RISK TREATMENT METHODS
IN THE CONSTRUCTION CONTRACTS
AND BUILDING PROCESS
The University of Sydney

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RISK TREATMENT METHODS IN THE
CONSTRUCTION CONTRACTS AND BUILDING PROCESS

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ABSTRACT

The purpose of this study is to suggest Risk Treatment Guidelines in an objective manner which concern all parties considering risk management in the construction contracts and the building process.

Apart from a literature survey, almost all of the information produced in this thesis was obtained by: a) an interview and b) a questionnaire, with senior executives of groups in the construction industry of Sydney concerned with risk management: such as the architect, owner, contractor, consultant, quantity surveyor, civil engineer, project and construction manager, insurance broker, and the solicitor.

The study has been divided with four stages: Firstly, Risk Identification (Chapter III), Risk Management Process (Chapter IV), and Risks in Contractual Relationships (Chapter V) are defined as an initial search for risk factors and idealised risk treatment methods.

Secondly, a pilot survey to establish a revised list of risk factors and normative risk treatment methods was conducted by an interview and a pilot questionnaire survey.
Thirdly, Questionnaire surveys were conducted as an empirical approach in stages one and two, and the result was analysed to provide detailed information to set up ultimate risk treatment guidelines for the next stage.

Fourthly, As a conclusion of this study, ultimate risk treatment guidelines (Fig. 7.1, P.308) have been drawn up by comparison of the data obtained and interpreted from the questionnaire with the normative risk treatment methods and risk factors.
ACKNOWLEDGEMENTS

With the bulk of final draft on my desk, I am allowed a perspective on this research which has been suppressed by a hectic pace.

My appreciation is for a great deal of information which was obtained from interviews and questionnaire with executives of the construction industry of Sydney.

I would like thank my principal supervisor, Professor G.P. Webber, his understanding of my personal goal on this research topic and his generous assistance helped me to explore. Also I am grateful to Dr. Ian Paterson for his encouragement during research.

In addition I would like to thank Dr. Keith Billings for his constructive criticism and unfettered curiosity without hesitation. To him, I am greatly indebted.

It goes without saying that I owe a debt of gratitude to my parent for their support.

I have often wondered why the acknowledgement to one's wife came last; now I understand. There are insufficient adjectives and adverbs to describe my wife, Chae Young, and her assistance, encouragement, and endurance in this research effort.
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"When you build a new house, you shall make a parapet for your roof, that you may not bring the guilty of blood upon your house, if any one falls from it."

Deuteronomy 22:8
Chapter I
INTRODUCTION

1-1 Background

"What threatens the stability and financial security of the construction industry is not design, but the problem of distributing the risks inherent in the construction process among the owner, the architect and engineer. Underlying this subject is the viability of the construction industry as it is known today.... The industry cannot be healthy unless the risks are forthrightly recognized and acknowledged, and the various contracting parties assume under the contract, without ambiguity, their respective parts of the risk."

[59:199]

The term "Risk Management" is being used more and more in these days, and yet there are still many people in the construction industry and also commerce who do not fully understand what it means. Some people have never even heard the expression; others have heard it used but never enquire its meaning; more, perhaps, think they know what it means and use it indiscriminately. There are a few, and it is to be hoped a rapidly growing number, who know the expression, really understand its meanings and spread its philosophy.
Risk management is commonly thought of as being a new art imported from the United States somewhere between 20 or 30 years ago [222:1]. Nothing could be further from the truth. Risk management has always been with us. The Bible itself is sprinkled with good risk management advice, the text at the front of this dissertation being one example.

Even before there were insurance managers in industry and commerce, let alone risk managers, there were individuals in most companies who were responsible for safety, fire insurance surveys, fire prevention, security, quality control, safe packaging and the like.

What happened some years ago was that Americans took something which most responsible person were doing in one form or another, wrapped it up in theory and jargon, and presented it as a new concept [170:1]. Of course, there is nothing wrong with this. Theory and jargon have their advantages and the main advantages of the concept of risk management is that it draws together all the methods of loss control and risk financing including insurance, and a logical method of protection against the risk.

Studies and articles on this specific problem area of risk management are not quite as scarce as studies of the whole.
Much have been written in the school of civil engineering and insurance, not in the school of architecture.

In the United States, two Ph.D dissertations; "Construction Project Risk-Sharing" by Ashley [8] and "A Quantitative Risk Management Approach to the Selection of Contract Provisions" by Mason [151] are particularly worthwhile in the sense of quantitative approach. In Australia, the another Ph.D dissertation, "Contractor's risk and Insurance in the Australian Building Industry" by Paterson [174] could be also considered as a cornerstone in this field.

Although those authors have examined risk management from different point of view especially in the construction industry by quantitative approach, the author believes that the main void is the lack of any empirical research on the reaction of all parties (owner, contractor, architect, consultant, engineer, legal side, and insurance...etc.) involved in the construction industry to the ultimate risk treatment methods in the construction process and contracts as a guide line for the risk management through the non-quantitative approach. Some of the literature deals with such risk factors with insurance policies while the other with only contract provisions. For a comprehensive list of these materials see the bibliography.
1-2 Purpose of Research

In looking at the construction industry today, we can recognize the fact that there is a seemingly inexorable tendency for projects to get larger at a rate faster than the growth of construction firms or ability of banks to fund the schemes [269:11].

Due to their gigantic size and longer duration, major construction projects contain many uncertainties or risks. As a result of this trend, most of the parties involved in the construction industry have made themselves aware of the techniques of risk management including the insurance administration.

As a result of the range and duration of projects, there is a pressing need to reform and redraft the risk treatment methods in the construction industry. The overall objective of this study has been to develop guidelines for risk treatment methods in the construction process and contracts (see Page 24, 2nd Paragraph). It should be clear that the purpose of this research is not the discovery or the invention of a new quantitative decision tool, but rather a ordering of risk treatment methods on the most effective priority basis.

It is the author's belief that should these risk
treatment methods afford a better way of approaching the unanswered questions of construction contracting, then this research will have made a contribution to the field of risk management in the construction industry.

1.3 Methodology of study

This study was conducted in the following steps:

1. Define risk in the construction process and contracts.

2. Identify risks in the construction process and contracts.

3. Formulate a risk categorization schemes.

4. Formulate various techniques for treatment of risk.

5. Provide an ideal concept of risk treatment guidelines by implementing the above approach developed.

6. Conduct a survey with the intent of providing a data base from which to generate ultimate risk treatment guidelines.

7. Suggest normative and ultimate risk treatment guidelines offered from this research.
The data for the creation of the methods and for the ordering of the methods in this thesis will be gathered by questionnaire from all groups related to the construction industry having a concern with risk management.

The purpose of this questionnaire survey is to attempt to provide ideal risk treatment guidelines. This survey, Chapter VI (p.205), contains four sections; (1) Identification and Nature of Risks, (2) Method of Risk Treatment, (3) Risk Sharing and (4) Effectiveness of Contract Type.

The purpose of each section is as follows; The first section is to find the relative importance of each construction related risk factors; the second is to find how those risks ought to be treated in the given manner; the third section is designed to find out how risks ought to be shared as between the owner and the contractor; finally the fourth is to evaluate the various recognized types of contract in terms of effectiveness in attempting the three major goals of low cost, high quality, and rapid completion.

While designing the questionnaire, it is suspected and recognized that the respondents would have difficulty in answering the questions without some
description of circumstances because each risk factor varies between project situations. For example, risk of inflation is normally a minor factor in domestic dwellings with a short construction period but can be a major influence on the manner in which large infrastructure projects are undertaken with construction periods longer than 10 years. It may be considered a minor or major risk. So the questionnaire is designed to ask each respondent to answer with a particular project experience which is currently being done.

1-4 Scope and limit of study.

The scope of this study is somewhat limited. It is designed to provide a detailed non-quantitative examination of risk factors in each method of risk treatment in the construction industry.

The extent to which the topic is discussed is designed to illustrate effective guidelines of risk management which are effective in the construction industry.

Therefore, the research effort should be addressed towards suggesting the most effective guidelines or framework of risk management and illustrating its use.
1-5 Summary

The methods of risk treatment of this dissertation are divided into two major categories; Risk Management Process and Risks in Contractual Relationships. Partioning the dissertation along these lines permits the two topics to be addressed separately but the author believes that these two types of risk treatment methods should be treated simultaneously when handling risks in the practical field.

Chapter II. introduces a general view of the concept of risk, risk management, and its objectives. It discusses types of risks in the sense of general theory, areas involving pure (static) risk and speculative (dynamic) risk, and presents existing risk categorization schemes in the construction industry. Although existing risk categorization schemes are not connected directly with risk treatment methods in this dissertation, the author believes that it is valuable to discuss existing risk categorization schemes briefly in order to link Chapters II and III.

Chapter III describes methods of risk identification as a help in identifying the risks which generally face the firm. Three systematic approaches to aid in this identification are discussed. These are the (1) Financial Statement Approach, (2) Flow Chart
Approach, and (3) Questionnaire and Checklist Approach.

The third method, the questionnaire and checklist approach, was found to be the most suitable for use in the identification of risks because it represents a direct way of obtaining data. The first two methods may assist in the formulation of a more complete questionnaire checklist. These latter approaches provide theoretical background to show the way to identify the construction-related risks which are primarily found in the construction industry. The enumeration of factors which may assist in the identification of construction-related risks adds a note of realism to reinforce the theoretical arguments. Also discussed are four major classification of risks often treated in the construction process. These are: (1) Construction Related Risk, (2) Contractual and Legal Risk, (3) Economic Risk, and (4) Political and Public Risk.

Having identified the risks facing a firm in Chapter III, the next step is to recognize the various methods of dealing with them. Chapter IV is divided into two major parts. The first part describes the five general methods for treating risks; (1) Avoidance, (2) Abatement, (3) Retention, (4) Transfer, and (5) Sharing. Chapter IV thus provides the decision-maker with a summary of the risk treatment methods available for consideration. Although insurance is a one of the most
important methods of risk treatment, its uses and types of insurance related to the construction industry are explained briefly in section 4.4 Risk Transfer as a guide line.

The purpose of Chapter V is to set out in summary form the principles of contractual relationships and clarify their characteristics and limitations, the responsibilities, and the lines of mechanism with a series of diagrams which represent the functional structure.

The first section is devoted to discussing six broad categories of contractual relationships which reflect current practice. These are; (1) Construction by General Contractor, (2) Design-Build Contracts, (3) Turnkey Contracts, (4) Construction Management Contracts, (5) Project Management Contracts, and (6) Separate Independent Contracts. An understanding of the principles behind these groupings should give the reader sufficient guidance to assess the method of risk treatment in contractual relationships.

After reviewing general contractual relationships, the next step is to discuss a dozen different types of contractual arrangements that can be used in procuring construction and related services. By considering the weakness of each type of contract, this section can
illustrate various risk factors of each contract type. In the questionnaire survey of this research, the respondents were asked to evaluate various types of contract in terms of effectiveness in attaining the three goals of low cost, high quality, and rapid completion.

As a result of descriptive and detailed study in previous chapters which are viewed from many points of origin, methods of risk treatment were then identified, with the intent of providing data from which to generate profiles of effective and practical risk treatment guidelines. This excercise resulted in the creation of the questionnaire (see Appendix 1) from which it was intended that the data base for the empirical part of this study would be obtained.

Chapter VI, thus, describes the administration of the questionnaire survey and detailed explanation of the result of each section of the questionnaire.

The survey was performed during the winter of 1985 in Sydney, and respondents were required to return the answer by mail set at not more than 4 weeks from the date of issue of distribution. Given the total 226 questionnaires within that period of time, 17% of questionnaires were returned before initial due date (31 of July, 1985). To accomplish a higher return, intensive
detailed phone follow-up communication was done for two weeks. Eventually the survey was returned by 38.9% (88 out of 226) by the end of September, 1985.

The questionnaire contains four different sections; (1) Identification and Nature of Risks, (2) Method of Risk Treatment, (3) Risk Sharing, and (4) Effectiveness of Contract Type. For Section 2 of the questionnaire, 'open' questions were used to pick up a range of opinions about risk treatment methods because they are inevitably an quantitative rather than the variable related answers which can be scaled and coded.

By doing this survey as an empirical approach to the final task of this study, the author attempts to confirm the theoretical and descriptive backgrounds by comparing them with the results of the survey.

Reading Guide to Dissertation

Figure 1.1 indicates the order in which the topic has been examined and in which this dissertation has been set down.
FIGURE 1.1 Model of Methodology of Work
Chapter II
Risk and Risk Management Concepts

Chapter II introduces a general view of the concept of risk, risk management, and also its objective management. It discusses types of risks in the sense of general theory, areas involving pure (static) risk and speculative (dynamic) risk, and presents existing risk categorization schemes in the construction industry. Although existing risk categorization schemes are not connected directly with risk treatment methods of this dissertation, the author believes that it is valuable to discuss these schemes briefly in order to link Chapter II and Chapter III.

2-1. Risk Management Concept

Forward-looking management today recognizes risk management as a specialized function far beyond the routine purchase of insurance policies. Henri Fayol was probably the first to describe this function; its objective was "... To safeguard property and assets against the theft, fire and flood, to ward off strikes and felonies and broadly all social disturbances or natural disturbances liable to endanger the process and even the life of business" [68:4].
Although at present there is no scientific theory of risk management, there are certain principles and concepts which have been evolved from the disciplines of economics, mathematics, psychology, and sociology. Risk management is as much an art as it is science. Thus, risk managers must rely extensively on nonquantitative techniques and intuitive judgement as discussed by Todd [222:11].

The basic principles of risk management are that both individuals and groups (i.e., business corporations, government and non-profit organizations) operate with limited resources in such a way as to maximize their objectives, whether they be utility, profits growth, etc.; that certain uncontrollable loss exposures exist which can not be prevented by safety and loss prevention activities alone; and that certain strategies of action are necessary to reduce uncertainties to predictable experience and thus to normal operating costs.

In respect of operating cost in particular, the expressions "Risk Management" and "Insurance Management" are not synonymous. Risk management covers a much wider field than insurance. Insurance is only a tool, although an important tool, of the individual responsible for coordinating the risk management function.
Nevertheless, since insurance is protection against risk, how does risk management differ from insurance management? Risk management is the practice of examining the cost-effectiveness of insurance protection within an organisation, while insurance is the transfer of risk to an insurer for payment of a premium, so that an unknown cost (the possible consequence of risk occurring) is exchanged for a known and budgetable annual premium.

Effective risk management involves much more than deciding whether to purchase insurance or to self-insure or to spend considerable sums on loss prevention.

In order to reduce risk and uncertainty regarding future potential losses effectively, all loss exposures must be systematically identified, measured, eliminated or controlled. Then, procedures must be established for placing insurance, allocating the cost of insurance and risk management, reporting claims, maintaining safety precautions, gathering, and evaluating loss statistics.

2-2 Risk Defined - General Theory

It is agreed in the literature that a distinction can be made between pure risks and speculative risks, and between static risks and dynamic risks [222]. Some authors consider the distinctions to be parallel, i.e.,
pure risk equal static risk and speculative risk equals dynamic risk) [43]. Pure risk donates only a chance of loss (i.e., destruction by fire)-no chance of gain, as opposed to speculative risk, where gain or loss is possible (i.e., investment in hopes of profits).

Examples of pure and static risks are physical damage to assets, loss of possession of assets, either by illegal means (i.e., fraud or criminal violence) or by legal means, (i.e., through a successful liability suit by a claimant), and loss of income resulting from loss of assets or personnel. It is these types of risks with which the risk manager is primarily concerned.

Static risks are connected with irregular forces of nature or mistakes and misdeeds of persons. They are present only in an unchanging economy, and they are always pure risks. Dynamic risks, on the other hand, are such thing as changes in politics, tastes, and habit of consumers, in current technology, or in the level of economic activity, any of which may cause loss or gain in income, depending upon their anticipation.

Parkinson [170:3] has labeled risks as a "pure risk," as opposed to a "Speculative risk" shown as follows;
1. Pure Risk

When only loss can result from its occurrence. It has been described as the chance of loss or no loss. It relates to the chances of having a fire or explosion or motor accident, of an employee being injured, or of an incorrect product leaving a factory. It is against risks of this kind that an insuree can normally obtain insurance, which can indemnify an insuree in monetary terms, against the consequences when such a risk arises.

If a loss does not occur, insurees are no worse off—apart from the cost of the insurance purchased. If a loss does occur, insurees are certainly no better off, however complete the insurance coverage, because they only recover what they have had anyway if the particular occurrence had not happened and, in addition, insurees are faced with uninsured losses of varying degrees.

2. Speculative Risk

Here this is a chance of either loss or profit. These risks can go in one of two ways, in that while there is a risk of loss, there is also a chance of profit. Pure risks can arise without
action on the part of the company, whereas the speculative risk usually requires a conscious management decision. For example, weighing the advantages and disadvantages of the profit potential will presumably guide a company's decision as to whether or not to embark on a new project, whether to buy or sell commodities or to launch a new product. Some management have made the wrong choice, and in some cases their companies have become insolvent; others have made the right choice and the profit potential has been fully realized. These are more fundamental risks against which it is not normally possible to obtain insurance protection. [170:3]

It has generally been considered that risk management should be concerned only with the pure risk; in other words those risks which are usually insurable. On the other hand, A. Willett [244:54] in his book THE ECONOMIC THEORY OF RISK AND INSURANCE (Irwin, 1951) says;

"While dynamic losses are the ones which most deserve compensation, because in general these occur through no negligence of fault on the part of the person suffering them, and while they are the ones which society can best afford to
make good, since they are accompanied by a net social gain, they are also the ones against which the least protection is furnished by existing methods of insurance."

A more current view is that this old-fashioned yardstick no longer holds good. For example, can it be said that the dynamic losses occur through no negligence or fault on the part of the persons suffering them? Sometimes this may be true, but many ventures into business have been made recklessly without due regard to such essentials as proper market research or quality control. Therefore, if the result is insolvency, only the managers of the business are to blame for embarking upon the project without a proper valuation of the possible consequences and taking the proper control or "self-preservation" measures.

While the risk manager is certainly more concerned with the pure risks to which everyone running a business is exposed, risk management techniques can be adopted with advantages to also assess the speculative risks.

Mehr and Hedges[156:34] in their book RISK MANAGEMENT IN THE BUSINESS ENTERPRISE (Irwin, 1963) say;
"We take the position that risk management as a managerial function is something more than corporate insurance management and something less than all management."

Accordingly it is probably illogical to have any boundary line for the risk management process, and risk management should be applied to all risks to which the company can be exposed. All can be identified and certainly all can be evaluated and, with varying degrees of success, controlled.

Risk is an inherent part of life and very few of us would be prepared to live our lives if the future was clearly laid down from the cradle to the grave.

Change is also a natural part of life. Alvin Tofler[223:12] in his book FUTURE SHOCK ( Bodley Head, 1970) says:

"Change is essential to man, as essential now in our 800th lifetime as it was in our first. Change is life itself. But change rampant, change unguided and unrestrained, accelerated change, overwhelming not only man's physical defence but his decisional process - such change is the enemy of life." [223:12]
In a paper given to the Association de Geneve early in 1975 G.N. Crockford, [50:23] an Assistant Director of Keith Shipton Developments Ltd, said:

"Risk can be considered as a function of change and risk management may thus be described as a technique for coping with the effects of change. It is a technique which has been formalised only in recent years, although many of its constituent activities have been practised to some extent for a much longer time. There are, however, grounds for fearing that while it is being formalised, the rate of change, the effects of which it is designed to control, is accelerating so rapidly that the more formal its techniques become, and the more they are thought of as a separate discipline requiring a new specialization, created at the interface of economics, applied psychology, engineering of all kinds, statistics, law, operational research, insurance and occupational medicine, the less it will be capable of achieving, in practical terms, the purpose for which it was set up."

Mr. Crockford goes on to suggest that evidence of change is all around us and nowhere more apparent than the world of industry, where risk management chiefly
operates. The time span between a discovery in a laboratory and its incorporation into standard technology is shortening all the time. Concentration and specialisation have increased with size.

Accordingly, if risk management has not been adopted by a company in the past it is suggested it is essential for that company's future success.

More questionable is the distinction between risk and uncertainty. Professor Robert I. Mehr and Emerson Cammack [155:112] define risk as "uncertainty concerning loss". A.H. Willet [245:88] made the first distinction between the two, but the distinction was unclear to many. He alluded to risk as an objective concept and to uncertainty as a subjective concept.

Frank Knight [125:17,20] in the early twenties, suggested that the difference is one involving the number of similar exposures to loss. According to Knight, risk is the doubt that exists where there are a large number of similar exposures, thus enabling the calculation of the chance of loss.

If the chance of loss could be calculated exactly, uncertainty would be eliminated, so that uncertainty becomes a function of the reliability of an estimate.
Each of these views above mentioned has its adherent, some maintaining that risk is equal to the chance of loss, others that risk equals the maximum probable loss. Probably the most accepted definition of risk today will distinguish it from uncertainty, a subjective concept, by stating that risk is a state of the world, uncertainty a state of mind. Uncertainty, then, is affected by our knowledge of a certain exposure to loss. Risk is not.

This research will deal with pure risk; i.e., an exposure to economic loss only. The term risk will be further restricted by defining it as an exposure to economic loss having the following characteristics (refer Page 4, 4th paragraph. Thus the guidelines referred to earlier will display pure risk treatment methods):

1. It arises solely out of the construction associated activities of the firm purchasing the construction. The construction purchaser may face many risks; this research will deal only with those arising out of the need to purchase the construction.

2. It must be identifiable and susceptible to description by a magnitude of the economic loss.
3. It need not be insurable.

2-3 The Objective of Risk Management

The literature agrees that the objective of the risk management function is aid to any organisation in achieving its objectives. Mehr and Hedges state that "the objective of management, including risk management, is to maximize the productive efficiency of the enterprise."[156:340] This objective is, according to them, both accurate and adaptive to nearly all philosophies because of the multitude of possible interpretations of the phrase "productive efficiency". Productive efficiency "refers to the relationship between the 'value' of what is 'produced' and the 'cost' of producing it," according to Mehr and Hedges, and "... there are many ways of measuring value and cost..."[156:340]

This objective is stated very broadly, however, and as admitted, applies to all management. Other writers prefer to define more narrowly the objective or objectives of risk management. Professor McDonald claims that risk control measures are directed to the attainment of one or more of the following objectives: to increase profits through cost reduction (mainly through loss prevention activities) and through removal
of barriers deterring managers from committing capital to potentially profitable changes; to shield profit margins by analysing and preparing for the consequences to profits of certain losses; to prevent distressing dislocations through sudden reduction in assets by protecting the firm against catastrophic losses.[145:3]

Professor William's and Hein's definition of the risk management appears to be a workable one because it suggests both a standard of performance and the direction of effort. It distinguishes the risk managers' task from that of total management, but does not attempt to specify what total managements' objectives are in any one case. They claim that the objectives of risk management to be the "..protection of the firm or family against accidental financial losses to its assets, both physical and human, and to the future income which might be derived from those assets..." and "... the minimization of expected losses or average losses in the long run."[248:59-60] Losses are defined broadly, to include insurance premiums as well as inconvenience and worry.

It may be concluded that the overall objective of risk management for the business firm is to aid the company in achieving its stated objectives, whether they be to maximize "profits," grow rapidly, maintain stable
income growth, expand into new markets, or some combination of the above, but with a minimum of penalty being incurred.

Having described the concept of risk, risk management, and objective of risk management, it is believed that review of existing risk categorization schemes in the construction industry is necessary for the reader to enter into Chapter III, entitled "Risk Identification." Although Section 2-4, Existing Risk Categorization Schemes, is not connected directly with the risk treatment models which will be described in this dissertation, the author believes that it is valuable to discuss existing risk categorization schemes briefly for linking Chapter II and Chapter III.

2-4 Existing Risk Categorization Schemes

As previously mentioned at the beginning of this chapter, existing categorizations are reviewed as a foundation for developing a categorization scheme for construction risks. Several publications and results of the interview which present such schemes will be discussed briefly to help link Chapter II and Chapter III entitled Risk Identification.
Mason [151] has classified risks into the areas of:

1. Nonperformance
2. Situation Changes
3. Cost of dispute settlements
4. Liability losses
5. Damage to the project during construction.

Mason formulated four methods for managing these risks:

1. Risk Avoidance
2. Risk Abatement
3. Risk Retention
4. Risk Transfer

Mason's work concentrated on the traditional bonding and insurance areas, which correspond to the nonperformance and liability-loss classifications, respectively. The viewpoint is primarily that of the owner, and the information presented is intended to aid in the selection of contract provision.

Shaffer[201] discusses the use of a risk analysis approach for cost estimating. He categorized risk elements as follows:
1. Design Elements
   a. Engineering Changes
   b. Field Changes
2. Contingency Elements
   a. Labour
   b. Other Job Conditions
   c. Pricing

Johnson and Rood[120] divided contractor's risks into the following categories:

1. Business Risks
   a. Capital Investments
   b. Cash Flow
   c. Profitability

2. Project Risks
   a. Contractual Specificity
   b. Project Cost Estimate

3. Operation Risks
   a. Management Control
   b. Operations Cost
   c. Labour Equality
   d. Construction Performance

The viewpoint of their work is that of the owner, and the objective is to provide information useful in
construction contract negotiations.

Frisby[79] classified risks as follows:

1. Entrepreneurial Risks
2. Project Risks
3. Resources to be managed
4. External Factors

Frisby's work is apparently intended to be used at the management level of a construction firm.

Kraemer[134] considers risk assessment from the viewpoint more typical of aerospace, electronic, or tooling industries rather than that of the construction industry. Kraemer considered an appropriate categorization scheme to be:

1. Cost Risk
2. Schedule Risk
3. Technical Risk

Gates[80] placed contracting contingencies into four categories:

1. Mistakes
2. Subjective Uncertainties
3. Objective Uncertainties
4. Chance Variations

Gates considered risks which necessitate the use of contingencies from the viewpoint of a contractor estimating costs for a project.

Marshall[150] considered three major factors to be important in formulating a measure of contractor risk arising from cost variations:

1. Cost Variability due to real world uncertainties
2. Contract Structure (including contract type)
3. Contractor's utility for money

Benson and Colwell[20] considered risks from the point of view of an owner in the process of selecting the type of contract to be used for a construction project. They define three categories for evaluating the assumption of risk:

1. Factors related to the day-to-day operation of the construction effort.
2. Resources necessary to construct the project which are beyond control or influence of the contractor.
3. Factors that are function of or related to the work or the work site.

Table 2.1 shows the abstracted opinions of existing categorization schemes mentioned above.

Summary

In this chapter, the concepts of risk, risk management, and objective of risk management have been introduced in general terms. Also discussed are types of risks areas involving pure (static) risk and speculative (dynamic) risk in the sense of general theory. Finally, this chapter has presented existing categorization schemes in the construction industry. As previously mentioned in the last part of Section 2-3, these existing risk categorization schemes are not connected directly with risk treatment models in this dissertation. But it is believed that the review of existing risk categorization schemes help the reader to relate Chapter II and Chapter III.
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| S.L. Shaffer [201]  
"Risk Analysis for Capital  
Using Risk Elements" 1974 | 1. Design Elements  
a. Engineering Changes  
b. Field Changes  
2. Contingency Elements  
a. Labor  
b. Other Job Conditions  
c. Pricing |
| J. Johnson and O.E. Reed [120]  
"Elements of a Fair and  
Equitable Profit Determination  
for Construction Contract  
Negotiation," Draft report of  
U.S. Army Construction Engineering  
Research Laboratory. (C.E.R.L.) | 1. Business Risks  
a. Capital Investments  
b. Cash Flows  
c. Profitability  
2. Project Risks  
a. Contractual Specificity  
b. Project Cost Estimate  
3. Operation Risks  
a. Management Control  
b. Operations Cost  
c. Labour Equality  
d. Construction Performance |
| T.M. Frisky [79]  
"Risk Management", Presented at  
the U.S. Army Engineer District  
Mobile Area and Resident Engineers  
2. Project Risks  
3. Research to be Managed  
4. External Factors |
| G.T. Kremer [134]  
"Meaningful Risk Assessment",  
Transaction of the American  
Association of Cost Engineers,  
1976 | 1. Cost Risk  
2. Schedule Risk  
3. Technical Risk |
| M. Gates [80]  
"Bidding Contingencies and  
Probabilities", Journal of  
Construction Division, A.S.C.E.  
Vol.97, No.02. Proc. Paper 8524  
November, 1971 | 1. Mistakes  
2. Subjective Uncertainties  
3. Objective Uncertainties  
4. Change Variations |
| C.W. Marshall [150]  
"Quantification of Contractor Risk"  
Naval Research Logistics Quarterly,  
Uncertainties  
2. Contract Structure (include Contract Type)  
3. Contractor's Utility for Money |

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<td>Factors that are a function of or related to the work or the work site</td>
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**Note:** Numbers are not in order.
CHAPTER III
Risk Identification

This chapter describes methods of risk identification as a help in identifying the risks which generally face the firm. Three systematic approaches to aid in this identification are discussed. These are the (1) Financial Statement Approach, (2) Flow Chart Approach, and (3) Questionnaire and Checklist Approach. The third method, the questionnaire and checklist approach, was found to be the most suitable for use in the identification of risks. The first two methods may assist in the formulation of a more complete questionnaire checklist. These approaches provide theoretical background to show the way to identify the construction-related risks which are primarily found in the construction industry. The enumeration of factors which may assist in the identification of the construction-related risks adds a note of realism to reinforce the theoretical arguments.

In this study the author also adopts the questionnaire approach for the identification of risk factors in the construction industry and it will be discussed in detail at Chapter 6 with the results of the survey.
Also discussed is risk classification in the construction process which classifies the risk into four categories. These are (1) Construction Related Risks, (2) Contractual and Legal Risks, (3) Economic Risks, and (4) Political and Public Risks. Details about these risks will be discussed in Section 3.2.

3-1 Methods of Risk Identification

Risk identification is probably the most difficult and important stage of risk management because nobody is aware of risks which have not been identified. One thing is certain; risks can not be identified from behind an office desk. A.J. Ingly says, in his article on "Risk Analysis in AMA (American Management Association) Insurance Series No. 112", risks can only be properly identified through "eyes and ears, a substantial imagination, and plenty of shoeholder." [114:56] Following are brief explanation of each method.

3.1.1. Financial Statement Method

First proposed by A. Hawthorne Criddle [49], this method of risk identification is based on the premise that the financial statement account titles serve as reminders of the various exposures to economic loss. In
other words, as the risk manager proceeds through the firms financial statements and schedules, the exposures to economic loss which jeopardize assets and operations will be logically and systematically uncovered.

The following analysis of the inventory item in a financial statement will illustrate Criddle's idea.

Inventory:

The exposure represented by this item relates to inventory owned by and in the possession or under the control of the corporation at the date of the financial statement. It properly consists of a raw materials and supplies and finished products. Inventory may be in the company's own manufacturing premises or in private or public warehouses or in the custody of processors or suppliers or in due course of transit. All such property is subject to physical damage, destruction or loss of possession. If this occur there is a possible consequential risk because of business interruption or other loss-causing conditions which were set in motion by the property destruction. There is also the risk of liability being incurred for injuries to persons or damage to property of others arising out of the ownership, existence or use of this property.
Another characteristic is that such property customarily moves from place to place while still completely owned by the corporation; thus, there is a possible transit and location of risk which may be significant with respect to high valued inventory items, especially when being transported by the corporation's own delivery equipment.

Risk investigation of this items begins at the point of the corporation takes title, and embraces all possible loss, exposures in transit while in the company's own plant, or in storage, or in the hands of processors or others, or in inter-plant transit, until incorporated into final form and solid, delivered to and accepted by others. Values are necessary by locations and modes of transit. Because "Inventory" is an item known to fluctuate the investigation of values at risk should include maximum and minimum ranges [49:16].

