminal law, common law, statutes and by-laws.
LEGISLATION
Enacted laws. In Canada, these are enacted at the Federal, Provincial and municipal level.

LIABILITY
Legal obligation to another party created as a result of actions or promises.

LIMITATION PERIOD
The period within which legal action may be commenced.

LITIGATION
The process of using the court system to obtain resolution to a dispute.

LUMP SUM CONTRACT
...or Stipulated Price Contract. A contract to provide goods or services for a predetermined fixed compensation.

MISTAKE
In contract law, an error which fundamentally changes the understanding of an agreement.

MITIGATION (OF DAMAGES)
The process, by one party to a contract, of reducing or minimizing the impact of a failure or breach of contract by the other party.

NEGLIGENCE
Failure to take reasonable care.

OFFER
A proposal to exchange one item of value for another. Such items may include goods, services, information or money.
PENALTY CLAUSES
Clauses in a contract which impose a (usually financial) penalty for failure to perform or failure to meet specific objectives.

PERFORMANCE BOND
An agreement by a surety to pay for unfinished work under a contract if the contractor defaults in its obligations to perform such work in a diligent manner. This bond is usually requested by the owner, and paid for by the contractor.

PRECEDENT
A preceding case upon which a current decision is made. Common law is generally based on precedents.

PROJECT MANAGER
There is no definitive definition of a project manager in law. The project manager is the person responsible for the timely and cost efficient completion of project deliverables.

PROJECT
A project is a defined (in terms of quality and scope) set of deliverables to be completed in a specified time to a predetermined budget.

SEAL (OF CONSIDERATION)
A seal on a contract replaces the requirement for consideration.

SEAL (OF ENGINEER OR ARCHITECT)
This is an indication on a drawing or other document that the document has been prepared under the supervision of the engineer or architect whose seal appears on the document. Seals are issued to registered professional engineers and architects by their regulating body (usually a state or provincial association).
SPECIFICATIONS
Documents which describe the technical requirements of a product to be supplied, manufactured, constructed or installed.

STATUTES
Laws created through enactment of legislation.

STIPULATED PRICE CONTRACT
See Lump Sum Contract.

SUBCONTRACT
A contract between a prime contractor and a party that will provide goods and services required by the prime contractor for completion of its obligations under the prime contract.

SUBSTANTIAL PERFORMANCE
Usually a defined measure of completion of a construction contract. This definition is embodied in the Lien Act.

TENDER
An offer to provide defined goods or services, usually in response to a request for quotations.

TERMINATION
Ending of a contract or agreement between two parties.

TORT
The law under which obligations of reasonable behaviour to others is enforced, to allow reasonable enjoyment of rights privileges and property in society.
TRUST FUNDS
Funds held by one party for the use or benefit of another party.

UNIT-PRICE CONTRACT
A contract under which reimbursement for goods and services is based on measured quantities and predetermined rates of payment for each measured unit.

WARRANTY
See Guarantee.