Although the financial statement method has been accepted as a help in identifying the risks which face the firm in general, the method provides little help in identifying the construction-related risks of a firm which is primarily engaged in the construction business.
3.1.2. Flow Chart Approach to Risk Identification

Another writer in this field of risk management has proposed a more exacting approach to risk identification. A.J. Ingly, in his article entitled "The Problem of Risk Analysis," suggests the use of a flow chart of the company operations as a tool in risk identification. To use his description:

"At the top of the chart, you put the raw materials at your supplier's plant and your purchased utilities; at the bottom, the ultimate consumer of your product. There should be enough blank paper between that you can trace your operation through its entirety - your plants, processes, warehouses, common carriers, and occupational diseases - remembering such offshoots as research, advertising, and airplanes that are not directly in this flow but certainly have a part in the panorama. If yours is a multiple-plant operation, you may well need a flow chart for each plant, or at least one for each group of similar plants.

Now, with this simple -or complex- picture completed, you can consider what might be the result if something of an insurable nature went wrong somewhere in this chain" [114:137].
Although Ingly wrote concerning the identification of insurable risks, his approach is just as applicable to the discovery of risks which can not be treated by transfer to an insurance company.

3.1.3. Questionnaire and Checklist Approach for Risk Identification

A third method of risk identification, and the method most often used by the insurance industry, is the risk questionnaire and checklist method. Checklists of potential losses are published by a number of organisations including: (1) Individual Insurers, Agents and Brokers, (2) Insurance Publishing Houses, and (3) the Insurance Division of the American Management Association. Perhaps the most detailed list is the forty-three page document of the AMA. The document is entitled "Risk Analysis Questionnaire," and its free and open use is encouraged by AMA [53].

To illustrate the general nature of the risk questionnaire, a summary of the general headings of the AMA questionnaire is given in Table 3.1

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<th>General I</th>
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Table 3.1 General Headings AMA Risk Questionnaire

The questionnaire of the American Management Association and similar questionnaire do not treat the construction operations of the company. Therefore, there is a need for a questionnaire-checklist to deal specifically with the construction process. The
questionnaire-checklist should be capable of serving a dual purpose.

First, it should allow the construction purchaser to identify the risks he must face in order that the risks may be dealt with in a rational manner. Second, it should enable the construction contractor or supplier to recognize the risks of construction which may, by contractual arrangements, become his legal responsibility.

After reviewing the methods of risk identification as a help in identifying the risks which face the firm in the general business viewpoint, the next step is to classify the risks associated with a construction process which must somehow be analysed and handled.

3-2 Categorization and Identification of Construction Risks

Having discussed the three general methods of risk classification, it would be beneficial to describe the risk categorization with a brief identification of risk factors which were identified by interviews with various parties involved in the construction industry and literature survey during this research. For more detail, see Table 3.2
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**Table 3.2: Identified Risk Factors by Interviews and Literature**

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- Page 3: Data Analysis
- Page 4: Discussion
- Page 5: Conclusion
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### Appendix

- Paper ONLINE
- Document ONLINE
- Report ONLINE
- Analysis ONLINE

### Preparation

- Report ONLINE
- Analysis ONLINE
- Preparation ONLINE
- Document ONLINE

### Conclusion

- Analysis ONLINE
- Paper ONLINE
- Preparation ONLINE
- Document ONLINE

### References

- Reference A
- Reference B
- Reference C
- Reference D
- Reference E

### Other

- Online Resources
- Digital Library
- Additional Information
As shown in Table 3.2 and Section 2.4 in detail, risks could be categorized in many ways. In this research the author will present four groupings; (1) Construction Related Risks, (2) Contractual and Legal Risks, (3) Economic Risks, and (4) Political and Public Risks.

3.2.1. Construction Related Risks

Table 3.3 shows the revised risk categorization schemes and detailed listed risk factors and the following is a brief description of the risks which could be faced by the various parties during the construction process.

Weather: The principal climatic elements, where human comfort and building design are being considered, are solar radiation, temperature, humidity, rainfall and wind. Secondly, but equally important, elements are dust-storms, permafrost, etc.

To prevent this risk factors, the following basic design must be obtained.

1. Mean monthly maximum and minimum temperatures and diurnal range.
2. Relative humidity values (maximum and minimum)
3. Average monthly rainfall, plus information on flash storms and flooding, also snow accumulation.
CONSTRUCTION RELATED RISKS

Weather
Acts of God
Availability and Productivity of Labor, Material, and Equipment
Delayed Completion
Defective Design
Differing Site Conditions
Changes in the Work
Local Conditions in the Overseas Projects
Vandalism and Malicious Mischief
Failure to complete Contract according to Plans and Specifications
Accidents
Subcontractor Failure

CONTRACTUAL AND LEGAL RISKS

Failure to enter into the Contract
Settlement of Disputes
Labor Contracts
Lack of Contract Clarity

ECONOMIC RISKS

Inflation
National and International Impacts
Funding
Interest Rate Variation
Exchange Rate Movement

POLITICAL AND PUBLIC RISKS

Political and Religious Influences
Theft, Burglary and Fidelity Hazards
Public Disorder
Local Work Methods
Union Strikes

TABLE 3.3 REVISED RISK CATEGORIZATION SCHEMES AND RISK FACTORS
4. Percentage of cloud information and solar radiation levels.

5. Mean and maximum velocity and direction of prevailing winds.[226;234]

Although very extreme conditions may exist for very short duration and may even be acceptable to human life, they must be taken into account in order to avoid structural or surface damage to a building. Also there may be modifying effects on the climate which is normal for the region, caused by local vegetation and attitude of the site, which may not appear at first from statistical evidence, but which can have beneficial effects on a very hostile climate.

The architect can make a significant contribution to resolve some of these problems by the careful study of suitable building forms and their orientation and positioning on the building site. Also, from the elevational design, it is possible to provide a suitable internal environment which is both pleasing and efficient and protects the inhabitants from the excess of the climate. The fortunate outcome of the importation of Western architectural styles totally inappropriate to local conditions is very apparent in many part of the world although there now appears to be, judging from building erected in the last few years, a greater
awareness of local conditions. International air travel, however, seems to have resulted in a desire to create building with a common internal environment, which are then merely embellished with local culture and planted down to provide a corporate image wherever the location.

The normal weather-related hazards of building which may be met are condensation, snow, hail, lightening, sand and dust, hurricane, etc. All have to be considered as possibilities in the architect's research and conception and also as a risk for the contractor since he can better assess its impact on the construction method.

Acts of God; Such risks as flood and earthquakes are exposures which have no purpose in being transferred beyond the owner except that the designer can assume the responsibility of designing to minimize their impact. Fire, however, to the extent it can be occasioned by the contractor's operations, may be one shared with the owner.

Availability and Productivity of Labor, Material, and Equipment; The availability and productivity of the resources necessary to construct the project are properly for the contractor to assume. His expertise should allow the assessment of cost and time required to obtain and apply these resources. This is the basic
service that the owner is paying for. The cost of labor, materials and equipment is a subject deserving considerable attention.

For example, in the sense that materials are either (1) locally produced, and relatively cheap, or labor, (2) imported from abroad and relatively expensive, or (3) a mixture of the two. In the Middle East countries, very often local materials are quite unsuited for work other than the traditional local construction. Even sand and aggregate, available profusion in desert areas, may be so contaminated with salts, etc., that they need through washing in precious drinking water (as opposed to equally-contaminated well water) before they can be used for the mixing of concrete, etc. At the other end of the scale, other countries, may be so proficient that they manufacture virtually all their required materials themselves - but when this occur, their local construction industry is likely to be equally proficient and hardly indeed of help from foreign contractors.

Delayed Completion: Another type of construction related risks is late completion. The construction owner is generally building something to be used in conducting his business. Normally, a delay in the completion of the project will result in some type of financial loss to the owner. If this is the case, then the construction
owner should consider methods of dealing with this risk of financial loss.

**Defective Design;** The tremendous expansion of construction both foreign and domestic has placed tremendous burdens on the engineering profession. Maintaining performance standards in the face of this is exceedingly difficult and many engineering associations are experiencing the difficulty of staffing design or construction supervision assignments with competent people. Unfortunately, the consequences of failures in this respect frequently fall to the owner and contractor instead of engineer who improperly assessed his own capabilities. Design failures or constructibility errors are becoming more and more apparent as engineers expand their firms, often with lower professional competence. The design-engineer should bear the true cost of such failures, not the owner or contractor. However, contractors are not usually very effective in pinning such responsibility. The pride of authorship becomes a very protection factor. Further, "Performance Specifications" are too often an escape from responsibility.

**Differing Site Conditions;** The site conditions have not changed since the contract award, but they may well differ from what was assumed prior to the start of work.
If the site conditions make the work to be done much more difficult and consequently more expensive, who is to be responsible for this additional cost?

The question of who should assume the risk of differing site conditions is frequently argued. One might argue that from the owner's standpoint the risk associated with differing site conditions does not meet all the characteristics of a manageable risk. Specifically, the characteristic that a risk is one which can result in a loss, seems to be violated. In practice, the owner can seldom negotiate a contract price change based on the contention that the site conditions made the work less expensive than contemplated by either party. The contractor need only state that he did anticipate that the ease with which the work is being accomplished, and reflected this fact in his bid. In practice, then, the owner faces an exposure to economic loss associated with unforeseen site conditions. He should recognize this risk so that it can be treated in an appropriate manner.

On the other hand, it could be said that Subsurface Conditions of geology and ground water can be transferred to the contractor because he is in the best position to assess the impact of these conditions on project cost and time. However as an essential party of
the transfer process, the owner has the responsibility to undertake pre-contract exploration measures and the designer has the responsibility to design for the conditions expected. The extent that this is not feasible should determine the degree to which the owner retains a portion of this risk under, say, changed conditions clause.

Changes in the Work; The contract documents are often an imperfect representation of what the owner intends to be completed under the contract. As the project develops into physical existence from a set of drawings and specifications, changes may become necessary. If the owner is not contractually able to make changes when these changes represent his best interest, he will be subject to a loss.

When considering the need to effect changes to prevent loss, the owner should consider the need to: (1) alter the work to be done under the contract, (2) suspend work operations for a period of time, and (3) terminate project operation.

Local Conditions in the Overseas Projects; Any agreement will be shaped to a considerable extent by local conditions. The politics, stability and customs of local site will be an important factors. The Commonwealth
countries which have a colonial past will have
determined the legal system and probably the type of
agreement that can be negotiated. Some countries without
such a history may have little in terms of commercial
law. Arbitration may not be provided for and the courts
may be available only to those of the appropriate
nationality of religion. The lack of European-type
facilities within a country may arise serious
difficulties for expatriate staff, which quaint local
customs like tribal warfare may have to be faced.

If the country is not politically stable the
project may follow an arbitrary course, and so may the
payment of fees.

The involvement of an international agency will
influence the situation. While such an agency may be a
establishing factor, it is another body which has to be
satisfied and if there is friction between client and
agency the consultant may find himself caught in the
cross-fire.

According to Beardall [226;11], ideally the
decision to use an agent should be made during the
initial market analysis but caution may indicate that
this decision be delayed since during the time a lot can
be learnt as to who would be acceptable.
The legal situation with regard to agents varies from country to country. In the Arab Emirates, for example, there are no legal requirements and registration of an agency agreement is not required. In Syria exclusive agency agreement have to be in a legal form and registered. In Saudi Arabia it is mandatory to have an agent and the agent of a consultant has to be a Saudi registered consultant. In Iraq the agency law is rigidly defined and transgression of the law is punishable by prison for the agent and blacklisting for the foreign countries. Beardall continues, needless to say, competent local law advice is essential before an agency agreement is signed.

Agent should thus be chosen with particular care, as it is an important and long association. Since there are few reference sources from which one can select agents at long distance, a lengthy is it to the country and discussions with residents in a position to assess a particular agent's financial responsibility, reputation in the community, etc. are indicated. Checking and cross-checking of information with a wide variety of sources is advisable, subtly or openly, into an unprofitable association with a friend or relative of one's initial contact.

The local commercial attache of an embassy, the
local Chamber of Commerce and consultants with offices in the country are helpful in assisting in the evaluation of potential agent, as are bankers and other professionals.

Local tendering method, taxation, duties, land acquisition law, work permits, import regulation, and legal framework also should be considered carefully in the market analysis stage.

Vandalism and Malicious Mischief: Title is self-explanatory and the exposure to loss is real. The location and type of project, as well as the protective measures taken, will affect the extent of exposure to loss.

Failure to Complete Contract according to Plans and Specifications: For a number of reasons, the general contractor may be unable or unwilling to perform his legal responsibilities under the construction contract. These reasons often include: (1) technical incompetence, (2) managerial incompetence, and (3) financial instability. The construction owner must recognize this possibility and take steps to deal with this exposure to financial loss.
Accidents; Accident exposures inherent to the nature of the work are best assessed by the contractor and his insurance and safety advisors. Further, he has the most control over site conditions which can increase or decrease the accident exposure. In recent years, it has been seen that a trend toward owners undertaking this traditional contractors's risk through "Wrap-Up" type coverage. It is believed that this is a fundamental error [273; Special Advertising Section]. Since the safety record is so heavily impacted by the contractor's methods, site conditions, worker's attitudes, and supervisor awareness, the owner will obtain the opposite of what he seeks. Ultimately the cost of insurance is the cost of losses plus the cost of administering the compensation for these errors.

Subcontractor Failure; This is a risk properly to the account of the contractor except where it arises from one of the other risks identified herein as attributable to the owner or designer. Contractors should be in the best position to assess the capacity of their subcontractors and should bear the risk of not assessing that risk properly.

3.2.2. Contractual and Legal Risks

Failure to enter into the Contract; The losses
associated with the failure of a contractor to enter into the contract include: (1) the loss created by the difference between the original low bid and the contract as ultimately signed, and (2) the expense and delay costs to the owner of again putting the job out for bids, if necessary.

Settlement of Disputes: Every agreement must provide for the eventuality of disputes. Amicable negotiations is always to be hoped for, but given that consulting engineers are only human and some inexperienced clients expect total perfection, disputes are inevitable and in the absence of an agreed method of dealing with them, matters could finish up in the courts of the client's country, which may not provide an acceptable forum.

In the case of overseas projects, many agreements provide for disputes to be settled under the Rules of Conciliation and Arbitration of the International Chamber of Commerce, but the parties to the agreement may have little idea of what is entailed.

The Secretariat of the ICC Court of Arbitration is based in Paris, but details of the services offered can be obtained in London. The ICC recommend that the following standard clause should be included in any
international contract;

"All disputes arising in connection with the present contract shall be finally settled under the Rules of Conciliation and Arbitration of the International Chamber of Commerce by one or more arbitrator appointed in accordance with the said Rules."

This standard clause expressing the will of the parties may be complemented, if the parties so desire, by stipulations as to the place of arbitration, the number of arbitrators, the national law applicable to the contract and, under some legal systems, the assigning to the arbitrators of the powers of amiable compositeurs.

The ICC recommend that in order to ensure that the arbitration clause is valid it must exist in written form. The ICC also draws attention to the importance of;

1. Not undermining the Arbiter's authority by limiting it.
2. Not designating multiple jurisdiction.
3. Ensuring that the arbitration clause is presented in such a way that neither party can overlook it.
If the parties fix the place of arbitration they should bear in mind the difficulties which may arise from choosing certain countries, due to the mandatory provisions of those countries' procedural laws. Such provisions must be observed if the award is to be valid in the place where it is made.

A profilation of arbitral methods seems at first sight to be unfortunate but two or three alternative systems might not be a bad idea since left to itself one system could easily degenerate into something as cumbersome as the legal process which it seeks to circumvent.

But some of the Middle East countries, like Kuwait and Oman, the resolving of disputes are subject to the local law, arbitrated by the local Chamber of Commerce and Industry. Decisions of the Committee are final and are not subject to appeal. [204;46,49]

Labor Contract; In the case of overseas project, one might conclude that labor costs are determined mainly by (1) where the workforce comes from, (2) how much it is paid, and (3) how much it produces. Some countries may insist for a variety of reasons that all labor must be imported, not merely the skilled tradesman. Labor importation can solve airfares in and
out, paid local and home leave, attraction money (depending on the degree of local hardship), the construction, furnishing and maintenance of labor camps, some or all of which may need air-conditioning, the provision of local entertainment and facilities in barren areas, mess facilities, medical facilities, local transport, and special allowances for religious and climatic considerations. The accommodation may have to segregate races and religions, and the entertainment may have to extend to the building and running of social clubs. Alcohol may be totally banned, whilst cold drinking water may be an expensive essential on tropical sites.

Mounting cost of labor when boom cities mop up available labor forces, and contractor are forced to compete in a scarcity market of increasing difficulty. Incidentally, it is by no means unusual to see Australian tradesmen stripped to the waist and working side-by-side with locals in the harshest of climates, especially in the more technical and scientific trades - but as one might expect, such people require incentives, and are not likely to go in for this sort of thing for nothing. In this respect contractors from countries like South Korea and Greece may enjoy a particular advantage through being able to move across the world complete with their own total labor forces, whilst other nationals to
restrict themselves to key men only, searching around in local markets for the majority of their workforce.

Lack of Contract Clarity; An understanding of what the conditions of contract require, impose and give is of course essential. They are probably negotiable to some extent although the standard response will more than likely be that everybody else is satisfied or there could be a positive statement that the conditions are standard and are not negotiable. Perseverence will usually enable a compromise to be reached, particularly if the negotiation centres around matters of fundamental concern.

The contract case as an example given in this section is a "Design and Build" contract [226;50-54] in the Kingdom of Saudi Arabia (see Appendix 2). This example is of a contract for the construction of 1664 flats in thirty two high rise towers in twenty-four months by a European contractor under a typical Saudi Arabian contract, and is compared with the FIDIC contract.

The condition of contract closely follow the order and working of the conditions of contract (international) for works of construction (FIDIC), through amendments have been made to allow for the
"Turnkey" aspect, thus reducing the duties of the consultant (termed the Engineer in FIDIC). In the redrafting there has been definite bias against the contractor, and some clauses are biased to the point of injustice if they are strictly applied and this contract place severe liabilities, penalties and restrictions on contractors and consultants which would be unknown within the bounds of the more familiar forms of contract. The clauses are given in numerical order and comments highlight the principal deviations between these conditions of contract and the FIDIC conditions.

3.2.3. Economic Risks

**Inflation:** Inflation is probably the most pernicious and inimical to every party in the construction process. Identifying it is hardly a problem; quantifying it and determining whether it should be shared and how to share it, are most difficult.

The chief victim of inflation is the owner, especially the public owner, subject to a myriad of environmental controls, historical preservation laws, endangered species acts, and financial restraints. The owner must not only cope with a variables and unpredictable rate of inflation over a long period of
time but must also include in his projections the impact of inflation, an impact that will surely be included in the contract price.

Although the contractor can, to a limited extent, lessen the effect of inflation, he can not be minimize the risk unilaterally. By himself, he can resort to sophisticated forecasting and scheduling devices; however, even computer techniques in conjunction with network analysis such as the critical-path-method, unfortunately are still not developed sufficiently to be of much help in dealing with the inflation. A prudent bidder, knowing all he can about the most recent trends in costs of materials, labor, and equipment must nonetheless adopt a defensive attitude in providing for inflationary costs. The owner can share this risk by providing for adequate mobilization costs, reduction of retained money, and payment for non-installed material delivered to the site or stored under bond.

As to availability of labor, materials, and equipment, the contractor is much better qualified to make determinations at the time of bidding than is the owner; these are risks that changes initiated by the owner or design deficiencies do not contribute to delays.
Warszawski [237,238,239,240] suggests the quantitative method to evaluate and control this risk factor through the series of his articles recently.

**National and International Impacts:** There are periodically, "Economic Acts of God," so to speak, of such magnitude that a contractor could not properly assess either their probability or cost impact. The author is referring to such occurrence as OPEC decisions, nationwide strikes, devaluation, tax rate changes, and the like.

**Funding:** is obviously a risk beyond the capacity of the contractor to control. Improper sourcing of these funds may occasion delays or create interest costs which are not anticipated and financing problems which to many contractors are unbearable. The tragedy of a competent contractor being driven out of business by delayed compensation for his services is one of construction industry's worst shame. This is especially true in the protracted negotiation of changes.

Too frequently the owner playing the cash-flow game to leverage dispute negotiations to his advantage. Sometimes it appears that the contractor with the financial capability to fund these delays can line with the process but only at great outlays of interest. The
small contractor in some cases can not even survive the process.

**Interest Rate Variations**: this risk can be eliminated if it is found possible to borrow at a fixed rate.

**Exchange Rate Movement**: This risk can be mitigated either by forward exchange dealing or by expressing and financing contracts in a currency thought to be stronger than one's own, assuming it is not possible or desirable to sell in your currency.

To take a particular example [225;37], one British consulting company was involved in a large contract in the Soviet Union, where they were supporting a British contractor against German competition. The position was that on a spot rate of exchange basis the German competitor was cheaper than the British contractor by about 5%, and there appeared to be absolutely nothing they could do. The solution, however, was to price the British bid in Deutch Marks, taking account of the forward discount of Sterling against DM over the three year contractual period that existed in this particular case. The result, at the time, was to enable the contractor to take the benefit of that forward discount, in other words the benefit from the greater amount of
sterling he would receive for his DMs as they were paid to him over the contractual period of three years. By using the forward foreign exchange market he was able to effect a reduction in his price compared with what it would have been had he simply quoted in DMs at the spot rate exchange. They were thus able to go back to the Russians with a price significantly below the German bid simply as a result of the exchange rate factor.

The Russian asked how this was achieved and, when it was explained, they insisted that both parties bid in Dollars. So the British team had to go back and do the same excercise in Dollars. At the time there was a forward differential between Sterling and DMs and they were able to achieve a significant reduction in the apparent price because Sterling was weaker than DMs. The Germans on the other hand had to do precisely the opposite, because the DMs was strengthening against the Dollar at that time and the forward market reflected this. In quoting Dollars they therefore had to increase their price in order to take account of fact that the dollars that were going to be delivered to them would result in fewer DMs than they needed. Game, set and match, German lost the contract. This is a fairly simple demonstration of what can be done. It also shows how the relative weakness of one's own currency be used to win contracts.
3.2.4 Political and Public Risks

**Political and Religious Influences;** Certain countries may mistrust or even reject out of hand the customs and standards adopted by the types of societies from which modern technology now springs. Arabs tend to ban anyone or anything connected directly, or indirectly, with Israel, and presumably this state of affairs will remain at least until the Palestine problem is finally solved. Right-Wing governments are on a sharp look out for left-wing subversion, and may possibly ban any form or sign of trade unionism, and may influence from beyond the Iron Curtain (and presumably left-wing governments may well take an opposite view). All of this can have important financial implications. For example, the required immigration visas for an essential labor force may be held, restricted, or even totally refused if the immigrant's country happens to fall suddenly from grace for any particular reasons.

Conversely, one might find that a particular country which has been relied upon as a principal source of labor suddenly decides to limit or even totally ban the export of its manpower. Either case can cause and have caused serious difficulties if not bankruptcies, when site organization costs and liquidated damages keep mounting up.
Theft, Burglary and Fidelity Hazards; The title of this risk is self-explanatory. Theft and burglary represent a substantial loss when they exceed the petty pilferage classification, and the risk of employing a dishonest person is ever present.

Public Disorder; and war are political acts of god of such impact that their risk is best retained by the owner lest he pays an unnecessary price for transferring it.

Local Work Methods; Traditional local construction methods tend to be far cheaper than modern international methods by virtue of their simple character, quite apart from labor cost implications, and up to a point good use can often be made of this advantage, especially for small and simple projects such as housing. Nevertheless, local standards need careful and critical consideration to ensure that they are acceptable for one's own purposes.

Union Strike; and all that it entails necessary are for the contractor. Unjustified work rules and the like are all risks the contractor must assess and provide for.

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characteristics, method of prevention, and suggestions of each risk factors which have been explained from Section 3.2.1 to Section 3.2.4. inclusive. This, Table 3.2, will be revised at Chapter VI in the process of designing questionnaire.

Summary

The first step in dealing with any exposure to economic loss is its identification. In this chapter, three methods of risk identification were discussed. These are; (1) Financial Statement Method, (2) Flow Chart Method, and (3) Questionnaire-Checklist Method. Among these methods, Questionnaire-Checklist Method was found to be the most suitable for use in the identification of risks because it represents a direct way of obtaining data.

Also categorization and identification of construction risks were set up which were identified by interviews with various groups in the construction industry and literature survey during this research.

As an idealised concept of risk treatment guidelines (see Methodology of Study, P.5) and a summary of detailed analysis and explanation of above mentioned construction risks commonly treated in the construction
process, Table 3.4 was produced and will be revised after a pilot survey in Chapter VI. (refer to Table 6.2 to 6.5 inclusive)
CHAPTER IV


Having identified the risks facing a firm in Chapter III, the next step is to recognise the various methods of dealing with them. The first part describes the five general methods for treating risks; (1) Avoidance, (2) Abatement, (3) Retention, (4) Transfer, and (5) Sharing. The author named these five methods as "Risk Management Process". Chapter IV, thus provides the decision-maker with a summary of the risk treatment methods available for construction.

Effective risk management involves much more than deciding whether to purchase insurance or to self-insure, or spend considerable sums on loss prevention. In order to reduce risk and uncertainty regarding future potential losses effectively, all loss exposures must be systematically identified, measured and controlled. Then procedures must be established for placing insurance, allocating costs of insurance and risk management, reporting claims, maintaining safety precautions, and gathering and evaluating loss statistics.

The British Safety Council has its own flow-chart approach for the same objectives [Figure 4.1].
FIGURE 4.1 THE LOGICAL APPROACH TO RISK MANAGEMENT (FROM BRITISH SAFETY COUNCIL)
4-1 Risk Avoidance

One of the most straightforward methods of dealing with a risk is to treat the risk by avoiding the activity which is associated with the risk. For example, a construction contract which places an unusually large amount of risk upon the contractor will, in general, have fewer bidders. The most cautious of the contractors will simply look elsewhere for work.

Avoidance can be a useful and common tool with which to deal with risk. However, often the method is impractical or impossible to apply. The contractor who refused to bid on any job which exposed him to an economic loss would find little or no work. There are many risks associated with the construction process, but the benefits to be gained by accepting the risk are usually more than enough to outweigh the potential losses involved.

4-2 Risk Abatement

Risk abatement is a general term describing the combination of loss prevention and reduction to lower the chance of occurrence and diminish the severity of a loss, should it occur. It might at first seem that the best risk abatement program would be the one which
prevented all losses. But such a program is neither always possible nor economically feasible. The loss reduction must equal or exceed the costs for the abatement program if the latter is to be feasible.

Risk management as a risk management tool can seldom eliminate the total risk. Consequently, abatement procedures are most often associated with some other form of risk treatment. Most often risk abatement is combined with a risk retention policy. For an abatement policy to be economically acceptable, the sum of the abatement cost and remaining risk should be less than the cost of the original retained risk.[151:27]

\[
\text{REMAINING RISK + ABATEMENT COST < ORIGINAL RETAINED RISK.} \\
\text{[Eq. 4.1]}
\]

A deterministic example will illustrate the concept. Assume that a risk manager determines that the annual cost of a retained risk can be reduced from 100,000 dollars to 90,000 dollars by a given risk abatement policy. He would then be justified in spending any amount less than 10,000 dollars per year for the implementation of the abatement program.

The above deterministic equation has a probabilistic counterpart, for there is uncertainty associated with each component of the expression. Mason used a
probability distribution theory to express Equation 4.1 as illustrated in Figure 4.2. The notation "PDF" indicated that the curves are Probability Density Functions, a term used to denote continuous probability distribution.

In general, the construction and development industries are not prepared to pay right and proper premiums for risk. Contractors, for example, should not be expected to provide operating funds for a project, so there is no sense in an owner trying to force that risk onto a contractor. If the contractor defaults, the owner ends up carrying the risk anyway. Nothing is gained by doubling risk bearers. Risk is not lessened by creating liability.

4-3 Risk Retention

Risk retention is a valid method of risk treatment and as such should be considered a viable risk management alternative. If the company, having recognized an exposure to economic loss, determines not to transfer the risk to another party, the company is said to have retained the risk.

Risk retention becomes an attractive or necessary tool only when at least one of the following conditions exists [248:176].
Figure 4.2 Probabilistic Presentation of Abatement Policy Decision. [151:28]
1. It is impossible to prevent or transfer the risk and avoidance of the risk is undesirable.

2. The maximum possible loss, or conservatively stated maximum probable loss, is so small that the firm can safely absorb it within one year and remain a going concern.

3. The chance of loss is so low that it can be ignored or so high that to transfer it would cost almost as much as the worst loss that could occur.

4. The firm controls so many independent, fairly homogeneous exposure units that it can predict closely what its loss experience will be.

This section, named as Risk Retention, describes the four major methods of risk retention. Those are (1) Planned-No Insurance, (2) Self-Insurance, (3) The Self-Assumption of Risk, and (4) Deductible Insurance.

4.3.1. Planned No Insurance

Methods for meeting the financial obligations associated with a retained risk differ between companies. The company which treats the risk by Planned No Insurance would recognize the risk but set up no reserve to meet potential losses.
4.3.2. Self - Insurance

The Meaning of Self - Insurance: Whether to self-insure or not and save large amounts of premiums paid annually to private insurers has been a continuing controversy among legislators and administrators of companies for many years. The controversy has its own roots in these misunderstandings of the term "Self-Insurance," the use of private insurance dollars, and the principles of insurance in general.

"Self-Insurance" is defined in a recent authoritative study as "... the conscious retention of risk, the level of which has been limited within the financial capacity of the firm, emanating from a distribution of exposures which permit reasonable predictions as to future loss probabilities" [187:21]. Attacking some of the traditional rigid criteria of a successful self-insurance program, professor Goshay says that an effective program is identified by the following criteria:

(1) Financial Capacity - Whether or not the losses anticipated as being retained are within the financial capacity of the organisation, given its various capital requirements;
(2) Adequacy of exposure distribution - Whether or not there is a group of independent exposures sufficient in number that the law of large numbers has produced a relatively stable loss experience (i.e., within a 15 per cent range);

(3) Catastrophe protection - Whether or not catastrophe insurance (similar to reinsurance for an insurer), is purchased to transfer losses greater than the self-insured wishes to absorb. [187; 15,21-27]

Professor Goshay states that a relatively large group of exposures which have a geographic spread is required to predict to some degree the amount of losses which can be expected. For this reason, predictability is difficult in most companies, because by nature they possess no spread of risk. However, he does not suggest that all exposures be of approximately equal size or have the same degree of hazard, or that equity be maintained among different exposures when contributions to the fund are determined, as to traditional self-insurance criteria [59:25]. Also, a self-insurance fund does not necessary have to consist of an amount equal to the replacement cost of the largest single exposure self-insured as has been suggested by Hanson [53:114]. Instead, excess insurance (or catastrophe insurance)
should be purchased to provide for any such contingencies, just as insurance companies purchase reinsurance to protect themselves against the destruction of large insured exposures.

Self-insurance is thus distinguished from a system of no insurance, where certain losses are provided for "after the fact" through special budget appropriation, bond issues, or other financing. It also must be distinguished from an emergency reserve fund in that the former involves a direct relation between the size of the fund and size of potential losses, and between the premiums paid into the fund and the risks insured.

**Advantage of Self-Insurance:** The main advantage accruing to a company which decides to self-insure certain of its risks is saving in insurance premiums [186:107]. Since 30 to 50 per cent of premium dollar goes to defray the administrative and sales expense of the insurer, if the company can provide the services previously provided by the insurer at a lower cost, it can save at least a portion of this amount by self-insuring [222:75]. Additional savings can be realized if an effective loss prevention program reduces the loss ratio and such experience would not otherwise have been reflected in premium cost savings. Interest on unclaimed premium dollars would also accrue to the company instead
of the insurer.

Reasons given by business corporations for their planned assumptions of risk include the followings.

(1) The existence of an effective safety or loss prevention program which has reduced the average level of losses to a point where they can be readily absorbed by the company.

(2) A loss-premium record over several years showing a consistent and substantial excess of premium payments over actual loss recoveries.

(3) A risk classification or applicable premium rate that the company feels is less favorable than its loss experience or risk situation merits.

(4) Favorable opportunities for minimizing or recovering losses by means other than insurance - for example, collection from transport carriers.

(5) Excessive delays or inconveniences in the investigation and settlement of many small claims, or those involving employees and customers.

[283:225]
4.3.3. The Self - Assumption of Risk

Self-insurance, is in fact, only one method of treating retained risks (see Figure 4.1). The self-assumption of risk, unlike self-insurance, does not involve actively establishing a continuing fund out of which losses are paid. It can be either active or passive. Passive self-assumption of risk occurs when the risk is unknown or ignored. Thus, a company is passively assuming a risk. If it has not identified the potential risk the result is disasterous. If the company merely ignores a risk, the other parties may possibly find themselves liable for negligence on their part [236:54].

Active or planned risk assumption can take one of two forms: (1) a self-insurance fund, or (2) appropriations from current revenue. The simplest and most used method of assuming risks is to merely expense losses to current revenue. In fact, this is the plan used by many companies which claim to be "self-insured." This method may be used independently or in combination with insurance (i.e., deductible clauses in policies, requiring insured to absorb the first dollars of any losses). To be effective without excess insurance, this method requires that the level of loss assumed each year must be predictable with relative accuracy and that there is no possibility of a large loss in a given year.
If there is a possibility of a large loss in any year, but the losses in most years are very predictable, the risk manager should expense the normal losses and insure the extraordinarily large ones by using a deductible or excess-of-loss coverage.

It is not usually wise to insure an exposure against loss when losses in a given year are highly predictable, since to do so is merely trading dollars with the insurer. In fact, the company would be paying more in premiums than it would collect for losses since the insurer must make a charge for its administration and other expenses. On the other hand, when losses are predictable over a given number of years, but vary widely in any given year, a self-insurance fund may be used rather than current appropriations to equalize the effects of such losses from year to year.

4.3.4. Deductible Insurance

Deductible insurance is a combination treatment method where a part of the risk is retained and a part of the risk is transferred through insurance. The deductible clauses allow the decision-maker to retain that part of the risk which his firm feels can be safely retained, while transferring the exposure to catastrophic loss, the use of deductibles is a common
method of risk retention. A considerable portion of the insurance literature is devoted to the selection of the optimum deductible. One approach to the selection of the deductible amount is discussed by Allen and Duvall [5].

4-4 Risk Transfer

Risk transfer is the general classification for the risk treatment which involve a shifting of risk burden from one party to another. This is accomplished in one of two basic methods: (1) Insurance or insurance-like transfer, and (2) Other types of contractual transfer. Insurance and surety bonds transfer the risk to a professional risk-bearer. The usual procedure involved in other types of contractual transfer of risk is to pass the normal responsibility of one party to another by use of a "Hold-harmless agreement." Thus, in effect, the second party has agreed to hold the first free and harmless from a loss which, in the absence of such a clause, would have been the financial responsibility of the first.

4.4.1. Insurance

Insurance is by far the most common method for risk transfer. One definition of insurance refers to it as "a social device for the accumulation out of which losses
are to be paid. The accumulation involves transfer and combination of risks [82:32].

More simply stated, an insurance company agrees, for a monetary consideration, to assume the financial impact of a particular risk for a given time period. The insurance company thus becomes a professional risk-taker.

The "insurance mechanism" is illustrated in Figure 4.3. This figure shows the parties and functions involved in an insurance contract. The figure is adapted from a previous work by Blanchard [21].

For more detailed about the mechanism between the insurance and risk in the Australian construction industry, the reader is referred the dissertation, entitled "Contractor's Risk and Insurance in the Australian Building Industry," worked by Paterson [174].

One additional aspect of insurance mechanism is reinsurance. There is no direct relation between the insured and the reinsurer. The insured's only interest in reinsurance is in its function of protecting the financial strength of the insurer by assuming a part of the risk of insurer.
FIGURE 4.3  Insurance Mechanism (from Blanchard)
4.4.2. Suretyship

In the present building industry, the construction bond is almost always required of a contractor. It is not unusual for a job to be needlessly lost due to the lack of proper bid and performance bonds. Often the failure to obtain a bond stems from the contractor's lack of knowledge about surety bonds and the surety bond market.

**Nature of Suretyship:** Webster's dictionary defines the word "surety" as: "That which confirms or makes sure; a guarantee; one who makes a pledge in behalf of another and accepts certain accruing responsibilities." Webster defines "suretyship" as: "The obligation of a person to answer for the dept, default, or miscarriage of another."

For centuries the only surety bonds available were personal bonds signed by individuals who generally were friends of the principal. When signing such a bond, the personal surety actually pledged his personal assets as a guarantee that the principal would carry out the terms of whatever agreement was made between the principal and another party. The personal surety's liability under the bond usually was much broader in scope than he anticipated, and many a personal surety has suffered
bankruptcy through signing what he probably believed to be an innocuous instrument required only as a matter of form.

In the latter part of the nineteenth century several corporations were formed for the sole purpose of furnishing surety bonds on as a commercial basis [77:83]. Although corporate suretyship was welcomed in the business world, its early development was slow. The demand for the various forms of bonds had not been fully established, and the surety companies were slow to fulfill whatever demand existed because they had to feel their way with extreme care and caution. They soon found that they could not underwrite the bond business in the same manner that insurance is handled.

Developments revealed that although some forms of bonds were of a normal nature, many others were strict financial guarantees, and that bonds falling into both these categories nearly always contained a hidden or latent liability. This element of risk necessitated the surety's through scrutiny and analysis of the bond forms and agreements. The surety, in addition to making a careful investigation of the background, capabilities, and financial responsibility of the applicant, also had to ascertain, as far as humanly possible, that the applicant could and would fulfill all the obligations
placed on it under the agreement of statute requiring the bond.

With the rapid growth of business in the early part of the twentieth century, surety bonds became more and more necessary in order to bridge the uncertainties in various forms of contract agreements. Further, in certain large cities contracts for public improvements were let to unqualified, or inexperienced contractors in their burgeoning growth years [77:83]. Specifications not only as to material but also as to workmanship were often under-developed, not prices or under-scrutinized, often result in tragic results and heavy loss of public funds.

Public bodies were bound by law to award contracts to the lowest, responsible bidder. However, because in that era there was no hard and fast rule for determining the interpretation of the word "responsible," the awarding authorities often let the contract involved to the closest political crony. Even in localities in which the "spoils system" was not the custom, this question still was a problem. The answer was found in the use of surety bonds. The government, as well as many cities either changed or passed laws which included the requirement of performance bonds of contractors on all types of construction and supply contracts.
Surety companies, in their underwriting, were expected to weed out the unworthy and irresponsible bidders. If the contractor could pass the scrutiny and investigation of the surety underwriter and could furnish corporate surety bond on the contract involved, he would be considered a responsible bidder. Thus, the problem of determining the responsibility of the contractor was shifted from the shoulders of the public officials awarding the contract to those of surety underwriters.

How Surety Bond Differ From Insurance: An insurance policy is a two-party instrument - the insured and the insurance company or insurer. The policy protects the insured against specified types of losses. The insured buys the policy for its protection against fire or accident or some other similar loss.

A surety bond, however, is a three-party instrument - the principal, who in a contract bond, is the contractor; the obligee or owner, who is a party requiring the protection of the bond; and the surety. The surety guarantees that the principal will make whole any loss the obligee might sustain by reason of the principal's failure to carry out and perform all the conditions of the agreement entered into between the principal and the obligee. If the principal fails or is
unable to fulfill his contractual obligations to the obligee, the surety can then seek recovering of its loss from its principal. Thus, it should be clear that when furnishes a bond, a contractor is not providing insurance for himself, but affording protection to the owner. The surety is similar to the endorser of a note, who must make good the maker's default on the note obligation.

Surety bonds are classified as a non-insurance method of risk transfer, but to the obligee the financial protection provided closely resembles insurance. Corporate sureties are considered insurers by the law and thus come under the insurance statutes. Surety bonds are written by most insurance underwriters. There are, however, several major distinctions of importance between suretyship and insurance which are worthy of note.

1. A surety bond has three parties to the contract- the principal, the obligee, and the insured. Two parties normally enter into an insurance contract- the insured and the insurer.

2. Under a surety bond, the principal obtains the bond and pays the premium but the obligee receives the protection. An insured usually
purchases an insurance contract to protect himself.

3. A loss under surety bond may be caused intentionally by the principal. An insurance loss should be accidental from the viewpoint of the insured.

4. Ideally, there would be no losses under a surety bond because the surety would not write the bond if there were any chance of loss and the surety would discover any potential losses in its investigation. An insurer expects some losses among the insured group. Ideally, therefore, a surety bond premium would not have to contain any expected loss allowance. The premium would cover only the surety's investigation and other expenses and provide some margin for profit and contingencies. An insurance premium must provide for expected losses. In practice, sureties do incur some losses because their investigations are not completely effective, but losses are a much smaller proportion of surety bond premiums than of insurance premiums. Surety bond loss ratios also tend to fluctuate more widely over time because of lower loss frequencies and the sensitivity of much bond experience to economic cycles and natural catastrophes.
5. If a loss does occur, the surety can turn to the principal for reimbursement. An insurer does not have this right against an insured [248:195].

The Use of Surety Bonds in Construction Industry: the use of surety bonds in the construction industry is widespread, particularly in the public sector. The following is a list of commonly used surety bonds in the construction industry with a brief statement of their purpose [54:98]:

<table>
<thead>
<tr>
<th>Bond Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bid Bonds</td>
<td>Given by the contractor to the owner, guaranteeing that, if awarded the contract, he will accept it and furnish final Performance or Payment Bonds as required.</td>
</tr>
<tr>
<td>Performance Bonds</td>
<td>Given by the contractor to the owner, guaranteeing that he will complete the contract as specified.</td>
</tr>
<tr>
<td>Labor and Material</td>
<td>Given by the contractor to the owner, guaranteeing that he will pay all labor and Bond material bills arising out of the contract.</td>
</tr>
</tbody>
</table>
Maintenance Bonds

Given by the contractor to the owner, guaranteeing the rectify defects in workmanship or materials for a specified time following completion. A one year maintenance bond is normally included in the performance bond without additional charge.

Completion Bonds

Given by the contractor to the owner and lending institution guaranteeing that the work will be completed and that funds will be provided for that purpose.

Supply Bonds

Given by the manufacturer or supply distributor to the owner guaranteeing that materials contracted for will be delivered as specified in the contract.

Subcontractor Bonds

Given by the subcontractor to the contractor guaranteeing performance of his contract and payment of all labor and material bills.

Basically, the construction purchaser would like to look to a financially solvent surety in the event the
successful bidder does not enter into the construction contract, the contractor does not perform his work properly, or the contractor does not pay his subcontractors or suppliers.

**Bid Bond:** The main function of the bid bond is to give the construction purchaser assurance that if the contractor fails to enter into a contract awarded to him, or to furnish the contract bonds required, there will be a financially responsible party to pay the damage. In other words, the bid bond could be said to insure the good faith of the contractor in entering his bid.

In other words, a bid bond guarantees that if the bidder is awarded the contract at the bid price, he will sign the contract and post a Performance Bond (see page 102) if required. It is designed to compensate the owner for the difference between the low bid and the next low bid if the low bidder fails to sign a contract in accordance with his proposal. The bond penalty is written for a specified amount, ranging from a very small percentage of the contract cost to as high as twenty per cent ([82:24] on certain government jobs).

Often the job specifications will allow a certified cheque instead of a bid bond. The disadvantage of a certified cheque is that the contractor ties up his own
funds. Once the low bidder signs the contract, the certified cheque is returned or the bid bond is cancelled.

In practice it is seldom that bonding companies have to pay penalties for contractors who refuse to sign a contract when they are low bidder. The reasons are as follows;

(1) It is a rare occurrence that a low bidder will not honor his proposal. The loss of reputation and goodwill which will result in exclusion from future bid lists is often reason enough for a contractor to make good his bid.

(2) If the low bidder is far below the other bidders due to an honest mistake or omission, both private and public owners will often excuse that bid rather than having the contractor default on the job.

Due to the above reasons bonding companies feel there is little risk in writing bid bonds and thus write them for free or for a very nominal charge to cover bookkeeping. They are written only if the contractor also purchase a performance bond.
Performance Bonds: This bond makes certain that should the principal fail to perform any of the terms and conditions under the construction contract, the owner is protected by the surety against resulting losses up to the face amount of the bond. The performance bond, thus, shifts much of the risks associated with default by the principal from the owner to the surety company.

Faced with a breach of contract by the principal, the surety must in some fashion: (1) promptly remedy the principal's failure, or (2) itself complete the contract, or (3) assist the owner to get the contract relet and fulfilled and then reimburse the owner for the extra cost of the substituted completion, up to the face amount of the performance bond.

Performance bonds are available with a face value of 50 or 100 per cent of the construction contract amount. Because of the loss and salvage experience of the surety industry, there may be no essential difference in the bond premium for a 50 or 100 per cent bond. This fact could have an effect on the transfer of risk decision.

Often there is a confusion as to what types of risk are treated by the performance bond. In general, the
surety's risk relates to getting the job completed properly at the contract price. Injury and property damage liabilities to third parties may occur during a construction project. Such risks are generally treated by public liability insurance carried by the owner, contractor, or both. However, depending on the language of the bond, the surety may be held liable on the bond for failure of the contractor to satisfy any contractual obligation to provide adequate public liability protection.

**Labor and Material Bonds:** These bonds are given to an owner to guarantee that the contractor will pay all labor and material bills on the job. It is often part of the performance bond, although it is possible to purchase this bond separately. This bond protects the subcontractors from the general contractor misusing funds due them and in turn protects the owner from subcontractors claiming not to have been paid. There is no charge for this bond if, as is almost always the case, a performance bond is being purchased with the labor and material bond.

**Supply Bonds:** These bonds are given by a supplier or distributor to the owner or general contractor guaranteeing that the materials contracted for will arrive at the time requested and for the contract
amount. These bonds are often requested of subcontractors who are not actually working on the job site, but are supplying materials some time in the future. This bond protects the general contractor in the event the subcontractor goes out of the business, or fails to deliver for any reason.

**Payment Bonds:** The payment bond gives assurance to the owner that all subcontractors and suppliers will be paid.

**Subcontractor Bonds:** Construction owners are not the only group who can use a surety contract to transfer risk. Prime contractors may wish to transfer to a surety the risk that one of their subcontractors may fail to perform or to pay his bills. The contract being bonded here is that which exists between the prime contractor and his subcontractor. If the subcontractor fails to perform, the prime contractor wants a financially able party behind the subcontractor. If the subcontractor does not pay his bills, the prime contractor will be responsible because he generally obligates himself to erect the project free of claims and liens. To transfer the risk of subcontractor non-payment or non-performance, the prime contractor requires a subcontractor bond.
The contractual arrangement for risk transfer may differ between surety bonds and insurance, but the decision of the obligee can be viewed in the same manner. For a premium payment the surety will bear a risk previously carried by the obligee. The obligee has thus transformed the contingency of risk to a fixed cost.

Insurance and Suretyship have been fully discussed as methods of risk transfer. While these methods are connected with the term of cash flow directly, the other method which is so-called "Hold-Harmless Clauses" is the contractual risk transfer by transferring legal liability or responsibility to others.

4-5 Risk Sharing

Sharing of construction risks can be among several contractors, between owner and contractor, or among owners in partnership. When the risk sharing is among several contractors they normally form a joint venture partnership. The concept of contractors joint venturing a single project is not a new; many of the large civil or infrastructure projects have been constructed by contractor partnerships. Middle East "Petro-Dollars" and development capital in south America are making more large, risky projects, which attract contractor joint
ventures commonplace [9:267].

Project characteristics which singly or in combination force contractors into a business alliance are: (1) High Risk, (2) Large Scale, (3) Foreign Work, and (4) Technological requirements [9:267]. In a project with one or more of those characteristics, joint venture contractor can advantageously combine financial resources and technical expertise to convert a large or risky project into an attractive business endeavour. In many cases, joint venturing actually increase the number of potential bidders and helps assure the owner that fair bids are submitted.

This section presents the definition, characteristics, and types of joint venture partnerships formed particularly for sharing construction related risks. Three main topics follow from this initial suppositions. The first centre concentrates on the type of sharing in the viewpoint of general management theory which are divided into two categories; one is coorporative method and the other is non-coorporative method. The second topic analyse the business structure of joint venture and the third describes the types of joint venture.

In the questionnaire of this study, the author
assumes that a joint venture is formed for the purpose of sharing risk between the owner and contractor, and analysis how to identify an optimal risk allocation for each risk factor which was already identified in Chapter 3. Details about the result of this questionnaire will be fully explained in Chapter 6.

4.5.1. Type of Sharing

Risk-sharing relationships have been divided into two classes: cooperative and non-cooperative [8:124]. Cooperative risk-sharing, typified by the joint-venture partnership, relies on one of three methods for risk division: (1) Subscription, (2) Equal Partnership, and (3) Allocated shares by sponsor. Joint ventures are initiated when a high-level management individual from company A calls his counterparts in companies B, C, etc. and asks them if they are interested in a partnership.

Cooperative Risk Sharing

Subscription: By requesting each company to determine what share of the project it desires, the initiating executive allocates by subscription. When enough subscriptions are received to total 100%, then the joint venture team is formed. For example, on a particular project a company wants 40% share. Suppose it
also receives subscriptions of 10%, 25%, and 30% from companies B, C, and D, respectively. Since the total is 105% the team has been identified. The extra 5% share can be eliminated by allowing D to participate at only 25%, reducing A's share to 35%, or by jointly agreeing on a redistribution. If, on the other hand, D had only desired a 10% share, then more companies would be needed.

**Equal Partnership:** The method of equal partnership seems to be the most equitable approach for a highly desirable project. Each company contacted by company A is given an equal share of the endeavor, so for a three-party joint venture each would receive a one-third share. This technique is sometimes used if sponsoring company A has included in the partnership one of its own subsidiaries so it can maintain an advantageous position in the project operation. In circumstances where the partners are distinct, the method may loose its attractiveness to the sponsor.

**Allocated Shares by Sponsor:** The third and often used method of division is allocated shares by sponsor. The sponsor will normally allocate the largest share to himself and partition the remainder to the other partners. This partition may be equal shares for contractors of approximately equal resources, or may be
aligned toward the special contribution of each. An example of three general contractors in a joint venture is shares of 40%, 30%, and 30% for companies A, B, and C, respectively. If, however, company C is a specialty contractor brought in on a project with 10% of the work in his special area, then the shares may be 50%, 40%, and 10% for A, B, and C.

Non-Corporative Risk-Sharing

Present options for determining risk shares in the non-cooperative situation are straightforward: (1) complete transfer of all risk to contractor, (2) owner (designer) division of risk, and (3) negotiation. Complete transfer and owner division typically occur in fixed-price competitive bidding. Negotiation can be a result of a breakdown in the competitive bidding or it can be the initial mechanism.

Complete Transfer: The mechanism of complete transfer cannot be placed aside as a foolish or unknown technique. Greenberg [8:13] states that there is usually;

An attempt by the owner or architect or engineer to pass all risks to the contractor and to avoid responsibilities for uncertainties and possible error in
design or computation, the idea being that the owner can thereby firmly establish his costs and that owner and architect or engineer can avoid responsibilities for errors.

This complete transfer of risk may result from the well intentioned but misguided feeling that they (engineers and architects) have not done their best for their employer unless every loophole and every contingency is resolved in the owner's favor.

**Owner Division of Risk**: Owner (designer) division of risk is a more prevalent mechanism for distribution. In this approach, the owner or designer/engineer acting as the owner's representative draws up a contract between owner and contractor in some sort of equitable fashion. A guiding principle for the contract maker is that each risk element should be distributed such that the effect on the expected project cost is minimized. Some experts argue further that only those elements with the direct control of the contractor should be passed to him.

Contracts are combination of many separate clauses which determine who accepts the responsibility for each identified risk. Mason [151:26-47] describes the instruments of risk distribution to form a percentage sharing device for sharing a single identified risk
element. For example, labor escalation may be shared 60% by the owner and 40% by the contractor. An abbreviated version of Mason's table on contract clause showing those pertinent to distribution is found in Table 4.2.

4.5.2. Business Structure of Joint-Venturing

The selection of the particular form of business unit to be employed is a matter for the founders to determine at the inception. Where a new enterprise is started as a fairly large operation, various factors affect the decision to use one business structure over another. Some of the relevant factors are; (1) Legal Requirements, (2) Federal and State Income tax effects, (3) Desire for Management Control, and (4) Loss Liability. (refer table 4.1), [242:2.3]

From a technical and legal aspect, there are three major forms of business organization; the single proprietorship, the partnership and corporation.

Corporation: A corporation is a legal entity which is established by law and exists separate and distinct from the individuals whose share purchases make it possible to operate. A corporation is an entity through which its shareholders as investors and its officers as management, carry on a particular business enterprise.
<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>PARTNERSHIP</th>
<th>Ltd. PARTNERSHIP</th>
<th>JOINT STOCK COMPANY</th>
<th>JOINT VENTURE</th>
<th>LTD. PARTNERSHIP ASSOCIATION</th>
<th>BUSINESS TRUST</th>
<th>UN-INC. ASSOCIATION</th>
<th>INC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISTINCT LEGAL EXISTENCE</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>UNLIMITED LIABILITY</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>PAY FEDERAL INCOME TAX</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>DELECTUS PERSONAE</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>MANAGEMENT AGENCY OR OPERATION</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>SHARE CERTIFICATE</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>DISSOLUTION ON DEATH OF MEMBER</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NOT ALWAYS</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>SINGLE BUSINESS UNDERTAKING</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

**TABLE 4.1**  CHIEF CHARACTERISTICS OF BUSINESS STRUCTURE (from Whitney)
<table>
<thead>
<tr>
<th>IDENTIFIED RISK</th>
<th>METHOD OF TREATMENT</th>
<th>RISK TRANSFER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. NON-PERFORMANCE</strong></td>
<td>RISK RETENTION</td>
<td>RISK TRANSFER</td>
</tr>
<tr>
<td>Failure to enter into the contract</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surety Bid Bond</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2)</td>
<td>Monetary Depot</td>
</tr>
<tr>
<td>Non-payment of creditors arising out of contract</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surety payment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bond</td>
<td></td>
</tr>
<tr>
<td>Failure to complete contract according to the plans and specifications</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surety Performance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bond</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2)</td>
<td>Warranty Clause</td>
</tr>
<tr>
<td>Untimely Completion</td>
<td>(1) Extension of time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2) Force Majeure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Acts of God)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clause</td>
<td></td>
</tr>
<tr>
<td>II. SITUATION CHANGES</td>
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<tr>
<td>Differing Site Conditions</td>
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<td>Changed Conditions</td>
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<td>(2) Unit Price Contract</td>
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<td>Changes During Construction</td>
<td>(1) Contractor's Right to stop Work or Terminate Contract</td>
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<td>Changes in Work</td>
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<td>III. LIABILITY LOSSES</td>
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<td>Deductible Insurance</td>
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<td>Property Damage</td>
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<td>Deductible Insurance</td>
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<td>(1) Owner's Insurance</td>
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<td>(3) Indemnification</td>
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<td>(4) Contractor's Insurance</td>
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**TABLE 4.2**  CONTRACT CLAUSES FOR RISK RETENTION AND TRANSFER (FROM Mason)
Ordinarily, a corporation is incorporated in the state in which it is extended to transact all or the principal part of its business. It is also possible to incorporate in one state and to do business in one or more other states. Factors which affect the choice for incorporation are:

1. Fees and taxes

2. Restrictions on the declaration of dividends.

3. Voting rights and restrictions thereon.

4. Requirements for amending articles of incorporation.

5. Powers of shareholders and directors in internal management.

6. Consideration for shares and standards employed in the valuation of property received as consideration.

7. Liabilities imposed upon shareholders and directors [242:2.4].

**Partnership**

A partnership is usually defined as the association of two or more persons for the purpose of carrying on a
partners. No person can become a member of the partnership without the consent of all partners.

There may be several different types of partners in the partnership:[242;2.9]

Real Partner: He is an actual partner, both in law and in fact.

Ostensible Partner: He is not a real partner, but by his conduct allow himself to be held out as a partner and is liable to those who extended credit on the assumption that he was a partner in fact.

General Partner: A real and active partner whose liability for partnership indebtedness is unlimited.

Limited Partner: A partner who is liable for firm indebtedness only to the extent of capital which he has contributed or agreed to contribute.

Silent Partner: A real partner who takes no part in the partnership business.
business as co-owner, for profit. The partners have a proprietary interest in the business. It is a voluntary contract between two or more competent persons to place some or all of their money, effects, labor, and skill in a lawful business with the understanding that the profits will be shared between them. Unlike a corporation, a partnership is not a legal entity, the debts of the partnership are the debts of the individual partners and one partner may be held liable for the indebtedness of the entire partnership.

It should be noted that a partnership is a unit and in ordinary transactions is regarded as a business unit distinct from each of its members.

Because a partnership is not regarded as a legal entity, it is not required to pay Federal income tax. Each year, partnerships must file an information return which sets forth the income or profits realized, whether received or not, by each of the partners who must individually report and pay taxes.

A partnership is a highly personal relationship. Each partner has a right to take part in the management of the business, to handle the assets for partnership purposes and to act as an agent of the partnership. For these and other reasons, one has a right to choose his
Secret Partner : A real partner whose membership is not disclosed to the public.

Dormant Partner : A real partner who is both a silent partner and secret partner.

**Limited Partnership:** A limited partnership is one composed of one or more general partners and one or more limited partners. It differs from a general partnership in several respects, two of which are basic. First, it can be formed only under statutory authority, and second, the liability of the limited partners for partnership debts is limited to the extent of the capital which they have contributed or agreed to contribute.

A limited partner occupies a position similar in some respects to that of a shareholder in a corporation; he is primarily an investor. Except at the risk of incurring unlimited liability, he can take no part in the management or operation of the business. Additionally, he is not an agent of the partnership.

**Joint Stock Company:** A joint stock company sometimes called a joint stock association, is technically a form of general partnership. It has some of the attributes of a corporation, differing in several
important respects from the ordinary partnership. It is dissimilar to a partnership in that its capital is divided into shares which are represented by certificates and are transferable; its business affairs are managed by directors or managers who are elected by the members and who alone have the authority to represent and bind it; its members are not its agents; and a transfer of shares by a member, or his death, insanity, or other incapacity does not dissolve it or afford a ground for dissolution. It is similar to a partnership and, unlike a corporation, it is not a legal entity and its members are each under limited liability with respect to obligations incurred by it during the period of their membership.

**Joint Venture:** A joint venture is a form of temporary partnership organized to carry out a simple or isolated business enterprise for profit, and is usually of short duration. It differs in a practical way from an ordinary partnership in that it is created for one business effort and is usually of short duration while an ordinary partnership is not. It also differs legally in several respects. Each venturer is not an agent of his co-venturers and does not necessarily have the authority to bind them. Usually the management and operation of the enterprise by agreement is placed in the hands of one member designated as manager. The death
of joint venturer does not necessarily dissolve the joint venture and joint venturer can sue his co-venturers. Except for these principal differences between a joint venture and a partnership, a joint venture is generally governed by the partnership laws. In general, to qualify for the election not to be treated as a partnership, the joint venture can not engage in a profit-making activity as such, but rather must limit itself to sharing of the costs.

**Limited Partnership Association**: It is legal hybrid which closely resembles a corporation. In its organization, regulation, status, and liability it has the attributes of a corporation. It is governed by statute, is a legal entity distinct from its members and the members are not personally responsible for its debts. To put creditors on notice, some countries or states requires the inclusion of the word "Limited" in the association name [242:53]. The only important difference between this type of association and a corporation pertains to the transfer of shares. Although the shares are freely transferable by the members, the transferee does not become a member unless so elected by
the other members. If the transferee is refused membership, he may recover the value of his shares from the association.

4.5.3. Types of Joint Venture

Sharing of construction risks can be among several contractors, between owner and contractor, or among owners in partnership. When the risk-sharing is among several contractors they normally form a joint-venture partnership. Motivations for establishing joint-ventures are examined in this section.

**Contractor Joint Ventures:** The concept of contractors joint-venturing a single project is not new. Middle East "petro-dollars" and development capital in South America are making more large, risky projects which attract contractor joint ventures commonplace.

Project characteristics which singly or in combination force contractors into a business alliance are (1) high risk, (2) large scale, and (3) foreign work [9:267]. In a project with one or more of these characteristics, joint venture contractors can advantageously combine financial resources and technical expertise to convert a large or risky project into an attractive business endeavor. In many cases, joint
venturing actually increases the number of potential bidders and helps assure the owner that fair bids are submitted.

**Owner Joint Ventures:** While joint ventures are common for contractors, owners have most often acted independently, possibly from profit incentives or fear of litigation. The technological era which now exists, however, produces countering forces to the non-corporative trends. For example, exploitation of some new energy sources and more cost-effective production processes cannot be undertaken by single companies, so in these special areas the government may allow companies to cooperate and form joint ventures.

Owner joint ventures occur for reasons similar to those of contractors, including large scale and high risk. An added quality of the owner association is continuing revenues from the final product. Contractors face a one-time sharing of profits, while owners have a long-term commitment to one another in sharing profits and operation responsibilities.

The joint-venture risk-sharing describes so far involves a cooperative association among the parties. A central and congruent goal of the contractors is to minimize their overall contingency and finance costs and
thereby offer a more competitive bid proposal. Owners anticipate that by working together they can accomplish what no single company in their industry would attempt.

Figure 4.4 shows the principal structure of joint venture between owner and builder.

Summary and Direction of Following Chapter

The preceding review of risk treatment methods establishes the foundation which characterizes the remainder of the dissertation. Those risk treatment methods are (1) Avoidance, (2) Abatement, (3) Retention, (4) Transfer, and (5) Sharing. The reader interested in risk management processes is encouraged to concentrate on Chapter IV and its theoretical development of treating risks in the construction industry. Discussion of risks in contractual relationships starts with Chapter V and proceeds through an identification of the commonly encountered contract treatment for the risks identified briefly in Chapter III.
FIGURE 4.4 JOINT VENTURE - OWNER AND BUILDER (From Grigg)

NOTES: (1) APPOINTMENT OF CONSULTANTS AND QUANTITY SURVEYORS MAY BE BY ARCHITECT AS AN ALTERNATIVE TO THAT SHOWN.
CHAPTER 5

Risk Treatment Method II - Risks in Contractual Relationship

The purpose of this chapter is to set out in summary form the principles of contractual relationships and clarify their characteristics and limitations, the responsibilities, and the lines of communications with a series of diagrams which represent the functional structure of each contract type.

The author believes that the approach mentioned above is the most suitable way to draw out those risk factors which are submerged in each type of contract form and to set up the method of risk management in contractual relationships.

The first analysis is devoted to discussing six broad categories of contractual relationships which reflect current practice. These are;

(1) Construction by a General Contractor
(2) Design-Build Contracts
(3) Turnkey Contracts
(4) Construction Management Contracts
(5) Project Management Contracts
(6) Separate Independent Prime Contract
An understanding of the principles behind these groupings should give the reader sufficient guidance to assess the methods of risk treatment in contractual relationships.

After reviewing general contractual relationships, the next step is to discuss a dozen different types of contractual arrangements that can be used in procuring construction and related services. Each type has its own strengths and weaknesses. By considering the weakness of each type of contract, the author believes that this section can illustrate various risk factors of each contract type.

5-1 Categories of Contractual Relationships

There are scores of risks inherent in any construction undertaking: availability of labor, materials and equipment, defective design, supplier failure, mistakes, accidents, traffic maintenance, inflation, and differing site conditions, to name just a few.

The treatment of these risks is central to how people often think of, and define, contractual relationships. If an owner says that he intends to
engage a (1) general contractor for project A, whereas he feels that a (4) construction manager is better suited to the circumstances of project B, that for project C he wants a (3) turnkey contractor, and that on project D he feels that (6) independent prime contractors would be preferable - the owner has his own concepts of each of these relationships and an understanding of how the relationships differ one from another. If a dictionary were consulted - even a construction dictionary - it is likely that the definition would not satisfactorily differentiate the several types of relationships. Unfortunately, people often use the same terms while each has in mind a different meaning. This leads to confusion and can, in the construction context, lead to claims and disputes when the expectations of one party are not fulfilled by the performance of the other party. Thus, instead of resorting to dictionary definitions of those relationships, one might better define them in terms of how various risks are treated.

The following is an attempt at such "risk" definitions:

5.1.1. Construction by General Contractor

This is probably the most widely used type of contractual relationship. The owner engages an
independent architect or engineer to prepare detailed plans and specifications for the work to be done. In some cases, the owner has the in-house capability to do it himself. Bids are then sought from contractors on the basis of those plans and specifications. Here the design responsibility is the owner's: he is deemed to have adopted the design of the engineer or architect as his own. If that design turns out to be inadequate or defective, the owner, of course, can turn to the designer for compensation. If the design was generated in-house, the owner naturally bears total responsibility.

The owner can have some of that risk shifted to the contractor in those instances where performance specifications are included. The contract documents may not set forth a particular design but instead simply specify, for example, a sprinkler system that complies with applicable building codes. However performance specification aside, the design responsibility is the owner's.

Where the contract is for a lump sum price, responsibility for the cost falls on the contractor. He bears all the risk of bringing the job in at the bid price. While there are a number of clauses that can mitigate this risk, it is basically up to the contractor
to perform within cost limits and to earn his profit within that limit as well.

The general contractor also assumes liability to subcontractors and typically agrees to indemnify the owner for projected-related damage and liability to third parties.

The contractor is responsible for coordinating the work of the various trades. The owner pays for the project, typically on a monthly basis and according to an agreed upon engineer's (or quantity surveyor's) estimate of the percentage of the work completed, less the amount agreed upon to be retained until completion of the work.

Usage. This type of contractual relationship is the one most widely used for buildings and for heavy construction - dams, tunnels, sewers, and highways.

Risks in Summary;

1. If the design was generated by an in-house capability of the owner, the owner naturally bears total responsibility for the design.

2. When the contract is for a lump sum basis, responsibility for the cost falls on the contractor.
3. The general contractor assumes liability to subcontractors and typically agrees to indemnify the owner for project-related damage and liability to third parties.

5.1.2. Design-Build Contracts

As the term implies the design-build approach establishes a single administrative, management, and professional responsibility for the two separate functions of design and construction. The owner enters into one agreement for both.

This procedure is utilized only when an owner has an in-house staff capability or is able to structure the monitoring of the work for close control having established a definitive program and strict criteria to which the design-build contractor must adhere.

A very simple form and example of the design-build approach is the purchase of a new single residence. The homeowner knows his basic requirements of a new single residence. The homeowner knows his basic requirements of number of rooms, baths, and type of finishes. His requirements are tailored to his budget and then he enters the marketplace to seek his product. The marketplace is able to respond by offering a predesigned and standard facility which a single contractor can
utilize and modify to meet the prospective homeowner's requirements. If a predesigned or standard structure does not meet the requirement, the contractor may modify the plans during construction based upon his know-how and experience or may retain a professional (architect or engineer) to prepare the design and incorporate the revisions in the plan. The home owner, however, is still only dealing with one party: the home builder performing the design-build function.

Translated into the context and complexity of industrial and heavy construction, many more variable factors must be taken into account in this method.

Having single-contract responsibility is a distinct advantage to an owner. In establishing the contract scope, it is necessary, however, for the owner to have available preestablished and definitive design criteria identifying his requirements. Such development can well necessitate a work effort as extensive as the preparation of preliminary design plans.

This method can also be used to obtain comparative designs and construction approaches from separate teams or groups.

This method can be utilized for seeking competitive proposals to meet an owner's preestablished budget. Such
proposals will be utilized to establish final design criteria and total project requirements.

Although there is a distinct advantage of single-contract responsibility, the design-build approach—other than in specialty areas such as oil and chemical process work—will require the formation of a project team consisting of a contractor and design professionals who have the expertise and knowledge to prepare plans for the work. Since the main cost of the project is the construction, and the design is only a small fraction of the total cost, the project team is usually created with the contractor being the prime contracting party and the professional groups under subcontract to him. Even though there are instances of associations, joint venture, or joint financial interest, the design group or groups usually have a secondary interest or are under the contract control of the contractor because of their limited financial interest in the total project as a whole. This can create a distinct disadvantage because of the loss of independence of the outside professional check and balance which exists under the traditional separation of contracting in which the architect/engineer is under contract to the owner.

Owner's considerations in the selection of the design-build team should include:
(1) Owner's staff - internal for project review and control

(2) Design-build team structure and capability

(3) Budgetary restraints and controls

The design-build method can be used on a competitive basis. The competition is not based upon the same design or design concept as under the lump-sum bid and contract. This is also true of turnkey construction which broadens the design-build concept.

**Risks in Summary;** As stated in Section 5.1.3. below, Grigg [94] shows a series of diagrams (see Figure 5.1, 5.2, 5.3, 5.4) represents the basic structures of Design-Build contracts. They are not exhaustive but rather are intended to be representative of their types or variations to their basic types.

5.1.3. Turnkey Contracts

As with the design-build method, turnkey contracts utilize a single contractor for all functions. There is the one administrative, management, and professional responsibility for design and construction. There is a single party under contract to an owner to fulfill these functions in addition to other functions that may be necessary to implement a project. These may include
FIGURE 5.1 DESIGN AND BUILD - GENERAL APPROACH (From Smith)

DESIGN PHASE

ARCHITECT AND/OR CONSULTANTS
Partial service only

DESIGN AND BUILD CONTRACTOR
Submit design erection and completion proposals

"IN HOUSE" design as alternative to appointment of external Architect and/or Consultants

BUILDING OWNER
Acceptance of proposals

PRE CONSTRUCTION PHASE

CONTRACTOR may seek advisory services from architect or consultant/s

Design and Documentation

"IN HOUSE" design as alternative to appointment of external Architect and/or Consultants

Contract

CONSTRUCTION PHASE

Advisory no authority

CONTRACTOR undertakes erection and completion of the works on a "LUMP SUM" basis.
May sublet parts of the works.

SUB CONTRACTOR/S

THE WORKS

* Design, erection and completion contract.
Lump Sum Basis: contract conditions usually have provisions to cover variation of the works and cost escalation together with time extension.
NOTE: (1) AGREEMENT:

PM is paid; contract sum consisting of:
- Target sum of construction
- Design fee (if applicable)
- and value of any variations and escalation provisions.

Project manager is paid the contract sum less any saving bonus if the actual prime cost of the work is less than the Target sum as adjusted for any variations and cost escalation provisions in the contract.

If the actual prime cost of the work is greater than the target sum as adjusted the PM is only paid the target sum as adjusted.
AGREEMENT: PROJECT MANAGER IS PAID; LUMP SUM AMOUNT FOR DESIGN, ERECTION AND COMPLETION PLUS; THE VALUE OF ANY VARIATIONS AND COST ESCALATION PROVISION OF THE CONTRACT.
PROJECT MANAGER AGREEMENT, DESIGN AND BUILD BASIS - CIVIL AND CIVIC FORM EDITION NO. 2 (From Grigg)

**DESIGN PHASE**

- BUILDING OWNER
  - ARCHITECT AND/OR CONSULTANTS when employed by PM
  - No authority over subcontractors or workmen employed on works. Duty is to report to owner on standards of workmanship and quality of goods and materials.
  - PROJECT MANAGER: Provides design services either "In House" or via the use of external consult. named by PM
  - CONTRACT
  - TARGET SUM IS ESTABLISHED
  - PM is paid, a design fee, a management fee. PROJECT MANAGER is reimbursed or the actual cost of the works. Bonus-penalty provisions apply that adjust the management fee within agreed limits. The fee will increase if the actual cost of the works is less than the target sum as adjusted and decrease if the actual cost is greater than the target sum as adjusted.

**PRE CONSTRUCTION PHASE**

- DOCUMENTATION
  - No authority over subcontractors or workmen employed on works. Duty is to report to owner on standards of workmanship and quality of goods and materials.

**CONSTRUCTION PHASE**

- CONTRACTORS
  - TARGET SUM is adjusted during the course of the works to account for any variations and cost escalation provisions.
  - Variations
  - THE WORKS
site selection, land acquisition, and financing all tasks that may be necessary to make the turnkey complete. As the term implies, it is an abbreviation for "turn the key," comprising all the functions required to enable an owner to turn the key (open the door) and start operating his newly developed and acquired facility. In other words, it means a complete, all-inclusive service whereby the contractor provides all of the engineering and construction functions needed by the owner under one contract. The detailed arrangements for compensating the contractor and the conditions of the contract can vary widely, except that, since the definitive pricing of the work must follow the engineering work, much of the initial pricing must be conditional.

Turnkey contracts have been in use since the early 1900s [93:201], and has been used most successfully in private capital projects, particularly those involving proprietary process system. In Europe, South America, and developing nations, turnkey is more universal in public works projects.

The turnkey contract is best suited to a situation when the initial basic information is minimal, there is only a preliminary underdeveloped concept to go on, and the time for delivering the completed work is exceedingly short and of the greatest urgency.
Normally, the owner would arrange for an engineering organization specializing along the lines of the character of the work involved to initiate preliminary investigations, start engineering studies, and design the facility involved. When the designs are completed and the specifications and contract conditions are all prepared, the next step is advertising for bids or sending out invitations for bids to a select group of contractors. After proposals are submitted, the owner would study them and enter into negotiations with those presenting favorable bids. Next comes the award of the contract and, finally, its execution.

All of this takes a long time by normal processes. The turnkey type of contract tends to telescope all of the various steps into one, allowing construction of the facility to proceed along with the engineering and design work or only slightly behind the design of the various parts. The engineer and the contractor being one, it is possible to order construction materials as the various drawings come off the drawing boards, and design and construction of the various features can be coordinated and integrated.

The owner engages the contractor and they sign an agreement describing in detail the authority and responsibilities of the parties. Under this agreement,
the contractor is to provide all technical investigations, engineering designs for mechanical and structural facilities, a complete construction service. He also will supply the know-how and ready application of his existing organization competent in estimating costs, purchasing, organizing and directing the field operations, employing consultants and specialists, and the handling of labor negotiations, legal matters, insurance, taxes, shipping and receiving items for use in the work, and other things required for the design and construction of the complete facility ready to operate.

The contractor would generally undertake the management of the enterprise for the owner. He would be reimbursed for all expenditures, but the owner would retain the right of approving matters affecting policy and also the larger commitment to be made by the contractor. The contractor would organize a detailed accounting system for the project and report periodically on the use of all funds advanced by the owner and the cost of the work.

Although these matters would cover the entire project, the owner would need assurance that things were not getting out of hand and that he would not be committed to a situation that later would prove to be impracticable. In other words, a check on the
feasibility of the enterprise should be tested before an attempt was made to go all the way. A three step provision written into the agreement would accomplish this.

First, the owner wants to know how long it would take and how much it would cost for the contractor-engineer to develop the initial designs to the point where a preliminary estimate of the possible total ultimate cost could be made.

The owner employs the contractor-engineer to make such an estimate for a wholly reimbursible cost plus a small fee. This might be called the first order by the owner. A short time limit would be set for the contractor-engineer's reply.

The contractor-engineer then begins accumulating all the variable facts from various sources. From the owner comes information about the product and its ingredients, the proposed process and the laboratory findings, the capability of the plant, the packaging to be involved, the handling and crating for shipment, details of the site, and any other tangible facts.

From other sources, the contractor-engineer would develop the particulars of the machinery required and
other matters to help him envision the construction problems and the cost. He proceeds with preliminary sketches and a description of the proposed facility, then prepares a report for the owner that includes an estimate of time and cost to develop the initial designs to the point where a definitive estimate would be possible. The report also would give an indication of feasibility of the enterprise.

The owner considers the information and decides whether or not to proceed with the project. If he decides to proceed, he issues what might be called his second order. It is an order to proceed with designs and engineering work necessary to make a definitive estimate of cost of the whole enterprise. To accomplish this, the owner budgets an amount of money in line with the estimate.

The contractor-engineer starts the engineering and designs, billing the owner for complete reimbursement of the necessary costs plus an agreed percentage fee. This cost and fee are considered chargeable against the budgeted funds.

During the preparation of designs covered by the owner's second order, the owner probably would direct the contractor-engineer to acquire the things needed
and to begin site improvement work. This assures that general feasibility of the enterprise is indicated by the information being developed from time to time.

If the contractor-engineer prepares his initial definitive designs and engineering data within the time allowed, as well as within the amount of money budgeted, he submits his findings and technical data to the owner along with the preliminary definitive estimate of cost for the whole project. At this stage, designs and specifications would not be completed in all details and would have to be supplemented as the project proceeds.

If the contractor-engineer fails to accomplish the initial definitive engineering work within the time and money budgeted, the owner client can cancel the contractor-engineer's right to proceed further with the project. As an alternative, the owner can consider the reasons for the failure and modify the terms governing the arrangement.

Assuming that the engineering data submitted by the contractor-engineer had been approved by the owner and the owner wants to make final arrangements for completion of the project, he issues a third order. This is the order to complete the engineering designs and proceed with the construction of the facility, all in
accordance with a reimbursable cost-plus-a-fee basis (see section 5.2). However, if the owner questions the feasibility of the project, or would have difficulty financing it, he would have a specific time to make a decision on what to do.

His alternative would be to cancel further activities on the project and settle with the contractor-engineer – a right he would have reserved. It is assumed, however, that he decides to proceed and that all the provisions in the original agreement for such an eventuality begin to operate. That is, it would have been set up for the contractor, when so ordered, to conclude all matters of design and construction according to prescribed terms and conditions applicable to a cost reimbursable basis plus an additional fee.

The amount of the fee and its conditions of payment could be quite variable. They could include a straight percentage fee based upon the cost of the contract work; a fixed fee agreed upon in the initial agreement, with the amount being a percentage of the definitive estimate submitted under the second order to the contractor; a fixed fee with penalties and incentives; or otherwise.

In any case, however, it is assumed that the fee might be on some kind of a sliding scale tied to actual
cost and that interim payments of the final outcome. This would require periodic forecasts of the final outcome. This would require periodic estimates by the contractor of the ultimate cost of the enterprise, using information developed as time passes. The owner would want such estimates for his financial control and to keep abreast of performance with the contractor. They are indispensable to the contractor in his job planning and cost control throughout the period of construction. It would be called third order estimate.

If the procedure above is followed it is obvious that estimating plays an important part even if the information on which to base it is merger and out of questionable reliability at first. However, as time goes on, the information becomes more reliable and more complete with the development of additional data and definitive designs. The estimates can be no more reliable than the basic assumptions and data used in their preparation - depending, of course, on the ability of the estimators preparing them.

For example, the estimate prepared according to the first order of the owner would take a lot of vision backed by the experience and knowledge of the contractor-engineer, and no theoretical alternative exists. The accuracy of the estimate might well be
questionable, because the basic information is minimal and no procedures for estimating according to a system can be outlined. The estimate prepares according to the second order of the owner would be more reliable.

It is assumed that approximate quantities of work and its general character can be established for pricing based upon the historical cost background of the contractor-engineer and that the second-order estimate can be systematized to fit a given concept of estimating. However, the ultimate in refinement is not possible because all the details are not yet designed. Highly technical installations, special machinery and devices to be developed, etc., would be priced on the appraisal permitted by similar experience.

Estimates prepared in accordance with the third order of the owner should be as refined as the engineering data would permit. They should follow a specific pattern and sequence so that they can be compared.

As mentioned earlier, the arrangement and conditions applying to turnkey type of contracts can vary widely and can be made to suit individual situation and opinions. By sacrificing some degree of control by the owner and minimizing the possibility of his being
able to readily identify the tendencies of the cost getting out of hand, turnkey type of contracts can be greatly simplified. They can be made on a one-step basis with the contractor-engineer being given more of a fresh hand from the outset.

*Risks in Turnkey Contracts:* The owner must convey to the contractor at the outset exactly what he wants done and functions or performance he expects of the completed facility. Unlikely competitive bid contracts, detailed designs are not available at the time of contracting. The owner presents the contractor with conceptual designs and performance specifications, the contract, which is then negotiated, commits the contractor to produce the completed facility within a stated schedule for an agreed-upon amount of money. With so many open variables and unknowns at the outset, if the contractor foresees risk in reaching agreement with the owner on the final product, he is likely to include contingency costs in his bid. Even though the construction costs may not be required in the long-run, they will push the cost of the project higher.

Also related to the cost of the turnkey projects are the time and money necessary to prepare detailed design and cost proposals. For each unsuccessful bid, there was a wasted design effort. These increased
overhead costs will have to be recovered somewhere, most likely through increased mark-up in future jobs. One possible safeguard against this problem is to require prequalifications from potential bidders. With the current trend toward tightening the public purse strings, the potentially greater cost of turnkey proposals, and the inflationary impact on the cost of services in this area must be a matter of concern to bidders and owners.

Within the inability for most clients to negotiate with several low bidders and then select one — not necessary the lowest— the practice of "Two Stage Tendering" procurement has risen. This method is identical to the one-step turnkey procedure except that price proposals are not required until the second step, after the technical proposals have been evaluated based on a number of acceptability criteria. In essence Two Stage Tendering allows an early selection of the prime contractor on the basis of fee or fee plus preliminaries or fee plus preliminaries plus main rates all based on outline documents. Once the prime contractor is selected, documents are developed further to produce second stage documents and further rates negotiated with the contractor. The contract is then awarded and building works commenced. The contractor is paid on the basis of measurement and rated together with the agreed fee and/or preliminaries. Apart from the saving of pre-
contract time there are other advantages to be achieved from the ability to involve the builder earlier with the design team. Grigg [94:36] illustrates the structure of the "Two-Stage Tendering" as shown in Figure 5.5.

In any contract of this type, a necessary safeguard for both owner and contractor is an accurate and clear presentation of performance and design specifications prior to signing a contract. If the perceived risk is too high, the net result might be a lack of innovation and even lower quality. Unless certain contractual incentives and shared risk are offered, the turnkey approach could leave the owner with an inferior product. Ultimately, whether turnkey proves to be the best path to follow in a particular instance depends greatly on the reputation of the contractor and specific terms of the contract.

Frein [77:401] illustrates the Turnkey Type of Contract with Base Fee and Award Fee. It is offered for reference only.

Usage. Turnkeys are used in the private sector, where an owner may want to turn over all responsibility for a job for various reasons. Complex manufacturing or processing plants are common instances where performance specifications are given. For example, the turnkey is to
FIGURE 5.5  TWO STAGE TENDERING - GENERAL APPROACH  (From Grigg )

CONTRACT: Builder is paid on the basis of measurement of designed works at rates agreed and a fee and/or preliminaries as agreed.

NOTE: (1) Appointment of Consultants and Quantity Surveyor may be by Architect as an alternative to that shown.
produce a facility capable of turning so much tonnage of iron ore or refined crude per day into a finished product, i.e., a certain grade of oil or a certain level of ore derivative.

An owner in need of such a facility may have no experience in the field. The turnkey may have an established record in that area. Although this method is frequently used for such projects, it is not limited to highly specialized projects.

5.1.4. Construction Management Contracts

Among the very many concepts of construction contracts, one which has received increasing acceptance in the industry of late years is the construction management contract.

Needless to say, as applies to other types of contracts, the conditions incorporated therein are tailored to fit the needs and the desires of the parties as related to the project or enterprise involved. It can be made to include more or less functions to be undertaken by the contracting construction manager, including whether or not the construction manager is to perform a part of the actual work with its own forces. However, more frequently the basic execution of the
physical work is handled by third parties under the supervision of the construction manager.

The construction manager in that concept functions as a technical arm for the owner and a custodian in dispensing the owner's funds in the accomplishment of the project at hand. For the parts performed by him (possibly the construction design), the management contract must provide specific provisions for compensating the construction manager.

The basic premise for employing the "Construction Management Concept" is that the owner is engaging the services of a qualified and experienced organization with in-house facilities and personnel capable of doing all the things that need to be done for final realization of the project. This includes the classification of all the functions which can be done by others, the preparation of contract and subcontract documents, the selection of capable contractors and subcontractors to perform the various parts, to let and supervise the performance, to dispense the owner's fund to cover the obligations so created, and to protect the owner's interest in every way compatible with prevailing laws.

The construction management contract is an offshoot of the somewhat universal practice of general
construction contracting on a firm price basis subject to the contract conditions drafted entirely by the owner, his consulting engineer of his architect. The basic difference is that the "General Contractor" becomes the "Construction Manager" and is reimbursed for all legitimate costs of the project which he incurs in the interest of the owner, and is paid a fee for his management services, such fee being agreed to as a percentage of the cost of the work, or a stated amount otherwise determined.

The resulting effect of this arrangement is that the general contractor - now the construction manager - has greatly reduced or minimized his financial hazard inasmuch as he no longer undertakes the whole cost of the job at a given price, subject to the ravages of inflation, delays due to weather, trade labor disputes, and many more things. These things have not been eliminated, but they substantially become someone else's worry. Very little in the way of job financing is required of the construction manager. The construction manager's fee for this work can be, and usually is, quite small percentage. The smaller fee is, of course, attractive to the owner.

Since much of the work under this concept is recontracted or subcontracted, much of the financial
hazard passes to those down the line who contract for its performance. Equitably, their pricing should include amounts for escalation which, following the flow of responsibilities, should indirectly be passed back to the owner who pays their contract price.

In the case of project expenditures which are reimbursed directly by the owner, the owner necessarily absorbs the extra and inflationary costs. Under such circumstances, the owner would not have realized any savings. Those who reconvert or subcontract various parts of the work, and who are exposed to all the hazards of the business, and subject to severe competition, unfortunately must absorb resulting over-runs of costs, to the ultimate benefit of the owner.

The construction management concept is more adoptable to building and industrial types of construction which are generally subcontracted to a large extent. It is not applicable to "Heavy" and "Highway" type construction, where more risks are inherent in their execution, and because they usually are more remotely situated and are less attractive to the normal run of subcontractors who specialize in building construction. Then too, some of the increments of the work are very large and not readily broken down for subcontract size.
Actually, construction management contracts, whether they were called that or not, have been with us for generations in one form or another. They bear a striking resemblance to the "cost plus a percentage fee" (see page 200) or "cost plus a fixed fee" (refer to page 202) type of contract, the difference basically being "Who performs the various necessary functions and construction operations." The "cost plus an incentive fee" (see page 195) type contract might well fit the same category. The same might also apply to the "turnkey contract" arrangement, if compensation to the principal contractor is predicated on a fee for his services and the costs which he would incur are to be reimbursed directly. More details of "cost-plus" contracts will be discussed fully in section 5.2.

This arrangement transfers a very large part of the responsibility to one major contractor who undertakes the work on a firm price bid, and has wide latitude in determining what part of it, if any, is to be subcontracted.

Since the modern day so-called "Construction Management Concept" of contract has been so widely accepted, and the burden of the project financing is absorbed by the owner, many organizations including general contractors, consulting engineers and others
have entered the field and offer such services. A number of the new comers, not previously practicing construction contractors, have had difficulties because of failure to have taken all of the important elements into account. Practical programming of operations and the coordination of the same were particular trouble spots. Failure to have properly defined the responsibilities of the various parties were apparent.

In some cases where practicing construction contractors have undertaken "construction management" as differentiated from "general contracting," their more competent personnel is reserved for the latter situation where more of their own assets and funds are at risk, and the "construction management" contracts are accorded the second-string people.

Thus the owner engaging a construction management contractor should limit his selection to highly reputable firms and should have in advance an understanding of the top personnel to be assigned to the job, after having carefully studied their qualifications, previous experience and accomplishments.

Recognizing again that construction management contract conditions can be quite variable in the incorporation of the desires and requirements of the parties.
Risks of Construction Management Contract;

1. If the professional construction manager recommends phased construction, the owner begins the project before the total price is established. Every completion may not provide a sufficient trade-off for this risk.

2. If the owner has only a fixed amount to spend, and would not build the project if its costy would exceed this amount, the traditional method would be preferable in such a go-no-go situation.

3. Success of the programme depends greatly upon the planning, scheduling, estimating, and management skills of the professional construction manager.

4. The owner has certain responsibilities and obligations that must be fulfilled in a timely manner.

5. The professional construction manager does not usually guarantee either the overall price or the quality of the work; this situation contrasts with that of the general contractor in the traditional lump-sum approach.
R.A.I.A (Royal Australian Institute of Architects) Practice Note 77 (November, 1983) defines construction management (see Appendix 3).

Figure 5.6 and 5.7 show the principle structure of the construction management contracts. Figure 5.6 represents the American Institute of Architects contract form B 801 which is well known to the construction management field in the construction industry.

Usage. Like the turnkey arrangement, construction management contracts are used where the owner lacks in-house capability, and typically, they are used on large complex projects where an objective coordinator can effect savings in time and money.

5.1.5 Project Management

A dictionary definition of "project" is "an undertaking requiring concerted effort." More informative definitions by those in project management
FIGURE 5.6 CONSTRUCTION MANAGEMENT - GENERAL APPROACH (From Glegg)

DESIGN PHASE  |  PRE CONSTRUCTION PHASE  |  CONSTRUCTION PHASE

BUILDING OWNER

CONSULTANT/S

ARCHITECT

Design Input

CONSTRUCTION MANAGER

Agreed Fee

DOCUMENTATION

Contract Administration and Inspection

TRADE CONTRACTORS are reimbursed in accordance with their contract by certificate of payment issued by OM or on certificate of architect issued after consultation with OM.

OM calls tenders for tradecontract

Award Trade contracts

OM coordinates and controls the work of trade contractor/s to ensure progress, supervises and inspects the works. Certifies payment

TRADE CONTRACTORS

OM undertake preliminary works, site est. & temp.

THE WORKS

Certification

Administration & Instruction

Inspection duties

Alternative additional possibility

Cost reimbursement contract if OM is to undertake parts of the works.
FIGURE 5.7 CONSTRUCTION MANAGEMENT - AMERICAN INSTITUTE OF ARCHITECT, DOCUMENT B 801

**DESIGN PHASE**

**BUILDING OWNER**
See article 2 AIA Doc. B141/OM

**ARCHITECT'S SERVICES:** include normal structural, mechanical and electrical engineering services & any other services agreed.

AIA Doc. B141/OM
Design input

**CONSTRUCTION MANAGER:** during design phase; consultation, scheduling, project budget, coordination of contract documents, labor, bidding, contract awards.

see article 1. AIA Doc. B 801

**PRE CONSTRUCTION PHASE**

**DOCUMENTATION**

**CONSTRUCTION PHASE**

The architect in cooperation with the CM, shall provide administration of the construction contract as set forth in AIA Doc. A 201/OM. Advice and consult with the owner and CM. Issue instructions to contractor's via the CM. Periodic site inspection. Issue certification for payment of contractors.

**INSTRUCTION**

**CONSTRUCTION MANAGER** during construction phase; project control, cost control, permits and fees, inspector's performance.

see article 1, AIA Doc. B 801.

**CONTRACTOR/S**

**GENERAL CONDITIONS OF CONTRACT**
A.I.A. Doc. A 201/OM (value based bids)

(2) Agreement;

AIA Doc. B 801, OM is paid; a Fee plus expenses or, Direct personnel expenses or, Fixed fee or, Percentage of cost.

**THE WORKS**

**NOTE:** (1) Construction manager is appointed as agents of the owner in the professional capacity.
tend to add conditions such as: projects are complex efforts to achieve specified results within a schedule and budget; projects typically cut across organisational and functional lines; projects are unique and not completely repetitious of some previous effort.

Eric Jenett, past chairman of Project Management Institute, gives an explicit definition of project management:

"Project Management (PM) is the planning and scheduling and subsequent management and direction of the time phased pattern of application of resources (time, dollars, people, equipment, material), skills and knowledge to the execution (completion) of the various components and segments of a project. This must be done in an orderly economical manner and sequence so that the project objectives as to time, dollar, and technical end results are successfully met. In day to day practice, project management in large measure actually is interface or conflict management; it must almost continually curb, direct, counter or if necessary override almost everyone's self-interest. Information, response time, structural relationships, communication channels, techniques and tools are either themselves very temporal in
nature or keyed to the temporary nature of projects. PM can be likened to management of a just-formed company whose sole objective is to go out of business as rapidly and economically as possible while still reaching a given goal of accomplishment - project completion on cost/schedule - via an unknown and usually undefined route". [123:223,224]

The report of National Economic Development Office of United Kingdom entitled "The Public Client and the Construction Industries (Wood Report),"[288:25,26] comments on the owner's responsibility in the building process and recommends that a single person should be nominated to provide a single interface between owner, designer and contractor.

It also recommends that on large or complex projects the owner should appoint a project manager to act on his behalf with the responsibility for the management and coordination of the relationship between owner, design team and contractor. The report continues that whilst a sound knowledge of design procedures, construction economics and method are needed, the background and training of a project manager are of less importance than his management expertise, decision making ability and leadership qualities.
The other National Economic Development Office report, "The Professions in the Construction Industries," [287:17] considers ways in which professionals determine the performance of the construction industry. This report considers fresh approaches to organization that have been brought about by more complex projects, greater integration between design and construction to speed project completion, growth in size and workload and the increasing demand for total packages. From these factors the demand for the role of project management has grown.

The report goes on to state that technical qualifications are necessary to fulfill this role and suggests that the project management could be recognized as a discipline suitable for specialization at a mid-career point. It suggests that there is a need for professional bodies to encourage and recognize the function of project management.

The objectives of project management are to apply management skills and techniques to the organization and control of all aspects of the project and to optimise the use of resources to produce a well designed and soundly constructed facility which will meet the owner's requirements of function, cost, time, budget, and future maintenance.
Separation of the pure management role of an entire project from the design and construction process enables project management to develop in its own right. The new framework provides the control of quality, time and cost expected by a client and provides a basis for the initiation and development of techniques and procedures in communication, coordination and control which will increase the efficiency of the construction process.

In some situations a project management function is exercised, but the organization providing the project manager itself provides a large portion of the contributions of specialists to the project.

Management structure shown in Figure 5.8 can be met, for example, in a consortium, local authority, or health authority. In such a situation a project manager plays a less dominant role and acts in parallel with other participants. The decision making activities of the project manager are less and his role tends to be more concerned with communication and coordination. The final responsibility rests on the department or consortium concerned and not solely on the project manager coordinating the team. In this coordinating role a project manager does not carry out total management, coordination being only part of the total role normally carried out by an executive project manager.
FIGURE 5.8 MANAGEMENT STRUCTURE OF NON-EXECUTIVE PROJECT MANAGEMENT

(From the Institute of Building, Occasional paper No.20)
The services provided by a Project Manager can vary from project to project and according to each client's specific requirement. In some situations, as illustrated in Figure 5.8, the project manager is fully responsible for the management of the total project as shown in Figure 5.9. These variable extremes for the role illustrate the diversity in the application of the function.

In the management structure shown in Figure 5.9 the client remains responsible for making key decisions concerning the project but the day-to-day running of the project is left entirely to the project manager. This structure is that for executive project management. The amount of authority delegated by the client will vary from project to project. Under some conditions the client may keep control of the project himself and use the project manager as a team co-ordinator. This again reduces the project manager's role to a non-executive one. The other extreme is where the client does not directly participate at all with the project and all matters are handled on his behalf by the project manager.

With this project management structure, management is totally separated from the design process and construction process. A project manager is appointed by
FIGURE 5.9 MANAGEMENT STRUCTURE FOR EXECUTIVE PROJECT MANAGEMENT
(From the Institute of Building, Occasional Paper No.20)
the client and is the sole contact with the client and acts exclusively as the client's agent in all matters concerning the project. The project manager has full authority for managing the project, and for the integration of all activities of the design and construction teams. In this position of the project manager considers professional advice objectively, and can balance the varying views to the best advantages of the client. Each member of the design team is now free to consider the the separate identification of the management functions within his own professional discipline in relation to his own activities; for instance, in the case of architect the programmed production of working drawings and other project information. The project manager is not involved directly in the commercial or professional processes inherent in the construction project and, therefore, possesses the ability to stand back and view the total process and interaction of the various functions impartially. The project manager provides only management expertise and no conflict of interest.

In some specialist industries, eg the petrochemical industry, various organisations have developed expertise in the design of the special processes associated with the industry in chemical manufacture and processing. Mechanical and chemical engineering is the dominant
element of the project and the client requires some guarantee of performance from the designer of the process. The structure in Figure 5.9 represents the contractual arrangements often found where a client requires a sole contractual link and in such situations the contractor may also have a performance liability and be involved in training of personnel for the client to operate the plant on completion.

Here the project manager assumes total responsibility for the project and for the contract performance of all the participants. The client contracts solely with the project manager, who in turn sub-contracts directly with all design members and all sub-contractors for the construction. In the petrochemical and chemical industries this sole legal relationship is stated to be preferential to clients and in such a role a project manager assumes a contracting responsibility, a design responsibility, as well as the responsibilities associated with the project manager role.

Figure 5.8 demonstrates the contractual relationship which is assumed in a normal project manager situation. It has been argued [283] that the project manager should not seek to carry out any of the duties or accept any of the responsibilities of any of
the individual members of the team, but should co-
ordinate and help augment their activities. The project
manager will be responsible for recommending a
professional team for the client's approval, but the
client should appoint each member separately. The
situation is similar to that which exists in teh
traditional process, except that management of the
project is not now carried out by the architect or
engineer but operated as a separate function of project
management. Thereby, the project manager becomes
effectively an extension of the client.

The term "project management" is at times used to
denote the same functions as that of the "Managing
Contractor" or "Construction Manager." Many architects,
undertaking full service commissions, would see one of
their functions, as being that of embracing the role of
the project manager for their client.

The role of the project manager is one that has
developed due to building owners believing that they
needed advice on matters outside of that available from
an architect. These matters were often related to
aspects of real estate management and promotion, an area
of service not generally covered by architects.
The service of the project manager developed from such a base have been expanded to embrace complete management of the project from inception to completion and even to management of the completed building as agents of the owner in the case of rental buildings.

In many such cases the services of the project manager are used to advice on the appointment of design consultants and to coordinate their roles and functions and to monitor their functions and their performance.

In more recent times there has been a further development of professional services into project management based on management principles and quite divorced from the real estate based approach. This form of project management involves the comprehensive management for a client of all aspects of a project from inception to completion of construction and commissioning.

Project management services may include the management of the following activities:

(1) Defining Client's requirements
(2) Assistance in arranging for financing
(3) Selection of Designers and Consultants
(4) Conceptual design and planning  
(5) Budgeting and cost control  
(6) Project accounting  
(7) Project Scheduling  
(8) Reporting and maintenance of records  
(9) Operational procedure  
(10) Preparation of Design and contract documents  
(11) Procurement and expediting  
(12) Selection of contractors and contract awards  
(13) Construction  
(14) Quality control  
(15) Commissioning  
(16) Project publicity and public relations [94:20]

**Overseas Experience;** In general terms it is possible to put the situations that exist into three overseas categories. In each case the organisation and training of the profession and the law of the country in question must be considered.

(a) Those countries (largely Commonwealth and former British Colonies) practicing under UK methods. Here there is a demand from local clients for Project Management, together with the same reluctance from the professional team to accept this alternative form of management of project.
(b) Those countries practicing under US methods, these include Saudi Arabia and Canada. In these situation, Project Management is readily accepted and the principles are clearly understood by clients.

(c) The third group is largely European, where the Project Management role is modified to suit the national and professional backgrounds of the individual countries.

The personal qualities required for Project Management overseas are even more important than those required for a manager operating in the UK, as the role of Project Manager in overseas locations can be even more demanding when coping with the additional frustrations of adverse climate, local custom and additional difficulties of communication. In many Third World countries, where development of infrastructure and industry is now progressing, Project Management has been adopted as a solution to the basic lack of indigenous management expertise. In former Commonwealth countries where British ties and methods of working are strong, the form of Project Management has largely followed the principles set out in the UK. In this overseas environment management skills are extended still further into such fields as import regulations, custom duties and dues, local taxation, local labor laws, port
difficulties, currency exchange and readmittance problems, local methods of construction and local materials and all the other aspects of working in an overseas environment where conditions, customs and law are different from the normal field of operations. In Australia and South Africa the development of Project Management has followed the UK pattern, with Project Managers being appointed on projects with responsibility for the total management of the project.

**Risks Summary of Project Management:** As stated in Section 5.1.4. Construction Management.

R.A.I.A. (Royal Australian Institute of Architects) Practice Note 63 (August, 83) provides the information on project management (see appendix 6). Figure 5.10 shows the theory of modern project management and Figure 5.11 represents common spans of responsibility in building project control. Diagram for the structure of Project Management is shown in Figure 5.12.

5.1.6. Separate independent prime contracts

**Risks and Description:** Here the owner bears the responsibility for financing the work, for coordination of the work, and for the design. The separate contractors bear the risk of the cost of the work and
FIGURE 5.10  THEORY OF MODERN PROJECT MANAGEMENT

Diagram illustrating the two fundamentals:
1) continuity from inception to evaluation of end product
2) independence of project manager from all other parties

NOTE:
Plurals are used because each party is invariably a group or team.
Designers include architect, engineer, cost-planners, etc.
Builders include sub-contractors, separate contractors, etc.
Users include occupiers, visitors, servicemen, etc.
FIGURE 5.11  COMMON SPANS OF RESPONSIBILITY IN BUILDING PROJECT CONTROL  
- showing the principal manager in each case (from RAIA P.N. 63)
NOTE: (1) Appointment of Consultants and Quantity Surveyor may be by Architect as an alternative to that shown.
for the design. The separate contractors bear the risk of the cost of the construction under lumpsum contracts, for liability to their subcontractors, and for indemnification for casualties relating to their portions of the work.

Usage. This method can only be used, or should only be used, when the owner has the capability to oversee and coordinate these separate components of the work. For example, an owner with skilled in-house construction management personnel may want to maintain complete over the project. He may have in-house capabilities for design and for construction management. The separate primes would be in special areas, with the owner managing the project.

Summary of Contractual Relationships

These broad brush-stroke definitions by risk factors will in each case be altered by the actual contract language. The point is that the name given the relationship means nothing. The only important thing is how the risks are treated in the contractual realtionships described above.

Under the definition given earlier, the owner potentially bears the most risk and responsibility in a
construction management arrangement. The construction management is essentially immune from contractual responsibility. The contractor bears the most responsibility in the turnkey and Design-Build relationship, as have defined it.

Time is also a factor in the choice of the parties to a contract. The general contractor method takes longer than some other arrangements. This is because all plans and specifications must be completed before work can go to bid. However, since they are complete, the final cost should be more predictable. In the construction management, turnkey or design-build types of contracts plans and specifications need not be complete before the work is awarded. If designs do not need to be complete, final cost is also more nebulous. But an owner may be willing to sacrifice a better some control on final cost for swift completion - or at least for the promise of saving time.

The final consideration is the capability of the owner. A large public agency is clearly able to provide design work and to perform construction management functions in-house. However, many public agencies are under some pressure to use private sectors designers for their work, and use outsidee construction contractor as well.
In the private sector, many large corporations and utilities have continuing and sizeable construction programs, and their choice of contractual arrangement will be dictated by the current capabilities and needs of the organization.

5.2 Type of Contracts

The purpose of this section is to describe the types of contract arrangement commonly used in the construction industry for procurement of project; indicate the circumstances in which each is considered to be applicable; delineate the advantages and disadvantages inherent in each; discuss the consequences of such arrangements in terms of the allocation of certain of the significant risks involved in construction, and, finally, to suggest how these contract changes in allocation of these risks.

In considering the various types available, it must be remembered that the owner of any construction project has three goals: (1) Low cost; (2) High quality; and (3) Rapid completion. These three goals are, however, never completely obtainable in any one contract since they are in part mutually exclusive. The lowest possible cost means low quality and slow completion. The highest possible quality means high cost and slow completion.
The most rapid possible completion means high cost and low quality. Every owner must necessarily compromise among the three goals to achieve in the greatest degree those which are most important to him.

Each of the different types of contracts examined in this summary varies in its effectiveness in achieving one or the other of the three goals.

It is axiomatic that the type of contractual arrangement which the owner should select is that type which in the circumstances described above is best calculated to achieve the owner's goals. In turn, the owner's goal can best be achieved by selecting the contract type that will most effectively motivate the contractor to the desired end.

The most effective contract type will vary from situation to situation depending upon: The degree to which the owner's desires - i.e., the plans and specifications or the statement of work - are firm and final; (2) The extent to which the owner is willing to assume some or all of the risks inherent in the contract; (3) The degree to which the owner wishes to monitor or manage actual contract performance; and (4) the relative value to the owner of each of the three possible goals he is trying to achieve.
There is no single type of contract which best fits these criteria in every possible situation. The natural tendency, for very good reasons, is to prefer the firm fixed-price contract whatever it can be used; but there are many situations that do not lend themselves to this type contract. In such cases some alternative contractual form which best fits the particular situation should be employed.

5.2.1. Fixed-Price Contract

In general the fixed price type of contract provides for performance of specified work in consideration of a stated price which is not subject to any adjustment except as specifically provided therein. Variations in this type of contract are described below, including the advantages and disadvantages inherent each.

The basic difference between a fixed price type of contract and a cost reimbursable contract type is that the contractor is, essentially, in the former type obligated to accept the risks of uncertainties while in the latter type the owner is, essentially, so obligated. Accordingly, in the fixed price type the firm bid price submitted by the contractor feels may arise during construction, and as to which the owner has not agreed to assume responsibility.
The amount of contingency which a contractor includes in a bid for work under a fixed price type depends on (1) his experience on similar projects, (2) his present workload, (3) his familiarity with the project, (4) how definable the parameters of construction are, (5) the nature and possible extent to which these have been defined and allocated as between the owner and the contractor in the contract documents, and (6) the degree of risk which the contractor is willing to accept.

1. Firm Fixed Price Contract

The firm fixed price type of contract provides for a price which is not subject to any adjustment by reason of the cost experiencee of the contractor in the performance of the contract. When used under the proper circumstances, it places maximum risk upon the contractor. In general it is awarded on the basis of formal advertisement for sealed bids, but may, in exceptional cases, be awarded on the basis of negotiations after the receipt of proposals.

Application: An advantage to the owner is that it (1) places maximum risk upon the contractor; (2) because the contractor assumes full responsibility in the form
of profits or losses for all costs under or over the firm fixed price, he has maximum profit incentive for effective cost control and contract performance; (3) both secure an advantage from the fact that the use of this type of contract imposes a minimum administrative burden on each with an exception described below.

Risk factors of firm fixed price contract are:

(1) The total time required from project conception to completion is the longest of any type contract, because time must be taken to prepare complete plans and specifications, and to receive and evaluate bids before any contract can be awarded.

(2) It is a firm fixed price contract only if the end product desired by the owner is known and specified in complete detail in the contract as awarded. If the owner's desires are not firmly fixed at contract award, then during the progress of the contract there will be numerous, costly changes. The guaranteed cost that the owner thought he had becomes an illusion.

(3) If the owner imposes, or attempts to impose, all significant risks on the contractor and takes none for himself, the contractor, in his bid price, must necessarily provide ample allowance for at least those risks which pose the greatest hazard of additional cost.
Ordinarily the contractor will not include in his bid sufficient allowance for every significant risk, since doing so will undoubtedly make him non-competitive. If every such risk does occur, the contractor may lose a great deal of money on the job. On the other hand, if none or few of the risks for which the contractor has provided in his bid occur, the contractor may make a great deal of money. This makes for a happy contractor, but the owner is paying too much for what he receives.

(4) The firm fixed price contract provides no financial motivation to the contractor to perform work of a high quality than that which just meets the contract specifications.

(5) If the work to be done is of such a nature that little competition can be obtained in the bidding process, there is no guarantee that the firm fixed price actually represents a fair and reasonable price for the work.

(6) If modification to the design and field changes become necessary or desirable, lengthy change order negotiations and contract revisions are likely to occur, with subsequent promotion of an adversary relationship. At the least, the flexibility of the engineer, during construction, to introduce logical modifications is impaired.
A typical example of this type of arrangement in Australia is seen at the end of this section as Appendix 5 entitled "Edition 5b Lump Sum Contract, Agreement and Conditions" (approved at 16 December, 1970). Also Figure 5.13 shows the functional structure of traditional lump sum form of contracting. Royal Australian Institute of Architect defines briefly Lump Sum Contract in its Practice Notes No.37 which was issued in November 1974. (see Appendix 6)

2. Fixed Price Contract with Escalation.

This type provides for upward and downward revision of a stated contract price upon the occurrence of certain contingencies which are specifically defined in the contract. The risks are reduced by the inclusion of escalation provisions in which the parties agree to revise the stated price upon the happening of a prescribed contingency. Where escalation is agreed upon, upward adjustments may be limited by the establishment of a reasonable ceiling, and provisions may be included for downward adjustment in those instances where the prices or rates fall below the base levels provided in the contract. Generally, escalation provisions are of two broad types: 1) Price escalation provides for adjustment of the contract price on the basis of increases or decreases from an agreed upon level. 2)
Labor and material escalation provides for adjustment of the contract price on the basis of increases or decreases from agreed standards or indices in wage rates, specific material costs, or both.

**Application:** The use of this type is appropriate where serious doubt exists as to the stability of market and labor conditions which will exist as, for example, during an extended period of construction and where contingencies which would otherwise be included in a firm fixed price contract are identifiable and can be covered separately by escalation. Obviously, labor and material escalation should be limited to contingencies beyond the normal control of the contractor.

**Advantages:** As to projects of long duration, say, in excess of 18 months, and since inflation effect on the costs of labor, equipment and materials is a definite factor which must be considered in pricing such jobs, contractors must either include a contingency amount covering the hazard as to the extent of such cost increases, or refuse to bid the job. In the former case the contract can become a gambling transaction – in the latter the owner loses the benefit of competition for the job.
Risk factors of this type of contract are:

(1) Since the owner accepts at least a substantial part of cost increases due to inflationary effect, he no longer has a true firm fixed price commitment as to the job.

(2) There are obvious difficulties inherent in its administration.

3. Fixed Price with Target Estimate Contract

This is a fixed price type contract with provision for adjustment of profit and establishment of the final contract price by a formula based on the relationship which are final negotiated total cost bears to the total target cost. In this type, the owner and the contractor, before award, negotiate the following items:

Target cost : against which to measure final costs

Target profit : a reasonable profit for the work at target cost

Ceiling price: the total dollar amount for which the owner will be liable
Sharing formula: arrangement for establishing final profit and price

After the work is completed, the contractor and the owner negotiate the final costs of the contract, sharing the overruns or underruns according to the agreed formula. To illustrate with figures, assume that the target cost for a contract is $1,000,000, the target profit is $100,000, the price ceiling is $1,180,000, and the sharing formula 75 percent (owner) and 25 percent (contractor). Under the formula, the contractor would keep 25 percent of every dollar saved. To earn a total profit of $120,000, therefore, he would have to reduce costs by $80,000 below target cost. Because there is no profit ceiling, profit would continue to increase indefinitely as the amount of underrun increased. Conversely, the contractor would have to overrun the target cost by $80,000 to reduce his profit to $80,000. If he overran by more that $180,000, he would lose money, since there is no minimum profit guaranteed in this type of contract. Regardless of the final cost to the contractor, he must meet the contractual specifications and the owner's liability can not exceed the ceiling price of $1,180,000.

Application: This type is appropriate when use of the firm fixed price contract is inappropriate and the
construction is of such nature that assumption of a degree of cost responsibility by the contractor is likely to provide him with a positive profit incentive for effective cost control and contract performance. The contractor performance requirements must be such that there is a reasonable opportunity for the incentive provisions to have a meaningful impact on the manner in which the contractor manages the work.

Advantages are as follows;

(1) A price is established similar to the guaranteed cost to the owner under the firm fixed price type of contract. Since the contractor is penalized for overruns above the target estimate (which is always something less than the price ceiling) and, conversely, rewarded for cost savings, he is financially motivated to perform at the most economical cost.

(2) It is usable in situations where the owner's plans are not sufficiently detailed to allow firm fixed price bidding without excessive provisions for contingencies, and yet sufficiently advanced that a reasonably accurate target estimate can be made.

(3) It is sufficiently flexible to permit the inclusion of monetary incentive provisions to the contractor for early completion.
Risk factors of this type of contract are:

(1) An accurate estimate of costs; arrival at a reasonable amount of profit to be added as target profit–both ceiling essential components of a proper target price, together with the setting of a proper price ceiling and a formula for establishing the final profit, all require a negotiation process which can involve areas of substantial disagreement. The necessity for resolving these, as a pre-requisite to arrival at a contract, constitutes a risk factor.

(2) This type of contract is usable when the owner's plans may not be sufficiently detailed to permit firm fixed price contracting, while true, is subject to these cautionary notes–the statement of work requires extra attention, and any performance incentives included will require careful drafting of "yard sticks" for measurement.

(3) The administrative burden upon both parties is quite substantial.

(4) The contractor's accounting system must be adequate for price revision purposes and permit satisfactory application of the profit and price adjustment formulae.
Frein [77:373] gives an example of this type of contract entitles "Form of Agreement - Target Estimate Type Contract with Penalties and Incentives."

Summary of Firm Fixed Price Contract

Most construction business is conducted with fixed price contracts. Anyone involved in the industry should understand this form of contract thoroughly and should be aware of risks that exist and of clauses that mitigate those risks.

In a fixed price arrangement, the project risks fall almost entirely on the contractor. He either brings the work for the bid he proposed, or he takes a loss. This is true whether he is a general contractor, an independent prime, or a turnkey. It can be true with a construction manager as well if the contract is set up that way.

From the owner's point of view, this seems like a protective device. But the simplicity is deceiving. The contractor's bid must be high enough to cover those risks - the unknowns that will surface in the course of construction - and to make a profit as well. It must also be low enough to be competitive. The result of this guesswork is that one side inevitably loses. If the
final project cost comes in lower than expected, the contractor makes more money while the owner could have spent less. If the final project cost comes in higher than bid, the contractor will not only lose money, but also he could go out of business. The owner, whether he wants to or not, can pass off the higher cost to someone else - the consumer, or in the public sector, the taxpayer. The solution could be as damaging in the long run as the contractor's loss is in the short run. An owner could be subjected to harsh criticism or lose sales.

5.2.2. Cost Reimbursable Contract Type

The cost reimbursement type may be described, in general, as one which provides for payment to the contractor of allowable costs incurred in its performance and to the extent prescribed therein. This type of contract establishes an estimated total cost and a ceiling which the contractor may not exceed without prior approval or subsequent ratification by the owner or his engineer. It is suitable for use only when the uncertainties involved in contract performance are of such magnitude that the cost of performance can not be estimated with sufficient reasonableness to permit the use of any type of fixed price contract. In addition, it is essential that the contractor's cost accounting
system be adequate for the determination of costs applicable to the contract and that appropriate surveillance can be accomplished by the personnel of the owner or engineer during performance so as to give reasonable assurance that inefficient or wasteful methods are not being used.

R.A.I.A. has defined briefly cost plus contract for building works in its Practice Note No.52 (see Appendix 7) and issued a "Cost Plus Contract for Building Works" at 10th of May, 1976 (see Appendix 8). This contract is administered by an architect and where the payment to the builder is to be on the basis of the actual cost of the work plus a fee. This fee may be either a lump sum or a percentage of the cost of the work. Alternatives are provided in clause 1 for those two conditions.

In this type of contract, the owner and contractor, before award, negotiate the following items:

Target Cost.
Target Fee.
Minimum and Maximum Fee.
Fee adjustable formula.

The formula determines the amount of fee payable to the contractor on the basis of the relationship between the negotiated target cost and the final total allowable costs. After the work is completed, the contractor and the owner negotiate the final fee (but not the final contract cost), in accordance with the fee adjustable formula. The formula might provide, for example, that the contractor would be penalized 25 percent of the actual cost overruns above the target estimate and rewarded by 25 percent of the underruns - in both cases, subject to the previously agreed minimum and maximum fee. The maximum fee gives the owner some degree of control over the final cost figure. Ideally, the owner would happily pay the higher contractor fee since by definition that would mean the total project cost is less than estimated. Such a contract can also have separate incentive provisions for early completion.
**Application:** This method has not been widely used. Obviously, the approach requires a highly sophisticated organization to monitor costs: both the contractor and the owner must be sizable to do this properly or even adequately. This method probably would be used on large complex projects where the parties are amenable to working out these contractual arrangements and can oversee their implementation adequately.

**Advantages:**

1. It permits the contractor to get started while engineering design is in progress, thus promoting earlier completion.

2. It permits provision of greater profit motivation to the contractor than exists in other cost reimbursable type contracts.

3. The owner does not pay, by way of a contingency, otherwise included in the bid price, for risks which do not materialize.

4. Considerable incentive to reduce costs can be "built in" by providing for adequate profit increase to the contractor.
Risks: The incentive for both parties seems great. However, the cost plus incentive fee contract has not been applied in many instances. The greatest drawback would seem to be the difficulty in establishing, documenting and cost savings that would result in the higher (or lower) contract fee, and in determining responsibility for cost overruns that would affect the contractor's fee. Clearly, if the overruns are owner-caused, the contractor will not want to be penalized by a lower fee. Thus, while this arrangement in theory holds great promise, in practice it can become a nightmare.

2. Cost Plus Award Fee Contract.

With this type of cost arrangement, the owner reimburses all allowable costs, agrees to pay a base fee, and sets up criteria on the basis of which the contractor may be paid more.

The criteria for "bonus" pay are as follows:

(1) He is reimbursed by the owner for his actual allowable costs in performing the contract.

(2) He is paid a base fee, negotiated prior to contract award, which does not vary regardless of the performance level he achieves, and which is a low
percentage of the agreed estimated total cost of the work and

(3) He is given the opportunity to earn, through superior performance, and additional award fee, which may be two or three times the amount of the base fee.

The amount of the award fee that the contractor earns in a given period is determined unilaterally by the owner, based on the owner's evaluation of the contractor's performance during that period. The basis on which the owner will make his evaluation is set forth in the contract and is designed to focus the contractors emphasis on achieving the goals that the owner considers most important. The opportunity to earn the award fee provides the strongest possible profit motivation to the contractor to improve his performance in the areas designated by the owner.

The contract itself will describe the factors, and the weights assigned to them, that the owner will use in his periodic evaluation of the contractor's performance. Periodically, if the owner's goal change, the contract, by mutual agreement, may be amended to revise the weights assigned to the various evaluation factors or to add new factors.

During the progress of the work, the contractor is paid only the base fee each month when that month's
portion of the work is completed. Periodically - perhaps every 6 months - the owner's designated representatives evaluate the contractors performance for that period and give him a numerical grade for his overall performance in the factors set forth in the contract. This overall grade determines the portion of the maximum attainable award fee that the contractor has earned and will be paid for the period being graded. The owner's determination is unilateral and not subject to appeal by the contractor, although he is given the opportunity to discuss with the owner the grading he received, and to learn where and in what he may not be meeting the owner's expectation.

**Application:** This might be used for projects in which there is some urgency about time of completion and where the owner wants to provide some incentive for the contractor to excel.

This contract had been used in Vietnam by The Army Corps of Engineers, the Department of Defence, the Navy and other branches of U.S.A. government. The circumstances were deemed special - diplomacy, urgency of completion, or other reasons - so that an award arrangement might be considered a tool to attain swift and proper completion.
Risks of this type of contract are as follows:

(1) Lack of guaranteed cost to the owner.

(2) Since the amount of the award fee paid to the contractor is determined unilaterally by the owner, personalities may improperly affect the amount of the award.

(3) Agreement on estimated total cost of the work may be difficult to reach. This figure is important both with respect to the base fee and evaluation of performance in determining the amount of award fee.


In the cost plus percentage of cost contract the owner is paid his actual costs plus a percentage of those costs as his profit. This type of contract, it should be noted, is prohibited by law for use in U.S. Government contracting. This suggests that something wrong with it. There are obvious disadvantages, the principal one being that there is almost a built-in disincentive for the contractor to watch the cost of the project since his fee increases in direct proportion to the cost of the work.
**Application:** Why then, would an owner want to use a cost plus percentage of cost contract? One application would be in an emergency such as rehabilitation immediately after an earthquake. In such a case, there would be none but the most rudimentary plans and specifications, and work would have to begin at once. Few contractors would undertake work in such conditions without the protection this type of reimbursement affords.

Another application would be where an owner has had a long and harmonious working relationship with a contractor that induces mutual trust. The owner knows that the contractor will not take advantage of him; the contract knows that the owner is fair.

**Advantages:** Permits the job to get started in the minimum amount of time as compared with all other types of contracts.

**Risks:** The main drawback of this type of contract is that the owner cannot control his costs. He does not have a good estimate to begin with, and the contractor has no incentive to save money. It is easy to see why these contracts are disallowed in the public sector. Allegations of misuse of funds are easily made and difficult to disprove. The contractor actually stands to
make more profit if he spends more of the owner's money. That state of affairs can be easily misinterpreted, and of course, abused.

An owner must define allowable costs in the most detailed manner possible to maintain some control over the project. Vagueness here could lead to claims as to which costs are reimbursable and which are not, which are direct costs and which are included in the overhead allowance. The owner bears most, if not all, of the risk in this arrangement.


This arrangement is similar to the Cost Plus percentage of Cost Contract, except that the fee is fixed. Thus the risk to the owner is somewhat diminished. The fixed fee, once negotiated, does not vary with actual costs but may be adjusted as a result of subsequent changes in the work or services to be performed under the contract, certainly in the event of a change or changes which amount to change of scope.

**Application:** The cost plus a fixed fee contract is suitable for use when, and only when, it is not feasible to use a fixed price type of contract, i.e., when, as previously stated, the uncertainties involved in
contract performance are of such magnitude that the cost of performance cannot be estimated with sufficient reasonableness to permit the use of any type of fixed price contract.

Risks: The owner again must define allowable costs carefully. He still does not know beforehand exactly how much his project will cost. He does know what his contractor's fee will be, but there could be disputes or claims if the contractor perceives a change in scope when the owner does not. The owner still bears the majority of the risk in this contractual arrangement.

5. Time and Material Contract.

At the very end of the spectrum, an owner might engage a contractor to provide men and materials at a rate fixed in the contract. This arrangement is close to rental service.

Application: An owner might want to use this method when he is in a position to maintain complete control of the work, or in order to complement his own in-house capabilities.

Risk: It is difficult for the owner to control his costs; he bears the entire risk of project cost.
Summary of Cost Reimbursable Contracts

The contract types which have just been described are most likely to be used in the private sector. The one overriding advantage of these contractual arrangements is that work can begin before all plans and specifications are complete. The great disadvantage is that the owner can not have a firm idea of what his final costs will be.

Some of more promising contract types, in which incentive is provided by the opportunity to earn a larger fee, require sizable organizations to administer them.

For these reasons, there will likely be more of these contract types by large firms in the private sector: for example, those with in-house construction capabilities and continuing construction programs. In the public sector, such methods might be used in extremely complex projects or special cases such as urgent defence programs. The space program or other such special projects where there are many unknowns might be another application.

The effectiveness of each type of contract will be discussed fully in Chapter VI with the result of the questionnaire survey.
CHAPTER VI
The Survey

6-1 Introduction

Various risk factors, methods of risk treatment, and characteristics of various contract types were identified as a result of descriptive and detailed study in previous chapters which were viewed from many points of origin with the intent of providing a database from which to form an idealized concept of risk treatment guidelines (refer to Methodology of Study, Page 5).

Figure 6.1 shows how the basis of creation of Questionnaire was formulated and how the theoretical and descriptive approach is compared with Questionnaire response. Thus the idealized concept of risk treatment guidelines mentioned above is modified after Questionnaire survey to provide a normative and ultimate risk treatment guidelines. (refer to Figure 1.1, Page 13)

6-2 Administration of Questionnaire Survey

This chapter describes the administration of the questionnaire survey including a explanation of
each section of the questionnaire which is itself forms a basic part of this dissertation.

Before designing the questionnaire, an interview with senior individuals in the construction industry who are working in Sydney area was conducted in order to obtain a general concept of risk management. (refer to Table 3.2, Page 43) Interviews were mainly concentrated on the question of Risk Identification and the Categorization of Risk Treatment Methods in the construction process. They were conducted with various parties which are involved with risk management in the construction industry. These are the Architect, Client, Building Contractor, Civil Contractor, Quantity Surveyor, Engineering Consultant, Construction & Project Manager, Insurance Broker, and Lawyer.

When the majority of interviews had been completed for the first time, it was possible not only to gain a general concept about risk management which prevails in the Australian construction industry, but also to look at specific information on the list of risk factors (refer to Table 3.3, Page 40) which are regarded as important in the construction process from feasibility study to practical completion. The majority of risk factors identified by interviews are compared with the risk factors, which are already obtained through the
literature study, described in Chapter III and as a result of the procedure mentioned above, the first draft questionnaire was designed for the purpose of pilot survey. (see Appendix 9)

Toward the end of each visit, where additional information was required, individuals were interviewed again. At this point, general queries regarding the first draft of the questionnaire were answered and the questionnaires were received if it had been completed. But during this first stage of the questionnaire survey, it was suspected that the respondents would have faced two difficulties in answering the questions. Firstly the majority of respondents noted that it was difficult to answer the questions without a description of circumstances because situation vary between projects. For example, Labor Disputes are normally a minor risk factors in domestic dwelling construction projects but can be a major influence on the manner in which large industrial projects are undertaken Therefore, depending on the projects, disputes can be be considered minor or major risk factors.

The second difficulty was noted at the Section 2 of the first draft questionnaire form, named Method of Risk Treatment. In this Method of Risk Treatment, it was recognized evidently that almost all respondents ignored
the method of retention, which was confused with the methods of abatement.

With the above acquired opinions in mind it is recognized that questions should have been asked of the respondents with the particular project experience which was currently being done by the each respondent's own firm or authority, they should also have been asked to indicate the characteristic of the project, the amount of the project cost, and the site of the project. Also the method of Risk Retention was omitted in the final draft of the questionnaire although it is regarded as one of the most important method of risk treatment.

The above difficulties and omission were considered and resulted in the creation of the final questionnaire (Appendix 1). When distributing the questionnaire, respondents were initially advised strongly to answer the questions in relation to the particular project experience in the beginning of the each section and also required to return the answer by mail not more than 4 weeks from the date of issue. The questionnaire were sent to the senior members of each firm or authority during the winter of 1985. Given the number of questions to be answered within that period of time, only 17% of questionnaire were returned before the initial due date (31 of July, 1985). To achieve a
higher return rate, intensive detailed phone follow-up communication with all remained respondents was done for two weeks. Eventually the answers were returned by 38.9% (88 out of 226) at the end of September, 1985. These were then used to construct the summary tables. (see Table 6.2 to 6.5 and Appendix 10. to Appendix 14 inclusive)

6-3 Nature of Respondents

The questionnaire was administered to all those groups with some direct involvement with Risk Management in the construction industry. These were Architect (32), Owner (13), Civil Engineer (30), Building Contractor (34), Building Consultant (34), Engineer (36), Construction and Project Manager (20), and Legal and Insurance (8). A total 226 were selected. Table 6.1 shows the number of respondents of each group and the return rate of the questionnaire. The volume of projects range from A$ 100,000 to A$1.0 Billion, and the average volume of total project was marked at the level of Million - 10 Million.

6-4 Identification and Nature of Risk

The collected survey data of the first section of the questionnaire, titled Identification and Nature of Risks, was analysed to understand the importance of each
<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>NUMBER DISTRIBUTED</th>
<th>NUMBER RETURNED</th>
<th>RETURN RATE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCHITECT</td>
<td>37</td>
<td>21</td>
<td>56.7</td>
</tr>
<tr>
<td>OWNER</td>
<td>18</td>
<td>10</td>
<td>55.5</td>
</tr>
<tr>
<td>CIVIL ENGINEER</td>
<td>35</td>
<td>5</td>
<td>14.3</td>
</tr>
<tr>
<td>BUILDING CONTRACTOR</td>
<td>39</td>
<td>20</td>
<td>51.2</td>
</tr>
<tr>
<td>BUILDING CONSULTANTS</td>
<td>15</td>
<td>4</td>
<td>26.6</td>
</tr>
<tr>
<td>ENGINEER</td>
<td>41</td>
<td>16</td>
<td>39.0</td>
</tr>
<tr>
<td>CONSTRUCTION &amp; PROJECT MANAGER</td>
<td>25</td>
<td>10</td>
<td>40.0</td>
</tr>
<tr>
<td>LEGAL AND INSURANCE</td>
<td>16</td>
<td>2</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>226</strong></td>
<td><strong>88</strong></td>
<td><strong>38.9</strong></td>
</tr>
</tbody>
</table>

**NOTE:** 5 questionnaires were returned because of changed address and were not included in the number of return.

**TABLE 6.1** THE NUMBER OF EACH GROUP AND RETURN RATE OF THE QUESTIONNAIRE
risk factor previously identified in Chapter III.

Each respondent was asked to rate the relative importance of each risk factor from 1 to 10 (1 = least important; 10 = the most important). Figure 6.2, 6.3, and 6.4 inclusive illustrate the results for Section 1.

6.4.1. Analysis of Construction Related Risks

As is shown in Figure 6.2, the greatest risk areas perceived by respondents are Late Completion and Defective Design out of 14 construction related risk factors. More than half (57.1%) of construction related risk factors are rated as "important,"; These are Differing Site Conditions, Weather, Availability and Productivity of Labor, Material, and Equipment, Changes in the Work, Failure to Complete Contract according to Plans and Specifications, Lack of Communication, Site Inspection, and Subcontractor Failure. The risks which are rated "not very important" are Acts of God, Vandalism and Malicious Mischief, Accidents, Local Customs in Overseas Projects.

The analysis of return thus indicates that almost all of the risk factors which are categorized in construction related risks (71.4%) are regarded as important risks. It should be pointed that the very
FIGURE 6.2 Identification & Nature of Construction related Risks

* Note: A; Differing Site Conditions  B; Acts of God
C; Weather  D; Availability & Productivity of Labor, Materials, and Equipment.
E; Late Completion  G; Changes in the Work
F; Defective Design  I; Failure to Complete Contract according to Plans and Specifications
H; Vandalism & Malicious Mischief  J; Accidents
K; Lack of Communication  L; Local Conditions in Overseas Projects
M; Site Inspection  N; Subcontract Failure
important risk of Late Completion shows the highest proportion of importance (69.2%) while the risk of Defective Design is rated 40.0%. The proportions of risk factors which are rated "important" ranges roughly from 30% to 60% within that category. For more detail, refer to Appendix 14.

6.4.2. Analysis of Contractual and Legal Risks

Figure 6.3 demonstrates the following shifts;

a) The risk of Labor Disputes is, obviously, rated "very important." It should be summerised as a natural result because of the nature of the Australian construction Industry.

b) A relatively large number of risk factors (57.1% of 7 Contractual and Legal Risks) are rated "important". These are Delayed Dispute Resolution, Lack of Contract Clarity, Approvals, and Cost of Dispute Settlement. It must be noticed that the risks which are related with the risk of dispute, such as Delayed Dispute Resolution and Cost of Dispute Settlement, show a relatively high proportion of importance.

c) Most noticeably, the risk of Lack of Contract Clarity is regarded as an important risk factor (50.9%).
FIGURE 6.3 IDENTIFICATION & NATURE OF CONTRACTUAL AND LEGAL RISKS

* Note;  
A: Failure to enter into the Contract  
B: Delayed Dispute Resolution  
C: Delayed Payment on Contract  
D: Lack of Contract Clarity  
E: Approvals  
F: Cost of Dispute Settlement  
G: Labor Disputes
However, this fact could give rise to some thought that the risk of Lack of Contract Clarity could be the major cause of disputes.

6.4.3. Analysis of Economic Risks & Political and Public Risks

Figure 6.4 confirms:

a) None of these risk factors is rated "very important"

b) The risk of inflation and funding are regarded as "important" risk.

c) The rest of the risk factors; National and International Impact, Exchange Rate Variation, Interest Rate Variation, are rated "not very important".

d) A high proportion of respondents (42.8%) rated the risk of Union Strike as "very important"

e) All respondents regard the risk of Public Disorder as "not very important"

f) On a relatively large proportion of respondents rate the risk of Local Custom of Site in Overseas
Figure 6.4 Identification & Nature of Economic & Political and Public Risks

*Note: A; Inflation B; National & International Impacts
C; Exchange Rate Variations D; Funding
D; Interest Rate Variations E; Local Custom of Site in
F; Public Disorder Overseas Projects
H; Permits and Ordinances I; Government Acts and Regulations
J; Political Stability of Site in Overseas Projects
K; Union Strike
Project and the risk of Permits and Ordinances as "not very important" risk factors

g) The risk of Government Acts and Regulations and Political Stability of Site in Overseas Project are rated as "important"

With the above summary in mind, only four risk factors are rated "very important" out of a total of 32 risk factors. Those are risk of Late Completion, Defective Design, Labor Disputes, Union Strike. The remaining risk factors (53.1%) are rated "important" while 12 risk factors (37.5%) are rated "not very important."

It is interesting to note that returns show that most of the economic risk factors, except the risk of Inflation and Funding, are rated "not very important." This figure demonstrates the same pattern already noted that most of the risk factors in overseas project are rated "not very important" because those risks, National and International Impacts, Exchange Rate Variation, Interest Rate Variation, are more sensitive factors in overseas project. It is possible that there is a general tendency for respondents to underestimate the importance of risk factors of overseas project unless directly involved at the time of survey.
In the category of Political and Public Risks, the risk of Government Acts and Regulations are rated "important" while the risk of Union Strikes is rated, not surprisingly, "very important".
6-5 Method of Risk Treatment

Section 2 of the questionnaire was designed to find out how respondents believed risks ought to be treated in a given manner; namely Avoidance, Abatement, and Transfer. Again, respondents were asked to answer the question with a particular current project experience in mind.

In addition "open" questions were used in this section of the questionnaire to pick up a range of opinions. After the responses were collected, they were summarised by category (see Table 6.2, 6.3, 6.4, 6.5). Although section 2 of the questionnaire is an open question, the author believes that it is inevitably an attribute rather than the variable question because no definite resolution of risk treatment methods could be answered.

6.5.1 Treatment method of Contraction Related Risks

In analysing returns in this area some responses are related for each item with relevant clauses from several types of contract. This is also done where possible against Avoidance, Abatement, and Transfer. Followings are detailed explanation of collected and
rearranged responses. Table 6.2 shows the collected responses for the treatment methods of construction related risks.

1. Differing Site Conditions

For example, the actual foundation conditions discovered on excavation may substantially alter the extent of work under the contract. The Australian Standard Contracts read Site Conditions as follows; [11;174-175]

<E5b>

Clause 7(a): The property warrants that the site of the Works will satisfactorily support the Works.
Clause 7(b): If the foundation conditions are indicated in the contract documents and they are discovered to differ the Builder is to notify and seek instructions from the Architect.
Clause 7(c): If the Builder in his tender indicates the conditions assumed and those discovered differ, he is to notify and seek instructions from the Architect.
Clause 7(d): The additional cost or any saving from the (b) or (c) differences is to be added to or deducted from the Contract Sum.
Clause 7(e): If the Builder considers that the Works require variation due to conditions encountered he is to notify and seek instructions from the Architect. Any subsequent variations to the Works will be treated as a variation under cl.79. The Builder will be entitled to an extension of time for delay pending instructions.

<MBW-1>

Clause 3.01: The Proprietor is responsible for the accuracy of all information given relevent to the site.
<table>
<thead>
<tr>
<th>AVAILABILITY &amp; PRODUCTIVITY OF LABOR, MATERIAL, AND EQUIPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>. Adequate time of organise plan before work commences</td>
</tr>
<tr>
<td>. Make realistic programme (Architect)</td>
</tr>
<tr>
<td>. Contractor to play ahead (Architect)</td>
</tr>
<tr>
<td>. Through pre-contract investigation</td>
</tr>
<tr>
<td>. Test available resources as part of design and plan phases</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AVOIDANCE</th>
<th>ABATEMENT</th>
<th>TRANSFER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DIFFERING SITE CONDITIONS</strong></td>
<td><strong>UNIT RATE CONTRACT FOR FOUNDATION WORK</strong></td>
<td><strong>CONTRACTOR TO ACCEPT RISK (ARCHITECT,OWNER)</strong></td>
</tr>
<tr>
<td>. Good soil investigations</td>
<td>. Provide technical report to contractor</td>
<td>. Latent condition clause (Project Manager)</td>
</tr>
<tr>
<td>. Extensive site investigation</td>
<td>. Provisional sum for contract cost</td>
<td>. Principal accept risk (Contractor)</td>
</tr>
<tr>
<td>. Deploy local geotechnical consultant</td>
<td>. Variation with design change</td>
<td>. Lump Sum Contract</td>
</tr>
<tr>
<td><strong>ACTS OF GOD</strong></td>
<td><strong>EXTENSION OF TIME FOR COMPLETION</strong></td>
<td><strong>OWNER TO ACCEPT RISK (PROJECT MANAGER, CONSULTANTS)</strong></td>
</tr>
<tr>
<td>. Make provisions in design if predictable, or for highly probability events</td>
<td>. Contingency Sum</td>
<td>. Principal share cost of damages (Contractor)</td>
</tr>
<tr>
<td>. Provide/Organize statistical records to assess this risk</td>
<td></td>
<td>. Contractor to accept risks (Owner)</td>
</tr>
<tr>
<td>. Do not build on sites at risks</td>
<td></td>
<td>. Owner to reimburse cost of delays &amp; Re-construction caused by this risk (Contractor)</td>
</tr>
<tr>
<td><strong>WEATHER</strong></td>
<td><strong>PROVIDE EXTENSION OF TIME CLAUSES WITH ATTACHED SITE OVERHEADS (CONTRACTOR)</strong></td>
<td><strong>CONTRACTOR TO ACCEPT RISK AS SPELLED IN CONTRACT DOCUMENTS (ARCHITECT, CONSULTANTS, PROJECT MANAGERS)</strong></td>
</tr>
<tr>
<td>. Use statistics and allow for delay</td>
<td>. Ensure site drained at all stages</td>
<td>. Establish a means of assessing unusual weather conditions with compensation - insurance or Contractual (Contractor)</td>
</tr>
<tr>
<td>. Prepare summary of known weather pattern</td>
<td>. Vulnerable materials under cover</td>
<td>. Full cost recovery (Contractor)</td>
</tr>
<tr>
<td>. Allow for normal inclement weather in contract terms</td>
<td>. Make allowance in feasibility for delays</td>
<td></td>
</tr>
<tr>
<td>. Recognize extra costs and delays</td>
<td>. Allow containing number of wet days in contract (Owner)</td>
<td></td>
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<tr>
<td>. Allow adequate extension of time</td>
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</tbody>
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<table>
<thead>
<tr>
<th>AVOIDANCE</th>
<th>ABATEMENT</th>
<th>TRANSFER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AVAILABILITY &amp; PRODUCTIVITY OF LABOR, MATERIAL, AND EQUIPMENT</strong></td>
<td><strong>PRE-ORDER CRITICAL MATERIALS</strong></td>
<td><strong>MAKE CONTRACTOR AWARE &amp; RESPONSIBLE FOR PRE-ORDERING</strong></td>
</tr>
<tr>
<td>. Adequate time of organise plan before work commences</td>
<td>. Continuous checking procurement</td>
<td>. Contractor's risk (Architect)</td>
</tr>
<tr>
<td>. Make realistic programme (Architect)</td>
<td>. Good project management by client, designer, and contractor</td>
<td>. Liquidate damages</td>
</tr>
<tr>
<td>. Contractor to play ahead (Architect)</td>
<td>. Allowance for importing labours</td>
<td></td>
</tr>
<tr>
<td>. Through pre-contract investigation</td>
<td>. Labor training</td>
<td></td>
</tr>
<tr>
<td>. Test available resources as part of design and plan phases</td>
<td>. Ensure contractor's order to schedule</td>
<td></td>
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<tr>
<td>. Recognize delays caused by unavailability</td>
<td></td>
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<tr>
<td><strong>AVOIDANCE</strong></td>
<td><strong>AGREEMENT</strong></td>
<td><strong>TRANSFER</strong></td>
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<tr>
<td><strong>LATE COMPLETION</strong></td>
<td><strong>LATE COMPLETION</strong></td>
<td><strong>LATE COMPLETION</strong></td>
</tr>
<tr>
<td>Monitor programme on frequent intervals</td>
<td>Minimize delays in issuing of drawings &amp;</td>
<td>Liquidated damages</td>
</tr>
<tr>
<td>Owner allow reasonable overrun in early</td>
<td>other information</td>
<td></td>
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<tr>
<td>programming</td>
<td>Strong programme clause in contract</td>
<td></td>
</tr>
<tr>
<td>Contractor prequalification</td>
<td>Penalty of bonus clauses</td>
<td></td>
</tr>
<tr>
<td>allow adequate time for complete</td>
<td>Incentive to avoid late completion</td>
<td></td>
</tr>
<tr>
<td>considering all risks of late completion</td>
<td>Extension of Time clause</td>
<td></td>
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<tr>
<td><strong>CHANGES IN THE WORK</strong></td>
<td><strong>CHANGES IN THE WORK</strong></td>
<td><strong>CHANGES IN THE WORK</strong></td>
</tr>
<tr>
<td>Control design and client approval</td>
<td>Ensure all changes adequately controlled</td>
<td>Client accept risks</td>
</tr>
<tr>
<td>Rigid project discipline</td>
<td>Deal with them efficiently</td>
<td></td>
</tr>
<tr>
<td>Establish project requirements prior to</td>
<td>Define scope of work earlier</td>
<td></td>
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<tr>
<td>contractor</td>
<td>Appropriate contract clause to handle</td>
<td></td>
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<tr>
<td>Documents well ahead</td>
<td>change</td>
<td></td>
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<tr>
<td>Good briefing of design</td>
<td>Good communication, process well informed</td>
<td></td>
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<tr>
<td>Prepare detailed brief before plan start</td>
<td>Make client aware of consequences +</td>
<td></td>
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<tr>
<td>Ensure client is exhaustively examined on</td>
<td>accept responsibilities (Architect)</td>
<td></td>
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<tr>
<td>its requirement at the outset</td>
<td>Reduce possibility of change by client</td>
<td></td>
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<tr>
<td>Good communication interpretation of client's</td>
<td>Set early warning system + Communication</td>
<td></td>
</tr>
<tr>
<td>requirements during design phases</td>
<td>Consultant charge for changes to their work (Architect)</td>
<td></td>
</tr>
<tr>
<td>Early planning of contract to finalize design</td>
<td>Allow schedule of rates for variations</td>
<td></td>
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<tr>
<td>Through investigation of design needs before</td>
<td>Include schedule of rates for materials and</td>
<td></td>
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<tr>
<td>tender stages</td>
<td>labour for trades</td>
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<td></td>
<td>Early review of documentation</td>
<td></td>
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<tr>
<td><strong>VANDALISM AND MALIGNANT MISCHIEF</strong></td>
<td></td>
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<tr>
<td>Security measures</td>
<td>Pay cost only share insurance cost (Consultant)</td>
<td></td>
</tr>
<tr>
<td>Watchmen on site &amp; Patrolling</td>
<td>Allow for repair costs</td>
<td></td>
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<tr>
<td>Strong clause in contract for site security</td>
<td>Inspection</td>
<td></td>
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<tr>
<td>AVOIDANCE</td>
<td>ACHIEVEMENT</td>
<td>TRANSFER</td>
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<tr>
<td>LACK OF COMMUNICATION</td>
<td></td>
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<tr>
<td>. Regular contact with site and contractor's report + site meeting</td>
<td>. Promote good relations</td>
<td></td>
</tr>
<tr>
<td>. Create structural meetings &amp; opportunity of communication</td>
<td>. Provide telephone</td>
<td></td>
</tr>
<tr>
<td>. All instructions and variations in writing</td>
<td>. Change administration procedure as necessary</td>
<td></td>
</tr>
<tr>
<td>. Regular site meeting with all parties</td>
<td>. Each party to share its own cost</td>
<td></td>
</tr>
<tr>
<td>. Define and establish commonly understood + agreed system in administration</td>
<td>. Written communication actions</td>
<td></td>
</tr>
<tr>
<td>. All building professionals should attend management course</td>
<td>. Regular review</td>
<td></td>
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<tr>
<td>. Have facilitator; consultant or employer</td>
<td>. Project management procedure</td>
<td></td>
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<tr>
<td>. Set up and enforce communication procedure</td>
<td>. Instigate management system when communication can not be avoided</td>
<td></td>
</tr>
<tr>
<td>. Ensure that each party is represented by experienced and competent personnel</td>
<td>. Meeting at frequent intervals</td>
<td></td>
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<tr>
<td></td>
<td>Encourage effective communication to avoid potential problem</td>
<td></td>
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<tr>
<td></td>
<td>Set up good line of communication</td>
<td></td>
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<tr>
<td>SITE INSPECTION</td>
<td></td>
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<tr>
<td></td>
<td>. Have a joint inspection on a required basis</td>
<td></td>
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<td></td>
<td>. Careful site inspection with photographs, etc</td>
<td></td>
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<td></td>
<td>. Carry out and record fillings</td>
<td></td>
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<tr>
<td></td>
<td>. Consultant &amp; Contractor to cooperate</td>
<td></td>
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<tr>
<td></td>
<td>. Use experienced consultant</td>
<td></td>
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<td></td>
<td>. Clarify basis of site inspection of works by client &amp; architect, i.e., reapprovals, delays, etc</td>
<td></td>
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<td></td>
<td>. Adequate time for thorough inspection</td>
<td></td>
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<td></td>
<td>. Involve all practices that may be involved</td>
<td></td>
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<td></td>
<td>. Site representation by contractor and consultants</td>
<td></td>
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<td></td>
<td>. Provide suitable level of site staff</td>
<td></td>
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<td></td>
<td>. Recognising of all conditions</td>
<td></td>
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<tr>
<td></td>
<td>. Perform to contact in agreements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If tenderers deemed to have inspected site, to be stated in documents</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contractor's risk (Architect, Consultant)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Make contractor responsible</td>
<td></td>
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<tr>
<td></td>
<td>Ensure contractor inspect site prior to tendering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsibility to full disclosure by principle (Contractor)</td>
<td></td>
</tr>
<tr>
<td>SUBCONTRACTOR FAILURE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>. Obtain references prior to selection of nominated subcontractor</td>
<td></td>
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<tr>
<td></td>
<td>. Clear obligation of responsibility</td>
<td></td>
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<tr>
<td></td>
<td>. Prequalification of tenderers to avoid unsuitable subcontractor based on proven ability</td>
<td></td>
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<tr>
<td></td>
<td>. Ensure payments passed on promptly</td>
<td></td>
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<tr>
<td></td>
<td>. Make decision whether to support or determine subcontractor before failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>. All subcontractors to be approved by superintendent</td>
<td></td>
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<td></td>
<td>. Check programme regularly</td>
<td></td>
</tr>
<tr>
<td></td>
<td>. Integrate subcontractor's work</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attempt to involve client in subcontractor selection so that sole responsibility is with client (Contractor)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contractor's responsibility (Architect, Consultants, Owner, Project Manager)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Make builder/Subcontractor jointly responsible (Contractor)</td>
<td></td>
</tr>
<tr>
<td>ACTION</td>
<td>AMENDMENT</td>
<td>TRANSFER</td>
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<tr>
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</tr>
<tr>
<td><strong>SUCCESS TO COMPLTE CONTRACT ACCORDING TO PLAN AND SPECIFICATION</strong></td>
<td><strong>Contract award to a skilled and financially strong company</strong></td>
<td><strong>Professional project manager</strong></td>
</tr>
<tr>
<td>. Observe inspection in process</td>
<td>. Provide additional management supervision resources to the project</td>
<td>. Contractor's risk</td>
</tr>
<tr>
<td>. Select tender or negotiate with known preffer</td>
<td>. Penalties</td>
<td>. Liquidated damages</td>
</tr>
<tr>
<td>. Pre-tender selection of tenderer</td>
<td>. Project &amp; Construction management process</td>
<td>. Apply maintenance clauses from contract</td>
</tr>
<tr>
<td>. Competent supervision</td>
<td>. Contingency sum</td>
<td>. Safety Bond (Performance Bond)</td>
</tr>
<tr>
<td>. Consultant's vigilance</td>
<td>. Suitable site supervision</td>
<td><strong>APPROACH</strong></td>
</tr>
<tr>
<td>. Detailed approval of job and inspection technique</td>
<td>. Concise detail of amendments</td>
<td><strong>ADJUSTMENTS</strong></td>
</tr>
<tr>
<td>. Clean documentation.</td>
<td></td>
<td><strong>ADJUSTMENTS</strong></td>
</tr>
</tbody>
</table>

**ACCTIONS**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>AMENDMENT</th>
<th>TRANSFER</th>
</tr>
</thead>
<tbody>
<tr>
<td>. Alert contractor to regard</td>
<td>. Insist on First Aid Provision</td>
<td>. Contractor's responsibility by contract</td>
</tr>
<tr>
<td>. Implement a safety management programme</td>
<td>. Safety programme</td>
<td>. Relly DIR supervision of safety</td>
</tr>
<tr>
<td>. Strong contract clause</td>
<td>. Regular inspection</td>
<td>. Insure contractor's compensation</td>
</tr>
<tr>
<td>. Provide effective protection</td>
<td>. Pay for treatment &amp; awareness of safety throughout organisation</td>
<td>. Enforce statutory obligations on contractor</td>
</tr>
<tr>
<td>. Training of employer</td>
<td>. Provide safety committee</td>
<td>. Insurance</td>
</tr>
<tr>
<td>. Site barriers and equipments</td>
<td></td>
<td></td>
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<tr>
<td>. Check equipment for safety</td>
<td></td>
<td></td>
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<tr>
<td>. Strong safety programme on site</td>
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</tbody>
</table>

**LOCAL CONDITIONS IN CARRYING CONTRACT**

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<thead>
<tr>
<th>ACTION</th>
<th>AMENDMENT</th>
<th>TRANSFER</th>
</tr>
</thead>
<tbody>
<tr>
<td>. Allow them</td>
<td>. Share risk in each party</td>
<td>. Contractor's responsibility</td>
</tr>
<tr>
<td>. Plan ahead</td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Good international relations &amp; Good project management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Adequate search and establishment of liaison with local authority</td>
<td></td>
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<tr>
<td>. Set up branch at site.</td>
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</tbody>
</table>

**DEFERERENT DESIGN**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>AMENDMENT</th>
<th>TRANSFER</th>
</tr>
</thead>
<tbody>
<tr>
<td>. Avoid innovative design in building, system design, subsystem of mechanical...etc.</td>
<td>. Avoid purchasing innovative materials</td>
<td>. Architect and Consultant should share responsibility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>. Owner's responsibility</td>
</tr>
</tbody>
</table>
Clause 3.02: If the "physical conditions and characteristics" encountered differ from those indicated in the contract documents or the Builder considers the Works require variation then he is to "promptly notify" the Architect who is to "promptly investigate" and issue instructions before the Work affected proceeds.

Clause 10.29: If a difference is discovered from the site conditions indicated or an instruction re cl.3.02 is issued, then the extra cost or saving is treated as a Variation except for the application or certain percentage on costs.

<AS 2124>

Clause 12.1: The Contractor is deemed to have examined all available documents, all information relevant to the risk of his offer, the site and surroundings; and to have informed himself of all relevant physical conditions upon and below the site, and the matters relevant to the means of executing the contract.

Clause 12.2: If physical conditions are encountered which differ materially from those ascertainable in complying with cl. 12.1 and could not reasonably be anticipated at tender date by a competent and experienced contractor, the Contractor is to notify the Superintendent who is to investigate and determine if a variation is necessary.

<NPWC-2>

Clause 12: As with AS 2124 the Contractor is deemed to have examined and have actual knowledge of information available and to have satisfied himself of the sufficiency of his tender to allow him to comply with all his obligations.

There is no clause equivalent to AS 2124, cl 12.2.

Avoidance Method: As can be seen in Table 6-2, it appears that soil test data through extensive site investigation is recommended as an avoidance method. It is also the author's opinion that the risk of differing site conditions could be greatly diminished or minimized by a more through site investigation prior to the
letting of the contract. But the question remains as to the economic justification of the more expensive site investigation. Followings answers were collected as avoidance method.

a) Good soil investigation

b) Extensive site investigation

c) Employ local geotechnical consultants

**Abatement Method:** The use of a Unit Price Contract, as opposed to a lump sum contract, is to be considered as a abatement method, in that if the quantities of work to be done are greater than expected, the owner must assume the additional cost. A provisional sum is also suggested as an abatement method.

**Transfer Method:** By furnishing no subsurface information, the owner has usually placed the risk of additional cost due to differing site conditions upon the contractor. Only if the contract affords the contractor relief will he be able to require additional compensation.

The use of lump sum contract, as opposed to a unit price contract, could be considered a transfer technique
in that if the quantities of the work to be done are greater than expected, the contractor must bear the cost.

As shown in Table 6-2 there are contrary opinions about the responsibility of this risk between two groups. One is the group of the architect and owner, the other is the contractor.

In addition, a Latent Condition Clause is suggested as an other transfer technique. A "Latent Condition", in the general sense, is defined as a condition which is "hidden, concealed; existing but not manifest or developed; dormant"[256;13].

The provisions in the available Australian Standard Contracts dealing with Latent Conditions are varied in their approach as shown below;

<E5b>: Clause 7 operates as the Proprietor's warranty that the site will satisfactorily support the project works, but is subjected to provisions relieving the Builder of responsibility where the sub-surface conditions are not as shown or described in the contract documents or are found to be different to those as may have been stipulated by the Builder in his tender.

<MBW-1>: In terms of clause 3.01 the Proprietor is responsible for the accuracy of information
relevant to the Site contained in the Agreement and Clause 3.02 provides relief for the Builder where physical conditions and characteristics of the Site, including sub-surface conditions, encountered in the execution of the Works differ from conditions and characteristics according to the Agreement or, in any event, give reasonable clause for the Builder to consider that the Works require to be varied. The proprietor's warranty that the site will satisfactorily support the Works is given in Clause 3.03 but then subject to the provisions of Clause 3.02 and accordingly that warranty is more limited than the warranty preferred in Clause 7(a) of E5b.

<AS 2124>: The Contractor is deemed to have examined the noted documents and the site and its surroundings and to have informed himself as far as practicable of all relevant physical conditions upon and below the surface of the site and, curiously enough, the climatic conditions at and near the site. Clause 12.02 provides for a variation application in the case of latent conditions. There is a broad shift of responsibility to the Contractor but a vexed question is raised as to what inquiries, investigations and the like should be made by the Contractor to satisfy the test of reasonableness. The revised AS 2124 adopts AS 2124, save that Clause 12.1(d) is deleted; that is the provision deeming the Contractor to have informed himself as far as practicable of all relevant physical conditions upon and below the surface of the site and the climatic conditions at and near the site.

<NPWIC-3>: Clause 12 operates as an extensive deeming provision similar to Clause 12.1 of AS 2124, but it does not contain a latent conditions provisions. [256;11-15,Raines]

Thus, E5b limits itself to sub-surface conditions, MBW-1 refers to conditions including sub-surface conditions and AS 2124 (and its revised version) does not limit the provisions to sub-surface conditions.
However, recently in Australia, Muir [256;02/"Avoiding Disputes by Effective Management of the Contract-A Contractor's View"] pointed out that the interpretation of Latent Condition causes significant disagreement between the parties.

2. Act of God

An Act of God is defined as circumstance "Which no human foresight can provide against, and of which human prudence is not bound to recognise the possibility" [256;358,359]. The risk of Act of God which is oftenly called Force Majeure is an expression taken originally from the Code of Napoleon [256;357]. Wallace says "actually a Force Majeure clause covers a wider class of events than Act of God, including man-made events such as strikes or wars, but it must be beyond the control of the person alleging it, and it must be construed in the light of a general background and terms of the contract in question, so that differing decisions may be reached in different contracts"[256;359]. However Wallace added that "the expression has not received judicial interpretation in a case of a building contract." [256;359]
Acts of God in design through obtaining or providing statistical records to assess is advised as an avoidance method as shown in Table 6.2.

**Abatement method:** Noticeably, Extensions of Time for completion is suggested as an abatement method. An extension of time provision is frequently made in building contracts for the architect or the engineer to grant extension of time for the completion of work where delay due to certain specified clause has occurred. At first sight, such a clause appears to be designed primarily for the benefit of the builder, since its effects, if the clause is operated, will be to reduce his liability to pay liquidated damages in the event of delays. This is certainly so when the delay is due to causes for which the builder would otherwise be responsible—e.g. bad weather, or strike.

The basic premise to this provision must be that where an event has occurred which no prudent contractor could avoid, particularly those caused by the proprietor or his agents. The time allowed should only be the time lost, not the time of delay itself[11;202]. Wet weather, for example, may have little effect because the work at the time is mostly under cover, or it may cause problems which take considerable time to rectify as when trenches
for footing fill up with water. An important legal requirement which is not always clearly expressed is that for a proprietor to be able to maintain and enforce the liquidated and ascertained damage provisions, he must not have caused any delay to the contractor, or if he has caused delay, he has granted an extension of time for that delay under an express provision to that effect.

Followings are details about extension of time clauses stated in four Australian standard contracts; E5b, MBW-1, AS 2124, NPWC-2.[11;203-206]

<E5b>

Clause 24(a); "Upon it becoming evident" that completion is likely to be delayed" the builder is to notify the Architect.
Clause 24(b); If the delay is caused by a clause listed in cl.24(g), the Builder "shall be entitled to claim and shall be allowed an extention of time" subject to this clause.
Clause 24(c); "Within a reasonable time of it being practicable" the Builder is to notify the architect, setting out the cause and stating "a fair and reasonable period" for an extention of the Completion Date. That period will be deemed to apply if the Architect fails "within a reasonable time" to disagree with, and make his own assessment of, the period for extention.
Clause 24(d); The Architect's assessment will be deemed to apply if the Builder fails "within a reasonable time" to disagree. The matter goes to arbitration if he disagrees.
Clause 24(e); The right to arbitration of what is a "fair and reasonable period" is not affected by cl.24(c) and (d).
Clause 24(f); The Architect may make extensions where he is of the opinion that the Builder is
entitled. (This may allow an extension for a delay not listed.)
Clause 24(g); The causes of delay which entitle
extensions are listed in detail. Of course
(i),(ii), (ix),(x),(xi) and (xiii) relate to
matters concerning the Proprietor and his agents
and the Architect. (xiv) is "any matter, cause or
thing beyond the control of the Builder."
Clause 24(i); The Builder is "entitled to
reimbursement for loss and expense" resulting from
a delay where all the conditions set out apply:
(i) Where the delay is caused by: the giving (or
lack of) of Architect's instructions; changes due
to regulations; the non-appointment of an
Architect; delays by separate contractors; and the
valid suspension of Work by the Builder.
Where the delay is caused by: delays in approvals;
disputes with neighbours; industrial unrest etc.;
any other caused beyond the Builder's control; and
in the Architect's opinion the Builder has so acted
as to be entitled. (Here the Builder's actions
must be considered.)
(ii) An extension of time has been granted or
allowed.
(iii) The delay is not due to a default or an act
of the Builder.
(iv) All practical steps have been taken to reduce
the delay and minimise expense.
(v) The loss and expense has not been included in a
variation.
(vi) That when notice claiming extension of time
was given it included notice of claim for loss and
expense.
(vii) Details of the claim have been given as soon
as practicable after it commenced and when the
details could be checked.
(viii) "Within reasonable time" of the extension
being given /or deemed, written details of the
expense and amounts involved (or an estimate) have
been given.

<MBW-1>

Clause 9.01; If progress is "delayed by any cause/s
beyond the control of the Builder (other than a
variation)" in a manner reasonably expected to
delay completion, if he desires to claim then the
Builder must notify the Architect within 20 days of
delay arising. Note no specific delays are listed.
The notice is to state the nature, cause, and if
possible the extent, of the delay.
Clause 9.02; "As soon as practical" the Builder is
to give a further notice stating "a fair and reasonable time" for extension.
Clause 9.03: The Architect is to determine within 20 days what, if any, extension is to apply, and notify the Builder.
Clause 9.04: If the Architect fails to notify in accord with cl. 9.03 there will be a deemed extension for the time nominated by the Builder.
Clause 9.05: The Architect may at any time extend the time for completion if of the opinion that the Builder is entitled. (Like cl.24(f) of E5b - allows an arbitrator also to extend.)
Clause 9.06: The Builder will not be entitled to an extension unless he takes proper steps to avoid the cause and to minimise the consequences.
Clause 9.07: If a variation is likely to cause a delay, the Builder, before commencing or as soon as aware of the likelihood of delay, is to notify the Architect. If agreement is not reached as to the extension, the normal procedure is to apply.
Clause 9.08: There may also be a reduction in time for variations. There are a number of time limits on actions which require careful note.

<AS 2124>

Clause 28.1: Where the Contractor is not given possession of the site (except for his not insuring), he may claim an extension of time. If the delay is for more than 3 months he may treat it as a default by the Principal.
Clause 36.4: "Upon it becoming evident" that completion is "likely to be delayed by any cause beyond his control" the Contractor is to "forthwith notify the Superintendent: He may then "as soon as practicable" claim an extension of time for delays notified, with a statement of facts in support.
If the Superintendent determines it is justified he is to grant an extension accordingly, (note no time limit) and as soon as practicable after the grant notify the parties. The Superintendent may also grant extensions where not claimed.

<NPWC-2>

Clause 27.1: A delay in giving the Contractor possession of the site is a ground of an extension of time, but is not a breach of contract.
Clause 35.4: Where execution of the Works is
delayed by any cause arising out of any breach of the Contract or other act of or omission of the Principal, or by any other cause (except a breach by the Contractor, his Subcontractors, etc) which the contractor considers justifies an extension of time, then he is to notify the Superintendent within 28 days of the cause of the delay arising, giving the facts in support of the claim.

Transfer Method: As shown in Table 6.2, the contractor, project manager, and consultants insisted that the principal share the cost of damages caused by the risk of Act of God while the owner claims that the contractor has to accept the responsibility of this risk. Detailed opinions about sharing this risk will be discussed in detail in Section 6.6.1. (see page 295)

3. Weather

In considering what is a reasonable time for the nature of work and the period, the risk of poor weather conditions including the duration of daylight affects the cost of a project.

For instance, a tender in the spring for work which, if accepted at once, would be completed before the winter, would not be likely to be held open for acceptance in the autumn or even mid-summer. Similar considerations will apply to coast defence or sea
outfall work likely to be affected seriously by spring tides or seasonal weather. For more detailed explanation of the risk of weather, refer to Section 3.2.1. of Chapter III.

**Avoidance Method:** Logically, it is almost impossible to avoid this risk completely because we still cannot precisely predict future weather conditions. However, respondents suggest the following ideas as was seen in Table 6.2:

a) Use statistics and allow for delay.
b) Prepare a summary of known weather patterns.
c) Allow for normal inclement weather in contract terms.
d) Recognise extra costs and delays.

**Abatement Method:** As already explained in the risk of Acts of God, the extension of time clause is also advised as a major abatement technique (for more detail about extension of time concerned with weather, refer to 2. Acts of God, Abatement Method in this Section). There are also few more detailed practical suggestions;

e) Ensure that the site is drained at all stages.
b) Put vulnerable materials under cover.
c) Allow number of wet days in contract.
Transfer Method: There is also a similar argument about the responsibility of the risk of weather between contractor and other parties including Project Manager, Architect, Consultant as already been shown in previous risk factors. For more detailed statistical opinions about sharing method, see Section 6.5.2.

4. Availability and Productivity of Labor, Material, and Equipment

The availability and productivity of the resources necessary to construct the project are properly for the contractor to assume. His expertise should allow the assessment of cost and time required to obtain and apply these resources. This is the basic service that the owner is paying for. The cost of labor, materials, and equipment is a subject deserving considerable attention.

Avoidance Method: As shown in Table 6.2, Architects recommend few ideas which are intensively concerned with organising construction programme such as;

a) Adequate time to organise plan before work commences.

b) Make realistic programme.

c) Contractor to plan ahead.
From a contractor's viewpoint, more practical methods are recommended as follows:

d) Thorough pre-contract investigation.
e) Test available resources as part of design and planning phases.

**Abatement Method:** As an abatement technique, pre-order method are advised strongly. External to Australia an allowance for importing labor is suggested. Labor training is also recommended to improve productivity which is already popular in the South East Asian construction market.

**Transfer Method:** Liquidated Damage clauses contained in most contracts are advised by owner which most of the contract often contains. The major characteristic of such clauses is described as "the intention to secure due performance of contractual obligations, and to regulate beforehand in an agreed and certain manner the right of the parties, rather than leave them to the less predictable remedies otherwise available, and in particular the assessment of damages for breach of contract" by Wallace [232;617].
On the other hand, Fluctuation Clauses are designed to obtain for the contractor the amount of any increases in his costs, usually of labour or materials or both, which may take place after his tender and before the work is completed. The R.I.B.A. Forms (Clause 31, 1963 Forms) contain an optional fluctuations clause. The I.C.E.(Internation Civil Engineering) form and any Australian standard form of contract contains no such clause, but a standard printed "Variation of Price" clause adapted to the standard form is frequently incorporated in the contract documents.

5. Late Completion

Contracts of every kind commonly specify a date for the performance of some act. When they do so, it is a question of construction, usually depending on the subject matter of the promise and the commercial sense of the transaction, whether the obligation is a condition, so that failure to meet the date is a fundamental breach. The principle has been well stated in an Australian case, where the obligation under review was that of the employer to make the site available for the contractor to start work by a certain date:

"Where a contract contains a promise to do a
particular thing on or before a specified daytime may or may not be of the essence. If it is, the promisee is entitled to rescind, but he may elect not to excercise the right and an election will be inferred from any conduct which is consistent with the contract remaining in being. If not of the essence or no longer of the essence because of election, rescission is generally only permitted after giving a notice requiring performance within a specified reasonable time, and after non-compliance with the notice" [232;604, Carr v. J.A.Berriman Pty. Ltd.(1953), 27 A.L.T. 273 (Australia)].

In the event of work not being completed by the date provided for in the contract, the usual provision in contracts about damages for late completion will be applied. Such a provision has advantage for both sides, particularly the proprietor who would otherwise have to prove his actual damages. The amount must be a genuine pre-estimate of the loss which may result from delayed completion, i.e. it must not be a penalty. [11;209]

Provisions which impose damages in the event of delay are closely linked with the provisions entitling the contractor to extensions of time to complete. It has
been said that the extensions of time provisions, particularly those entitling an extension for the actions or orders of the proprietor, operate for the benefit of the proprietor because they keep his rights to damage for late completion 'alive'. The actual provisions considered below vary, especially with respect to notice and the timing of the application for or the withholding of damages.

The following are contract clauses which read Late Completion in Australian Standard contracts; E5b, MBW-1, AS-2124, and NPWC-2.[11;209-210]

<E5b>

Clause 27: If the Builder fails to complete the Works by the Date for Practical Completion (as extended under cl. 24) and the Architect gives notice at or within 28 days of the Notice of Practical Completion that they ought reasonably to have been completed on some earlier date (no earlier than the adjusted date), then the Builder is to pay or allow the sum calculated and certified by the Architect at the rate stated in the Appendix for the period.
Note: The withholding or dept only arises after the Notice of Practical Completion is issued, not from the Date for Practical Completion.

<MBW-1>

Clause 10.14: A similar provision to cl. 27 of E5b but notice is to be given within 20 days of the "date on which the Works actually reached or were deemed to have reached practical completion" that the works ought reasonably...etc.
Clause 10.15: This allows a provisional withholding
from Progress Certificates issued after the contract Date for Practical Completion. This withholding will be accounted for when the calculation and certification is made pursuant to cl. 10.14. The amount of the withholding is that which is "then provisionally due", not the estimate of the ultimate liability.

<AS 2124>

Clause 36.5: If the Contractor fails to achieve Practical Completion by the Date required then he is to pay the Principal liquidated damages at the rate stated in the Annexure. (note: no notice is required) The amounts progressively calculated may be deducted from any money due to the Contractor (including the Security if necessary). Where the Principal has used or occupied part of the Works then the amount payable will be reduced as determined by the Superintendent.

<NPWC-2>

Clause 35.5: Similar to cl 36.5 of AS 2124.

**Avoidance Method:** Although several ideas are recommended in an attempt to avoid the risk of late completion as shown in Table 6.2, the author believes that all these ideas could be categorised as method of abatement techniques because of their similar characteristics. These are:

a) Monitor programme on frequent intervals.

b) Owner allow reasonable overrun in early programming.

c) Contractor prequalification.

d) Allow adequate time for completion.
Abatement Method; The owner may reduce the risk of late completion through the use of a extension of time clause. The extension of time clause (see page 232 ) outlines for both contract parties where delays are execusable and those which are not. For those execusable delays, the owner has retained the financial risk of delay.

Another technique which is advised is using the Bonus and Penalty clause for the risk of unexecusable delay. The use of penalty clause only is usually not enforced by the courts [151;55]. By providing a bonus for early completion and penalty for late completion, the law is more likely to find that the contract was bargained for both parties on an equal basis, thus upholding a penalty for late completion.

Transfer Method; The most commonly encountered transfer vehicle for this risk is a Liquidated Damage Clause ( refer to page 228 ). A Liquidated Damage clause is a contract provision under which the owner and contractor agree that unexecused delays will result in a deduction from the contract amount. The amount to be deducted is set by contract and is usually stated in dollars per day.
If the contract makes no statement regarding events delaying the works of contractor, the law generally places the risks upon the contractor. The owner may well wish to abate certain of this risks. Often contracts contain Acts of God clause. Such clauses excuse the contractor from the cost of delays due to certain specified events as already explained in the risk of Acts of God. (refer to page 230) Floods, earthquakes, strikes, fires, war are often included as special risks in the international contracts.

6. Defective Design

Risk of defective design, popularly known as errors and omissions, is suggested as the responsibility of the owner. However it is also suggested that the consultant and the architect should accept the responsibility for damages resulting from errors or omissions.

Avoidance Method; As shown in Table 6.2, followings are recommended as an avoidance method.

a) Pride of authorship.
b) Avoid innovative design in building, system designs, structures, and subsystems of mechanical, electrical components.
Abatement Method; Avoid purchasing innovative materials.

Transfer Method

a) Architect and Consultant should share the responsibility.

b) Owner's responsibility.

7. Changes in the Work

It frequently becomes necessary to make changes in a project after the contract has been awarded. Changes must be authorised by the owner, and for this reason, the owner is frequently responsible for the cost associated with such changes. In standard contract provisions, the phrase 'change' is stated as the phrase 'variation'.[17;186-189]

<E5b>

Clause 1(a)(ii): The Architect "in his absolute discretion" can order variations of the works. There is no limit on the extent to which the contract may be varied.

Clause 19: No variation shall vitiate the Contract. Variations are to be valued using the Bill of Quantities unit rates where it is "work of the same character...under similar conditions...as work priced". Where it is not reasonable to apply such rates or there is no Bill then "a fair variation is to be made".
If it is not possible to predetermine the valuation or if instructed to, the Builder is to proceed with the variation work, keeping a record of the cost calculated at "appropriate current rates". The Builder is to submit a "reasonable price" for each variation supported by evidence and calculations. It may be agreed for others to measure for pricing by the Builder.

If the Architect dissents with the price, he may request revision of it giving reasons or provide his own valuation.

If the Builder does not dissent from that valuation it shall be deemed to be the value. The parties are not prevented from referring to arbitration any matters concerning variations. The Builder is to pay any fees associated with measurement for variations, but they are added to the Contract Sum.

The Builder is entitled by cl. 19(c) to overhead and profit on all variations whether added or omitted.

<MBW-1>

Clause 6.10: The Architect may instruct variations subject to them being "within the general scope" of the contract and of the "character and extent contemplated by and capable of being executed" under the Contract.

The contract sum is to be adjusted and the Date for Practical Completion adjusted as approved. All variations are to be authorised in writing by the Architect except in urgent matters which are to be confirmed "as soon as practicable".

Clause 10.16: All variations are to valued by the Builder submitting a "reasonable price" including details of delay costs, and actual or estimated costs, and measurements. (Fees paid for measurement are added to the Contract Sum.)

The parties are to endeavour to agree on the valuation including delay costs prior to commencement of work or as soon thereafter as practicable. If not agreed then valuation is by cl. 10.17 or cl. 10.18.

Clause 10.17.: The unit prices in the Bill of Quantities are to be used to value variation work of "similar character" done under "similar conditions". For other work a "fair valuation" is to be made.

The costs and expenses of delay caused by the variations are to be added to the value of the work.
To the value thus calculated is added an agreed percentage for preliminaries. Further agreed percentage allowances are then applied to the valuation; a different rate may be applied to additions and omissions.

<AS 2124>

Clause 40.1: Variations to work under the contract must be made only on a direction in writing. The Superintendent has "full power" to order variations over a wide range. The extent of all variations however may not, without the Contractor's consent, increase or decrease the value of the Contract by more than the percentage stated, or a reasonable amount if none is stated. In assessing the extent, certain variations are not accounted for.

Clause 40.2: Valuations are to be made applying Bill or Schedule rates where applicable to the variations. If the rates are not applicable the valuation is to be determined by agreement, or if not agreed, by the Superintendent "as he considers reasonable". Alternatively the variation may be carried out as Daywork in accordance with cl. 43.

Clause 40.3: The contractor may claim that a variation direction will interfere with the fulfilling of his obligations. The Superintendent may nevertheless require the execution of the variation and the contractor's obligations will be relieved to the extent set out by the Superintendent.

<NFWC-2>

Clause 40.1: The Superintendent may order a wide range of variations, altering the scope and character of the work with no limit on the extent to which the works may be varied. Unless otherwise agreed, the valuation of a variation is to be agreed prior to commencing work on it.

Clause 40.2: The valuation is determined in similar ways to cl. 40.2 of AS 2124 except that there is no provision for execution of the work as Daywork.
Avoidance Method; The number of ideas which described the importance of good communication with the client were as follows; (see Table 6.2)

a) Good briefing of designing.

b) Prepare detailed brief before plan starts.

c) Ensure client is exhaustively examined on his/her requirement at the outset.

d) Good communication interpretation of client's requirements during design phases.

The following ideas are also suggested;

e) Control design and client's approval.

f) Rigid project discipline.

h) Establish project requirements prior to contractor.

i) Documents well ahead.

j) Early planning of contract to finalize design.

k) Through investigation of designing needs before tender stages.

Abatement Method; A more through investigation or control of project alterations prior to contract awards and the introduction of construction expertise into the planning phase of a project are advised to reduce the
need for extensive charge after the contract has been awarded. The following summaries the suggestions made;

a) Define scope of work earlier.
b) Good communication, process well ahead.
c) Set early warning system + communication.
d) Early review of documentation.
e) Ensure all changes adequately controlled.

Again, since changes must be authorized by the owner and who is financially responsible for the cost associated with such changes, the following techniques are recommended;

f) Make client aware of consequences and accept responsibilities.
g) Reduce possibility of change by owner.
h) Consultants to charge for changes to their work.
i) Allow schedule of rates for variations to include schedule of rates for materials and labour for trades.

Also using an "appropriate contract clause to handle change" is recommended. For the abatement technique by contract clause for change, as already explained above, the Variation clause can serve the
function of an abatement method whereby the owner retains the responsibility for the cost of project changes. It also permits the owner to order changes without the necessity of obtaining the approval or consent of the contractor. Through the use of Contractor's Right to stop Work or Terminate clause, the contractor is given the right to withdraw from the project should there be a change in the owner's situation such that the job must be discontinued. The Suspension of Work clause allows the owner to stop work on the job temporarily, if necessary. The Owner's Right to Terminate Contract clause also allows the owner the alternative of stopping construction completely if a situation change necessitates such action. Details about the determination by the owner or contractor are given as follows in Australian contracts;[11;215-219]

**Determination by the Proprietor**

<ES5b>

Clause 22(a): Provided he is not in breach of the Contract, the Proprietor may determine the employment of the Builder under the Contract. This may not be done unreasonably or vexatiously. The procedure for determination requires default by the Builder. If without reasonable cause he suspends the execution of the Works; if he fails to proceed with reasonable diligence or in a competent manner; or refuses or persistently neglects to remove defective work or materials thereby materially affecting the Works, he will be in default.
The Architect is then to send by certified mail a notice specifying the default and stating the Proprietor's intention to determine if the default is not remedied "in a bona fide manner" within 14 days.

If the default is not remedied, the Proprietor may within a further 14 days by written notice delivered by certified mail forthwith determine the employment of the Builder under the Contract.

Clause 22(b): If the Builder commits one of a detailed series of insolvent acts then the Proprietor may forthwith by written notice delivered by certified mail determine the employment of the Builder under the Contract.

Clause 22(c): On the determination of the Builder's employment:
- the Proprietor may employ others to complete, using all plant materials and temporary works on the site; and
- If required, within 14 days the Builder is to assign all subcontracts and supply agreements (subject to their reasonable objection to further assignments).

The Proprietor may pay any subcontractor or supplier for work and materials not paid for by the Builder. Payments made may be deducted from any sum due to or to become due to the Builder.

- The Builder when required and not before, is to remove temporary works, plant, and materials. If not removed after 14 days, the Proprietor may sell them and adjust any amount due.
- Until the Works are complete the Proprietor need make no further payments. "As soon as reasonable" the cost to complete are to be ascertained and all adjustments made to the Contract sum. Any amount in excess of that otherwise payable will be a debt owed by the Builder.

<MBW-1>

Clause 12.01: The defaults which entitle the Proprietor to determine are similar to those cl. 22(a) of E5b though in more detail. The Architect gives the notice of default, sent by certified mail.

Clause 12.02: When the default is not remedied within 10 days, the Proprietor may within a further 10 days by written notice sent by certified mail determine the Builder's employment.

Clause 12.03: Similar to cl. 22(b) of E5b, though the determination may be made "at any time".

Clause 12.04: Wherever the registration is required
by legislation and the Builder is de-registered, the Proprietor "may forthwith determine" his employment.
Clause 12.05: The proprietor's rights are similar to those under cl.22(c) of E5b. Payments made to subcontractors may be "deducted from or paid out of the proceeds of any security... or from any sum due" etc.

<AS 2124>

Clause 48.1: If the Contractor defaults in performance or observance of the Contract or refuses or neglects to comply with directions, then the Principal may issue a show cause notice, stating its purpose (this clause), the default or refusal involved, and the period (14 days at least) within which the Contractor is to show cause why the powers should be excercised.
If the Contractor fails to the Principal's satisfaction to show cause within the period, then the Principal may take the remaining work out of the Contractor's hands (wholly or in part), or cancel the contract. Where the work is taken out of his hands, the Contractor will not be entitled to further payment until after completion and adjustment.
Clause 48.2: Where the Principal has taken the work out of the Contractor's hand he may:
- complete the whole (or Part) of the work remaining, or he may employ others to carry out the work;
- take possession of and use any materials, plant, etc. owned by the Contractor as needed for the contract completion;
- require the Contractor to assign within 14 days any subcontract or supply agreement.
The Contractor's only right is to require the Principal to maintain the Contractor's plant.
On completion all plant and surplus materials are to be handed over to the Contractor, except if the final cost of the work results in an unsatisfied deficiency where the Principal may sell the plant and materials to satisfy the deficiency.
Clause 48.3: On the issue of the Certificate of Practical Completion the Superintendent is to ascertain the total cost of the work. Where the total cost is greater than the amount which would have been payable, then the Contractor is to reimburse the principal.
Clause 44.1: Similar to cl.48.1 of AS 2124. No minimum time limit is specified for the show cause notice. The Principal may suspend payment and give notice to show cause. The Principal having taken over the work, may exclude the contractor from the site. The Principal may alternatively cancel the contract.

Clause 44.2: Suspension of payment may continue until the default, refusal, or neglect stated in the notice has been remedied.

Clause 44.3: Where the Principal elects to take over the work, he may complete or may contract with or employ others to complete. The Principal has similar rights to use plant and materials as in cl.48.2 of AS 2124 though he has no specific right to require assignment of subcontracts.

Clause 44.4: Similar to cl.48.3 of AS 2124.

Clause 44.6: If the Contract is cancelled, the Contractor forfeits all money not payable at the time of the cancellation. Money paid and payable at the time of the cancellation is deemed to be in full satisfaction of all claims of the contractor.

Determination by the Contractor

Clause 23(a): The Builder may, if any of the following occurs, forthwith by written notice sent by certified mail suspend operations, or determine his employment under the contract. A suspension of the Works will not prevent determination of his employment.

- If the Proprietor, having not paid a certified amount within the time required, further fails to pay within 7 days of a notice of possible determination.
- If the Proprietor interferes with or obstructs the issue of any certificate.
- If the execution of the Works is delayed by more than 28 days by;
  -lack of instructions applied for,
  -disputes with neighbours or occupiers,
  -the failure to reappoint an Architect,
  -dealys caused by special contractors,
- The Builder not having possession of the site any delays may be treated as consecutive if not interrupted by other than bona fide recommencements.
- If the Proprietor commits one of specified acts of insolvency,
- If the Architect fails to issue a Certificate after 7 days of due date and further fails to issue within 14 days of a notice from the Builder of possible determination.

Clause 23(b): Any rights or remedies, including the Builder's liabilities under cl.20, which have arisen prior to the removal of the Builder's property from the site will remain despite determination.

The Builder and subcontractors with proper care and dispatch shall remove all temporary buildings, plant and materials. After accounting for money previously paid, the Proprietor is to pay the Builder:
- the value of the work completed;
- the value of work executed but not complete;
- the cost of materials ordered for the Works, which become the Proprietor's own payment;
- the cost of removing plant, materials, etc.;
- any loss and/or damage, and/or expense caused to the Builder.

The Builder is entitled to a lien on unfixed materials paid for by the proprietor.

<MBW-1>

Clause 12.06: Similar to cl.23(a) of E5b except the Proprietor has 10 days in which to pay after notice is given by the Builder. Also the extent of the delays to the execution of the contract for the various reasons will be set out in the Appendix.

Clause 12.07: As with E5b the insolvency of the Proprietor entitles the Builder to determine his own employment.

Clause 12.08: As cl.23(b) of E5b.

Clause 12.09: In the event of prolonged delays to the commencement or execution of the contract not caused by either party, then either may notify the other by certified mail of his intention to determine the Builder's employment. Within 15 days of the parties are to negotiate a determination agreement. If none is reached the matter may be referred to arbitration. See also 12.10 and 12.11.
Clause 47.1: If the Superintendent fails to certify or the Principal fails to pay as prescribed, the Contractor may give to the principal and the Superintendent notice of the failure either serving as required or by registered mail. If after 14 days the Superintendent fails to give his decision or the Principal fails to pay, the the Contractor may either suspend the Works adding the costs thereof to the contract sum, or cancel the Contract and recover payment for all work executed and all rightful damages.
Clause 47.2: The same rights apply where the Principal is insolvent.

Clause 34.5: The Contractor has no express right to determine his employment under the contract. He has a right to suspend the progress of the Works (cl.34.3) and where the suspension was "due to an act, default or omission of the Principal" his employees or consultants, then the Contractor is entitled to the extra costs attributable thereto.

Transfer Method: Again the similar argument about who is responsible for the risk of changes in the work was shown in Table 6.2. The statistics about sharing the risk of Changes in the Work will be explained in Section 6.6 with the result of Survey.

8. Vandalism and Malicious Mischief

As explained in Chapter III, the title is self-explanatory and the exposure to loss is real. The location and the type of project, as well as the
protective measures taken, will affect the extent of exposures to loss. Answers for the treatment of this risk are as follows; (see Table 6.2)

**Avoidance Method**

a) Security measures.
b) Watchman on site and patrolling.
c) Strong clause in contract for site security.

**Abatement Method**

a) Allow for repair cost.
b) Inspection.

**Transfer Method:** As the most usual transfer vehicle, insurance is recommended.

9. Failure to Complete Contract according to Plans and Specifications

**Avoidance Method:** As with the risk of subcontractor failure, some measure of contractor prequalification through pre-tender selection or a negotiation with well known performer can provide some protection. The
contractor's past experience may well be a clue to what the owner may expect to happen on his job. As shown in Table 6.2, recommended methods for the avoidance techniques are:

a) Observant inspection in process.
b) Selected tenderer or negotiate with well known performer.
c) Competent supervision.
d) Pre-tender selection of tenderer.
e) Consultant's vigilance.
f) Detailed approval of job and inspection technique.
g) Planning and quality assurance.
h) Clean documentation.

Transfer Method; The most common transfer technique is a surety bond. This bond, called a performance bond, has been described in some detail earlier in Chapter IV. Also liquidated damages is recommended. Another often used vehicle is the warranty clause. A warranty clause insures that defects which appear after completion are still the responsibility of the contractor. Under a warranty clause, certificate of completion, final payment, and moving into the project may not relieve the contractor from responsibility for defects. These
different causes for defects are often reflected in the contract by provisions entitling payment for the rectification of the design defects. Australian Standard Contracts read warranty clause as follows; [11;210-211]

<E5b>

Clause 25(g): The Date for Practical Completion is the date of commencement of the Defects Liability Period.
Clause 26: Any defects, shrinkages, or other faults which become evident within the Period stated in the Appendix are to be good "within a reasonable time" of the Architect's instructions. Those due to materials and/or workmanship being not in accordance with the contract will be at no cost to the Proprietor. Those occurring notwithstanding compliance will be treated as variations. If no period is nominated in the Appendix, the Defects Liability Period will be 26 weeks.

<MBW-1>

Clause 9.11: the Defects Liability Period commences on the Date of Practical Completion (Notice or deemed) and is for the period stated in the Appendix. (A period must be stated.)
Clause 9.12: Subject to cl. 6.11 and agreement to adjustment for uncorrected work, the Builder is to make good all defects "within a reasonable time" of the end of the period.
Clause 6.11: If during the period stated, "any faults, omissions, shrinkages or other defects" are apparent then the Architect may instruct rectification stating a reasonable time for the making good of those defects. The Builder is promptly make good and complete within the period stipulated. Those defects occurring notwithstanding compliance with the contract will be treated as variations, and other rectified at no cost to the Proprietor. If a defect is not made good "within a reasonable time" it may be made good by others (see cl. 5.06). There may be a second Defects Liability Period applied to those items of plant or parts of the
Works listed in the Appendix. The second Period will commence from the making good of a defect in the initial period, and can no longer than the main Period.

<AS 2124>

Clause 38.1: The Defects Liability Period commences on the Date of Practical Completion and runs for the Period stated in the Annexure. Provision is made for separate periods to apply for Seperable Portions.
Clause 38.2: The Contractor during the Period is to rectify defects and omissions existing at Practical Completion and which become evident, and are due to any cause for which he is responsible (including design), when directed to by the Superintendent. The direction may state the date by which the remedial work is to be completed. If not completed by the time stipulated, the Principal may rectify at the Contractor's risk and expense. The Contractor is not responsible for the effects of fair wear and tear.
Clause 38.3: Where remedial work is necessary, the same period for Defects Liability (or a lesser period) may apply to the remedial work from the day it is completed. Tests may be ordered on remedial work within one month of completing that work (see cl. 33.8).

<NFWC-2>

Clause 37.1: Similar to cl. 38.1 of AS 2124 but where the Principal occupies or uses part of the Works prior to completion (cl. 35.3) the Defects Liability Period for that Part commences at the occupation or use.
Clause 37.2: As cl. 38.2 of AS 2124.
Clause 37.3: As cl. 38.3 of AS 2124.
Clause 37.4: As cl. 33.8 of AS 2124.

10. Accidents

During the performance of all building and engineering operations, an accident may result in damage
to the works themselves, or lead to claims in tort for damage to property by third persons such as adjoining occupiers, or for personal injuries by workmen, neighbours or passers-by. It has already pointed out that [232;98] employer will always be vicariously liable in tort for the acts of the contractor. There is, nevertheless, a very real possibility that the employer may find himself sued by third persons as a result of damage being done by the contractor, on the ground that he or the architect owed a duty of care in contract or tort to injured persons or adjoining occupiers. [232;306]

However it is not unusual to find express provisions under which the contractor undertakes to protect the works themselves during construction and to reinstate them free of charge in the event of any damage occurring from whatever causes. Again, during the course of the contract, prior to practical completion, the contractor has the control of and responsibility for the safety of and protection of all the work, temporary work, materials and plant. The contractor will also be responsible for the protection from damage to property and personal injury of persons other than those involved in the contract. The only general law exception to these liabilities of the contractor will be where the proprietor by his actions or negligence causes the
damage to the works, etc., or the injury or damage to other persons. These liabilities and exceptions are expressed in the main contract forms in a number of ways under different clause headings.[11;189-190]

<E5b>

Clause 20(a): Except in an additions and alterations contract the Builder is liable for and indemnifies the Proprietor against claims for damage to any real or personal property, arising from the execution of the contract provided it is due to the negligence or default of the Builder or Subcontractors etc.

The indemnity does not cover damage to property arising by accident or as a result of faulty design or from the Proprietor's default.

Clause 20(b): The Builder is liable for and indemnifies the Proprietor against claims for personal injury or death of any person as a consequence of the execution of works, unless due to an act or negligence of Proprietor or persons for whom he is responsible.

Clause 20(c): If the Proprietor or a tenant or other authorised person occupies a part or all the Works prior to Practical Completion, the Builder is not liable for damage to property or injury to persons etc. "occasioned by such occupation or use".

<MBW-1>

Clause 8.01(Both Alternatives): As cl.20(a) of E5b.
Clause 8.02(Both Alternatives): As cl.20(b) of E5b.

<AS 2124>

Clause 16.1: Prior to Practical Completion the Contractor is responsible for all "work under the Contract" including all materials and plant and temporary work.

Clause 16.2: Except where the loss or damage to the Works frustrates the Contract, the Contractor is promptly and at his own cost make good loss or
damage to the work under the Contract, for which the Contractor is responsible. Losses and damages arising from an "excepted risk" in cl. 16.3 are to be promptly made good and the work involved treated as a Variation.
Clause 16.3: The "excepted risks" (for which the contractor is not responsible) are negligent acts or omissions of the Principal and the Superintendent and anyone for whom they are responsible, and major events such as war.
Clause 16.4: After Practical Completion and prior to the Final Certificate the Contractor has a limited responsibility for damage to the Works etc. arising from the completion of his obligations.
Clause 17: The Contractor is to indemnify the Principal against all loss or damage to the property of the Principal or others and claims resulting from injury or death to the Principal or others, arising from the execution of the Works.

<NPWC-2>

Clause 16.1: Prior to Practical Completion the Contractor is solely liable for the care of the Works, temporary works, materials and plant on the Site.
The Contractor is, at his own cost, to make good any loss or damage resulting from "any cause whatsoever" except the "excepted risks" in cl. 16.2 for which the making good will be a variation.
Clause 16.2: Excepted risks are generally as stated in cl. 16.03 od AS 2124, though acts or omissions of professional consultants are included.
Clause 16.3: For the period from Practical Completion until the end of Defects Liability the Contractor is to indemnify the Principal against loss or damage to the Works arising from acts or negligence of the Contractor, his subcontractors, agents etc., or out of a default (faulty design, workmanship or materials) by the Contractor under the Contract. There are detailed provisions to apply in staged completion.

Avoidance Method; Almost of the answers are concerned with safety techniques such as; (see Table 6.2)
a) Alert contractor to regard.
b) Implement a safety management programme.
c) Strong Contract Clause.
d) Provide effective protection.
e) Training of employer.
f) Site barriers and equipment.
g) Check equipment for safety.
h) Strong safety programme on site.

Abatement Method; Similar ideas are suggested with the avoidance methods except "Providing safety committee".

Transfer Method; Insurance is given as the most oftenly used transfer vehicle. All respondents agree that this risk is the contractor's responsibility.

11. Lack of Communication

The most important aspect of the day-to-day technical communication with construction industry involves tender documents and working instructions..etc. And each party has to make his own decision as to what he thinks the other party wants or will accept. This leaves the way open for misinterpretation and for differences of opinion. For instance, having received
instructions from the client, the contractor then has to 
assess them down the line and transform the written 
communication into real construction. This involves 
giving instructions at different levels in the firm, 
each level requiring its own form and standard of 
communication. To site and engineer level, instructions 
are mainly transmitted in writing and this includes 
drawings, But below this level, the communication is 
mainly oral.

Avoidance Method: For communications among parties, 
several methods to improve communication procedures are 
recommended;

a) Regular contact with site and contractor's 
report + site meeting.
b) Create structural meeting and provide 
opportunity for communication.
c) All instructions and variations in writing.
d) Regular site meeting with all parties.
f) Define and establish commonly understood and 
agreed system in administration.
g) All building professionals should attend 
management course.
h) Set up and enforce communication procedure.
i) Ensure that each party is represented by 
experienced and competent personnel.
**Abatement Method:** For the methods of abatement, similar ways are also recommended with the avoidance methods. These are:

a) Promote good relations.
b) Provide telephone.
c) Change administration procedure as necessary.
d) Each party share its own cost.
e) Verbal communication memos.
f) Regular review.
g) Project management procedure.
h) Instigate management system when communication can not be avoided.
i) Meeting at frequent intervals.

12. Local Conditions in Overseas Project

The politics, stability and customs of local sites in overseas project will be important factors. The Commonwealth countries which have a colonial past will have determined the legal system and probably the type of agreement that can be negotiated. Some countries without such a history may have little in terms of commercial law. Arbitration may not be provided for and the courts may be available only to those of the appropriate nationality or religion. (For more detail about this risk, refer to page 52) Recommended ideas for the treatment of this risk are as follows;
**Avoidance Method**; Unfortunately only a few superficial comments were given for this risk. No ideas were given for the abatement and transfer method.

a) Plan ahead.
b) Good international relations and good project management.
c) Establish branches overseas

13. Site Inspection

As shown in Table 6.2, following answers were given as treatment methods for the risk of site inspection.

**Avoidance Method**

a) Have a joint inspection on a required basis.
b) Careful site inspection with photographs, etc.
c) Carry out and record filing.
d) Consultant and contractor to cooperate.
e) Use experienced consultant.
f) Clarify basis of site inspection of works by client and Architect, i.e.) reapprovals, delays, etc.
g) Adequate time for thorough inspection.
Abatement Method

a) Involve all parties that may be involved.
b) Site representation by contractor and consultants.

14. Subcontractor Failure

This is a risk properly account for by contractor except where it arised from one of the other risks identified herein as attributable to the owner or designer. Problems arise in relation to nominated subcontractor occurs when through death, liquidation, bankruptcy or repudiation, the subcontractor is no longer able or willing to continue and complete his work.

Avoidance Method; Methods by prequalification of tenderers are strongly suggested for the avoidance technique;

a) Obtain references prior to selection of nominated subcontractor.
b) Clear obligation of responsibility.
c) Prequalification of tenderers to avoid unsuitable subcontractor based on proven ability
Abatement Method

a) Ensure payments passed on promptly.
b) Make decision whether to support or determine subcontractors before failure.
c) All subcontractors to be approved by superintendent.
d) Check programme regularly.
e) Integrate subcontractors work.

Transfer Method; Although this is a risk for the contractor except where it arises from one of the other risk of the owner or designer, the contractor may attempt to involve the owner in subcontractor selection so as to share some responsibility with the owner.

6.5.2. Treatment Methods of Contractual and Legal Risks

15. Failure to enter into the Contract

Avoidance Method; Various ideas which are mostly concerned with the sufficient checking of tendering conditions were given as follows; (For more detail, refer to Table 6.3)

a) Tender invitation to inform of conditions and obligations.
<table>
<thead>
<tr>
<th>AVAILED</th>
<th>ADAPT</th>
<th>TRANSFER</th>
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</thead>
<tbody>
<tr>
<td><strong>FAILURE TO ENTER IN THE CONTRACT</strong></td>
<td></td>
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<tr>
<td>. Tender invitation to inform of conditions and obligations</td>
<td>. Ensure adequate correspondence exists to form surrogate contractor</td>
<td>. Negotiate tender</td>
</tr>
<tr>
<td>. Ensure contract is signed prior to commencement</td>
<td>. Research the condition which lead to the failure</td>
<td></td>
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<tr>
<td>. Prevent by strong tender and contract procedure</td>
<td>. Take appropriate action to reduce risk</td>
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<tr>
<td>. Check the elements of offer and acceptance</td>
<td>. Selected tendering</td>
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<td>. Security deposits and good tendering conditions</td>
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<td>. Deal with reputable</td>
<td></td>
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<td>. Tender on work within financial and technical ability</td>
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<tr>
<td><strong>DELAYED DISPUTE RESOLUTION</strong></td>
<td></td>
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<tr>
<td>. Respond to correspondence promptly</td>
<td>. Seek legal advice early in dispute</td>
<td>. Contractor's responsibility</td>
</tr>
<tr>
<td>. Delete arbitration clause from contract</td>
<td>. A well guess to compromise and negotiate reasonably</td>
<td>. Require contractor to carry on regardless of matter in dispute</td>
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<tr>
<td>. Appropriate step by step process for resolution of disputing contract</td>
<td>. Regular Union meeting</td>
<td>. Use of an arbitrator at early stage in dispute</td>
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<tr>
<td>. Provide penalty down</td>
<td></td>
<td>. Work to continue despite of dispute</td>
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<tr>
<td>. Industrial relations management and practice</td>
<td></td>
<td>. Principle provide industrial responsibility (Contractor)</td>
</tr>
<tr>
<td>. Attack to problem immediately if occurs</td>
<td></td>
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<tr>
<td>. Specify the method of settlement</td>
<td></td>
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<tr>
<td>. Conciliation relevant if parties can not resolve dispute by negotiator</td>
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<tr>
<td>. Effective &amp; Equitable dispute resolution</td>
<td></td>
<td></td>
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<td>. Union contact &amp; discussion with agreed dispute settlement mechanism</td>
<td></td>
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<tr>
<td><strong>APPROVALS</strong></td>
<td></td>
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<tr>
<td>. Ensure document complete</td>
<td>. Site conference with all representatives</td>
<td>. Principal to secure approvals before tendering</td>
</tr>
<tr>
<td>. Set up clear system of approvals, submission meeting, etc.</td>
<td>. Respond promptly in the event of delays, and monitor progress carefully</td>
<td>. Contractor's responsibility to submit items for approval at early stage</td>
</tr>
<tr>
<td>. Obtain as many consents as possible</td>
<td>. Simplify procedures, shortening of approval delegation</td>
<td>. Architect's and Builder's responsibility</td>
</tr>
<tr>
<td>. Consultants, Contractor, and owner to cooperate to obtain all approvals as required</td>
<td>. Double check before commenced</td>
<td></td>
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<tr>
<td>. Streamline government systems</td>
<td>. Contact liaison with bodies giving approvals</td>
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<tr>
<td>. Plan ahead to get early submissions</td>
<td>. Ensure Approvals do not delay performance of project</td>
<td></td>
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<td>. Keep approvals authorities informed about projects</td>
<td>. Induce time periods for approvals in contract documents</td>
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<tr>
<td>AVOIDANCE</td>
<td>AGREEMENT</td>
<td>TRANSFER</td>
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<tr>
<td><strong>LACK OF CONTRACT CLARITY</strong></td>
<td></td>
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<tr>
<td>- Obtain independent check of documentation</td>
<td>- Have contract documents readily an educated lawyer</td>
<td>- Have contractor sign document that all not reviewed clauses are understood (Consultant)</td>
</tr>
<tr>
<td>- Write a clear contract and have pre-</td>
<td>- Check with the contractor about problems before signing</td>
<td></td>
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<tr>
<td>contract negotiation to clarify</td>
<td>- Provide for reviews as early as possible</td>
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<tr>
<td>- Use of firm's model contract form or</td>
<td>- Preparation of documentation manuals for written contracts</td>
<td></td>
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<tr>
<td>conditions</td>
<td>- Rectify quickly</td>
<td></td>
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<tr>
<td>- Use professional consultants and lawyers if necessary</td>
<td>- Regular site meeting</td>
<td></td>
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<tr>
<td>- Choose experienced consultants</td>
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<tr>
<td>- Get contract clear by adequate review before awarding</td>
<td></td>
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<tr>
<td>- Ensure contracts are written carefully for each project. Do not use standard clauses without checking the relevance to current project</td>
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<tr>
<td><strong>COST OF DISPUTE SETTLEMENT</strong></td>
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<tr>
<td>- Good communication with contractor</td>
<td>- Respond quickly</td>
<td>- Contractor's responsibility (Architect, Consultant, Owner)</td>
</tr>
<tr>
<td>- Cover by agreement with owner</td>
<td>- Seek legal advice early in dispute</td>
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<tr>
<td>- Delete arbitration clause from contract</td>
<td>- Budget appropriation for disputes</td>
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<tr>
<td>- Negotiate prior to getting into a dispute solution</td>
<td>- Keep contingency fund for this purpose</td>
<td></td>
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<tr>
<td>- Attempt to settle dispute when arising</td>
<td>- Willingness to resolve dispute &amp; construction work</td>
<td></td>
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<tr>
<td>- Should be settled within 28 days of occurrence</td>
<td>- Ensure contract is Risk+Fall cover</td>
<td></td>
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<tr>
<td>- Specify the method of settlement</td>
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<tr>
<td><strong>LABOR DISPUTES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Assessment prior to awarding contract</td>
<td>- Skillful industrial relation management</td>
<td>- Contractor's responsibility</td>
</tr>
<tr>
<td>- Skillful negotiation</td>
<td>- Have let dispute become confrontation</td>
<td></td>
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<tr>
<td>- Negotiate site related labor conditions</td>
<td>- Have strong Industrial Relation representation on site - solve problem at work place</td>
<td></td>
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<tr>
<td>- Response of owner to contribute where</td>
<td>- Ensure contract give extension of time for labor disputes</td>
<td></td>
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<tr>
<td>appropriate to resolve disputes</td>
<td></td>
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<tr>
<td>- Trained industrial officer available</td>
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<tr>
<td>- Good industrial relations</td>
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</tbody>
</table>
b) Ensure contract is signed prior to commencement.
c) Prevent by strong tender and contract procedure.
d) Check the elements of offer and acceptance.
e) Security deposits and good tendering conditions.
f) Tender on work within financial and technical ability.

**Abatement Method:** The practice of private bid opening may be considered an abatement technique in that it provides the owner with the option of allowing an obviously erroneous low bidder to correct his bid. Any such attempt where the bid results are public knowledge would inevitably result in legal action by an unsuccessful bidder. Also, when the low bidder does not know the magnitude of the other bids, he is less likely to attempt to avoid entering into the contract because he was considerably lower than other bidders.

**Transfer Method:** The security Bid Bond, described early in Chapter IV (see page 100), is the most frequently used transfer vehicle of this risk. With a few legal exceptions, failure by the contractor to enter into the construction contract will result in a claim against the Bid Bond.
16. Delayed Dispute Resolution

Avoidance Method; The answers obtained for the avoidance methods are as follows; (see Table 6.3)

a) Respond to correspondence promptly.
b) Delete arbitration clause from contract.
c) Appropriate step by step process for resolution of dispute contract.
d) Provide penalty down.
e) Industrial relations management and practice.
f) Attack problem immediately if it occurs.
g) Specify the method of settlement.
h) Conciliation relevant if parties cannot resolve dispute by negotiater.
i) Effective and Equitable dispute resolution.
j) Union contact and discussion with agreed dispute settlement mechanism.

Abatement Method; Similar comments were given with the methods of avoidance such as;

a) Seek legal advice early in dispute.
b) A well guess to compromise and negotiate reasonably.
c) Regular Union meetings.
Transfer Method; There was some disagreement between the owner and the contractor about the responsibility of this risk. However, whether the project is involved in dispute or not, all parties point out that the contractor should carry on regardless of the matter in dispute. The use of an arbitrator at an early stage is also suggested.

17. Delayed Payment on Contract

The risk of non-payment or insufficient payment on a contract causes a tremendous financial difficulty for firms. In overseas projects the treatment of risk of delayed payment on contract sometimes needs a direct diplomatic negotiation between countries.

Avoidance Method; As shown in Table 6.3, the following answers were given as an avoidance method.

a) Ensure reliable source of funds of the project.

b) Acquire fixed interest rate loan to avoid financial difficulty. (Owner)

Abatement Method

a) Through legal procedure.

b) Act promptly if the difficulty is perceived.
Transfer Method

a) Owner's responsibility.

b) Obtain credit which is repaid over a period of time following practical completion.

18. Lack of Contract Clarity

Many disputes are the result of ambiguous plans and contract clauses.

Avoidance Method; Various answers were given as follows; (see Table 6.3)

a) Obtain independent check of documentation.

b) Write a clear contract and have pre-contract negotiation to clarified.

c) Use of firm's model contract form or conditions

d) Use professional consultants and lawyers if necessary.

e) Choose experienced consultants.

f) Get contract cleared by adequate review before awarding.

g) Ensure contracts are written carefully for each project. Do not use standard clauses without checking the relevance to current project.
Abatement Method; Methods which were recommended for the abatement technique of this risk are:

a) Have contract documents read by an educated laymen.
b) Check with the contractor about problems before signing.
c) Provide for reviews as early as possible.
d) Preparation of documentation manuals for written contracts.
f) Rectify quickly.
g) Regular site meeting.

Transfer Method; Almost all of the respondents did not answer for except one consultant who said "Have contractor sign document were not reviewed".

19. Approvals

In building contracts, there are frequently to be found express terms that the work, in addition to its compliance with the contract requirements and description, is to be done to the approval or satisfaction of the architect or engineer, or for the employer, or for some person quite unconnected with the contracting parties, such as the local or by-law authority.
Avoidance Method: To avoid the risk of approvals, followings answers were given; (see Table 6.3)

a) Ensure documents complete.
b) Set up clear system of approvals, submission meetings. etc.
c) Obtain as many consents as possible.
d) Consultants, contractor, and owner to cooperate to obtain all approvals as required.
e) Streamline government system.
f) Plan ahead to get early submission.
g) Keep authorities informed about projects.

Abatement Method

a) Site conference with all representatives.
b) Respond promptly in the event of delays and monitor progress carefully.
c) Simplify procedures, shortening of approval delegation.
d) Double check before commenced.
e) Contact liason with bodies giving approvals.
f) Ensure approvals do not delay performance of project.
g) Induce time periods for approvals in contract documents.
Transfer Method

a) Principal to secure approvals before tendering.
b) Contractor's responsibility to submit items for approval at early stage.
c) Architect's and Builder's responsibility.

20. Cost of Dispute Settlement

Avoidance Method; Ideas for the improvement of communication with owner were suggested for the avoidance purpose as follows;

a) Good communication with contractor.
b) Negotiate prior to getting into a dispute resolution.
c) Attempt to settle dispute when arising.
d) Cover by agreement with owner.
e) Specify the method of settlement.

Abatement Method; As with the avoidance method, an "early response to problem" is recommended as follows;

a) Respond quickly.
b) Seek legal advice early in disputes.
c) Keep contingency fund for this purpose.
d) Budget appropriation for disputes.

e) Rise and Fall clause.

Rise and Fall will be discussed further in the risk of Inflation. (refer to page 64 and 279)

Transfer Method; It was claimed this risk should be a responsibility of the contractor by the architect, the consultant, and the owner.

21. Labor Disputes

Avoidance Method; If the principal or construction manager controls industrial relations for the project, it is most important to minimize contractual disputes by making sure that the most competent and experienced industrial relations practitioners are appointed.

Abatement Method; Similar answers are shown with avoidance method except using Extension of Time clause;

a) Skillful industrial relation management.
b) Have strong industrial representation on site to solve problems at work place.
c) Ensure contract give extension of time for labor disputes.
6.5.3. Treatment Methods of Economic Risks

22. Inflation

It is necessary for all segments of the industry to give proper consideration to the treatment of this risk factor. Should an owner be unwilling to accept responsibility for this uncertainty, he must be prepared to pay an additional sum for the price of performance. In today's climate where there are voluntary wage and price guidelines, one must meet the criteria and limitations set down in the guidelines by the executive branch of government. This will cause, over a period of time, a distortion in the economic relationship between wages and prices. The demands and desires of labour and requirement for project by the people and organisations who participate in the industry must in the long term be met. After these voluntary guidelines have been made ineffective in the economy as a whole, they will be made mandatory. Following this development and its increased distortion of economic relationships, these controls will be removed causing a rapidly escalating wage and price spiral which will make it imperative for contractors to bid hard money type contract without including unconscionable escalation clause.

Avoidance Method; The use of lump sum contracts and rise and fall contracts are the most prominent avoidance
technique as suggested. Most building and engineering contracts are lump sum contracts. As a consequence of economic insecurity and inflation most lump sum contracts are subject to rise and fall. Generally only small or short term projects are for a fixed price. There are a variety of methods falling between the extremes of full rise and fall and a fixed price, usually providing for an agreed amount in lieu of the right to rise and fall, or for rise and fall to apply only after an agreed period.

However, there have been a number of different rise and fall clauses and formulae used in building contracts which have been the subject of many disputes and complex decisions by the courts [11;101]. The most recent provisions have been based on separate formulae for both labour and materials, with the contract sum divided into percentages for each, depending on the nature of the contract. The percentage provisions need not total 100 per cent; i.e., the contractor may agree to accept some of the risk for the increased cost of labour and materials. Where this was done under a 60 per cent labour formula it was held that a contractor could recover some part of the increase not covered by rise and fall by a claim under cl. 24(1) of E5b.
The Building and Construction Council (B.A.C.C. formerly B.I.A.C.) have developed a formula which is widely used, and will probably form the basis for a National Cost Adjustment Formula which has been operating since 1980. Similar formulae are in operation in other states. The B.A.C.C. CAP-2 formula operates on both labour and materials, utilising indexes issued by the B.A.C.C. The materials index is published by the Australian Bureau of Statistics. The value of the adjustment to the contract sum is calculated by using the amount of each progress payment due to the contractor and the indexes for that month. The use of special conditions of contract recommended by the B.A.C.C. hopefully should eliminate the disputed and litigation that have occurred with other clauses and formulae.

As shown in Table 6.4, the other ideas for the avoidance method are:

a) Provide funding for projected inflation.
b) Ensure agreement with owner has cover for escalation and hopefully,
c) More government control of awareness of inflation, occurs through supply and demand.
<table>
<thead>
<tr>
<th>INFLATION</th>
<th>AVOIDANCE</th>
<th>AVOIDANCE</th>
<th>TRANSFER</th>
</tr>
</thead>
<tbody>
<tr>
<td>. For long term projects provide funding for projected inflation</td>
<td>. Claim escalation entitlement promptly</td>
<td>. By agreement with owner (Consultant)</td>
<td>. Use escalation clause to pass on the effect to client (Contractor)</td>
</tr>
<tr>
<td>. Ensure agreement with owner has cover to escalation</td>
<td>. Provide Rise and Fall formula</td>
<td>. Insurance of exchange or inflation changes</td>
<td>. Insurance of exchange or inflation changes</td>
</tr>
<tr>
<td>. Use lump sum contract</td>
<td>. Pre-purchase key items if possible</td>
<td></td>
<td>. Insurance of exchange or inflation changes</td>
</tr>
<tr>
<td>. Use rise and fall contract</td>
<td>. Speed of construction, skillful purchasing</td>
<td></td>
<td>. Insurance of exchange or inflation changes</td>
</tr>
<tr>
<td>. More govern control of awareness of inflation, also occurs through supply and demand</td>
<td>. Effects built-in to control &amp; monitor at monthly intervals</td>
<td></td>
<td>. Insurance of exchange or inflation changes</td>
</tr>
<tr>
<td>. Allow for realistic extermination of inflation</td>
<td>. Research before decision on contract</td>
<td></td>
<td>. Insurance of exchange or inflation changes</td>
</tr>
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<td></td>
</tr>
<tr>
<td>NATIONAL AND INTERNATIONAL IMPACTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Define in contract if predictable</td>
<td>. Claim escalation entitlements promptly</td>
<td>. Contractor’s responsibility – Contractor is in the best condition to assess his risk level and include in his contract cost (Owner, Architect)</td>
<td>. By agreement with owner (Contractor)</td>
</tr>
<tr>
<td>. Ensure contracts are written in appropriate currencies</td>
<td>. Allow reasonable extention of time claims (Architect)</td>
<td>. Insurance of exchange rate risk</td>
<td>. Contractor’s responsibility (Contractor)</td>
</tr>
<tr>
<td></td>
<td>. Make provision in contract by formulation</td>
<td>. Extention of time provision</td>
<td>. Contractor’s responsibility (Contractor)</td>
</tr>
<tr>
<td></td>
<td>. Rise and Fall adjustment</td>
<td>. Owner to accept share of this risk of beyond on contractor’s control (Project Manager)</td>
<td>. Contractor’s responsibility (Consultant)</td>
</tr>
<tr>
<td></td>
<td>. Allow contingency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXCHANGE RATE VARIATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Alter materials or labor subcontract to reduce impact of higher costs</td>
<td>. Insurance of Exchange rates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Rise and Fall formula</td>
<td>. Owner to accept risk (Contractor)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Contingency cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTEREST RATE VARIATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Ensure agreement with owner has cover for interest rate variations risk</td>
<td>. Have contract with frequent cash flow payment</td>
<td>. Contractor is the best position to assess this risk level and include in his contract cost (Architect, Engineer, Project Manager)</td>
<td>. Contractor’s responsibility (Consultant)</td>
</tr>
<tr>
<td>. Ensure prompt cash flow payments for work done</td>
<td>. Plan cash flow to avoid large expense</td>
<td></td>
<td>. Contractor is the best position to assess this risk level and include in his contract cost (Architect, Engineer, Project Manager)</td>
</tr>
<tr>
<td>FUNDING</td>
<td>AGREEMENT</td>
<td>TRANSFER</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>----------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>. Carry out proper cost assessment and monitor cash flows</td>
<td>. Submit progress clauses promptly</td>
<td>. Owner's responsibility (Architect)</td>
<td></td>
</tr>
<tr>
<td>. Prepare cash flow forecast</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Arrange finance in advance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Ensure reliable source of funds &amp; ability to pay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Good initial estimation &amp; continuous updating of estimation</td>
<td></td>
<td></td>
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</tbody>
</table>
Abatement Method; Few ideas which attempt to reduce the impact of inflation were given such as;

a) Pre-purchase key items if possible.
b) Speed of construction and skilled purchasing.
c) Effects built-in to control and monitor at frequent intervals.

Transfer Method; Using escalation clause to transfer this risk to the owner is given by the contractor while the consultant advise this risk should be shared with the owner and the contractor by agreement.

23. National and International Impacts

There are periodically "Economic Acts of God", so to speak, of such magnitude that a contractor could not properly assess either their probability or cost impact. These are referring to OPEC decisions, nationwide strikes, devaluation, tax rate changes and the like.

Avoidance Method;" Defining this risk in the contract if predictable" is suggested and also "Ensure contracts are written in appropriate currencies" which ,in certain case,, is a vital factor in bidding for
overseas project. For detailed explanation of the bidding currency, refer to Section 3.2.3. of Chapter III.

**Abatement Method:** The following answers were given;

a) Allow reasonable extension of time for claims.
b) Make provisions in contract by formulation.
c) Rise and Fall adjustment.
d) Allow contingency.

**Transfer Method:** The project manager and the contractor suggested this risk should be shared with the owner and the contractor while the owner and the Architect claims that this risk is contractor's responsibility by including contingency sum in contract cost. Extension of time was also given as a transfer technique.

24. Exchange Rate Variation

In these times of fluctuating dollar levels, considerable care is needed to be exercised in arranging contracts for materials and equipment from overseas or with overseas funds. Attention needs to be given to the way in which the Australian dollar will
match those currencies and the value or otherwise of off-setting amounts in different part of the world.

**Abatement Method;** Using Rise and Fall formulae and Contingency Cost could be the most frequent abatement methods for this risk and for the **Transfer Method;** Insurance of exchange rates provides a safety transfer method.

25. Interest Rate Variation

The following were recommended as various treatment techniques;

**Avoidance Method**

a) Ensure agreement with the owner has cover for this risk.
b) Ensure prompt cash flow payment for work done

**Abatement Method;** Planning a cash flow to avoid large expenses could be an efficient abatement method for this risk.

**Transfer Method;** The majority of parties pointed out that this risk should be allocated to the contractor by allowing sufficient cost in his contract price.
26. Funding

Funding is obviously a risk beyond the capacity of the contractor to control. Improper sourcing of these funds may create delays or interest costs which are not anticipated. Financing problems which result in many contractors being driven out of business by delayed compensation for his services is one of the construction industry's worst problems. This is especially true in the protracted negotiation of changes. Too frequently the owner plays the cash-flow game to leverage dispute negotiations to his advantage.

Various answers for the treatment of this risk were given as follows; (See Table 6.4)

Avoidance Method

a) Carry out proper cost assessment and monitor cash flow.

b) Prepare cash flow forecast.

c) Arrange finance in advance.

d) Ensure reliable source of funds and ability to pay.

e) Good initial estimation and continuous updating of estimation.
<table>
<thead>
<tr>
<th></th>
<th>AVOIDANCE</th>
<th>AVOIDEMENT</th>
<th>TRANSFER</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC DISORDER</td>
<td>. Work in secure areas and investigate prior to contract</td>
<td>. Better security arrangements</td>
<td>. Contractor to carry appropriate insurance against loss (Architect)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>. Ensure client or authority guarantees security of project (Contractor)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>. Do not accept as contractual risk - basis for time &amp; money clauses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Project Manager)</td>
</tr>
<tr>
<td>LOCAL CULTURE OF SITE IN</td>
<td>Know what they are and allow them</td>
<td>Establish strong local contacts and branch</td>
<td>. Contractor’s risk</td>
</tr>
<tr>
<td>OVERSEAS PROJECTS</td>
<td>. Hire local agents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERMITS AND ORDINANCES</td>
<td></td>
<td></td>
<td>. Contractor’s responsibility</td>
</tr>
<tr>
<td></td>
<td>. Keep authorities informed on project</td>
<td>. Negotiate with authority to gain permits</td>
<td>. Client to be responsible for obtaining permits (Contractor)</td>
</tr>
<tr>
<td></td>
<td>. Consider requirements at design stages</td>
<td>. Plan for delays if difficulty perceived</td>
<td>. Try to transfer responsibility to owner (Architect)</td>
</tr>
<tr>
<td></td>
<td>. Good planning and project management</td>
<td></td>
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<tr>
<td></td>
<td>. Adequate time to submit and obtain approvals</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>. Ensure adequately arranged at the time of tender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOVERNMENT ACTS AND</td>
<td></td>
<td></td>
<td>. Contractor’s responsibility</td>
</tr>
<tr>
<td>REGULATIONS</td>
<td>. Good documentation and knowledge of requirement</td>
<td>. Keep information up to date</td>
<td>. Client to be responsible (Consultants, Engineer)</td>
</tr>
<tr>
<td></td>
<td>. Through research into government regulations and potential charges</td>
<td>. Research current application</td>
<td>. Contractor’s responsibility (Contractor, Project Manager, Architect)</td>
</tr>
<tr>
<td>POLITICAL STABILITY OF</td>
<td>. Allow to recognise and to avoid</td>
<td></td>
<td>. Possible government backing</td>
</tr>
<tr>
<td>SITE IN OVERSEAS CONTRACT</td>
<td>. Construction and project management to act responsively to events</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>. Security situation aware at time of tendering and get agent advice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNION STRIKE</td>
<td>. Assess potential and monitor throughout job</td>
<td></td>
<td>. Contractor’s responsibility</td>
</tr>
<tr>
<td></td>
<td>. Ensure amenities are good</td>
<td></td>
<td>. Client to reimburse cost of delays for strikes (Contractor)</td>
</tr>
<tr>
<td></td>
<td>. Attempt to have current/site labour agreements</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>. Make illegal (Owner)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>. Promote good relation at site</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>. No confrontation</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>. Labor relations practice by contractor</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>. Responsive attitude to union</td>
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</tbody>
</table>
6.5.2. Treatment Methods of Political and Public Risks

27. Public Disorder

Like industrial action, the risk management planning requires good communications and clear thinking about the real issues and people concerns. As found on a number of projects, for example, recently, Bondi Beach Redevelopment Project, Blue Mountain Project case are still in mind, management frequently finds itself manoeuvred into a defensive position. Yet there is always the opportunity for management to anticipate developments and reactions and plan the right initiatives to carry the arguments and continue with their projects.

For the avoidance of this method, a Better Investigation of Work Areas and Security Arrangement were advised.

28. Local Custom of Site in Overseas Project

Any agreement will be shaped to a considerable extent by local customs in overseas project. Arbitration may not be provided for and the courts may be available only to those of the appropriate nationality or religion. All these possibilities may give rise to serious difficulties.
Avoidance Method: As shown in Table 6.4, it was suggested hiring local agent during the initial market analysis.

Abatement Method: Establishing a strong local contact and branch

29. Permits and Ordinances

It is strongly suggested that obtaining permits and rights of way in advance of construction, are ways to minimize risks and mitigate losses.

Avoidance Method

a) Keep authorities informed on project.
b) Consider requirements at design stages.
c) Good planning and project management.
d) Adequate time to submit and obtain approvals.
e) Ensure adequately arranged at the time of tender.

Abatement Method

a) Negotiate with authority to gain permits.
b) Plan for delays if difficulty perceived.
Transfer Method: Again, there is a confrontation between the opinions about the responsibility between the contractor and the owner.

30. Government Acts and Regulations

Most participants were aware that the regulatory requirements of the federal, state and local council, affect almost every construction procedure today. Regulations by government in the social area such as safety and economic opportunity are rules under which the contractor rightfully must and should operate. While there is additional risk in this less known and interpretive area, it is similar to the "work rules" established by union contract or agreements. Various answers for the treatment of this risk were given as follows.

Avoidance Method

a) Good communication and knowledge of requirement.
b) Thorough research into government regulations and potential changes.

Abatement Method

a) Keep information up to date.
b) Research current applications.
Transfer Method: There is a strong confrontation between the contractor and the owner. Statistical result about this risk will be explained in Section 6.6.

31. Political Stability of Site in Overseas Project

It could be possible to reach an understanding of the stability of the market and to see whether or not it tends to be dominated by a particular country and to what extent this adds to the competitive situation. However, who would have anticipated such a rapid collapse of the regime in Iran, which was pro-western, possibly to be replaced by a government which will wish to break the old association? This situation is instanced to demonstrate the potential fraility of any market and to suggest that in consultancy, where the promotional outlay is small compared with contracting, a totally definite analysis of the complete market is almost impossible to attain.

Abatement method

a) Hiring a local agent to get advice.

b) Possible government backing.

c) Construction and project management to act responsively to the event.

d) Security situation known at time of tendering.
32. Union Strikes

Union strikes and all these entail are the contractor's responsibility. Unjustified work rules are exampled as the risk the contractor must assess and provide for. Following are the answers which were suggested for this risk.

Avoidance Method

a) Assess potential and monitor throughout job.
b) Ensure amenities are good.
c) Attempt to have current/site labour agreement.
d) Make illegal.

Abatement Method

a) Promote good relation at site.
b) No confrontation.
c) Labour relation practice by the contractor.
d) Responsive attitude to union.

Summary

All collected responses of Section 2 of the questionnaire has been examined and explained in detail. In analysing returns in this section, risk treatment
methods by using contract clauses were carefully explained with detailed information of the Australian Standard Contracts.

6.6 Risk Sharing

The third section of the questionnaire, Risk Sharing, is designed to analyse how each respondent believes that listed risks ought to be shared between the owner and the contractor.

The purpose of this section is to provide basic statistical data in allocating the risk between the owner and the contractor because particular interests in risk analysis are in determining the most efficient allocation of risk between the parties at the tender documentation stage and in the selection of tenders from contractors with varying skills and financial capabilities rather than considering which party can best assess the levels of risk involved and has the capacity to overcome the various problems which might arise. In using the term 'capacity', it means managerial and technical skills, labour, equipment, and financial strength.
6.6.1. Risk Sharing of Construction related Risks

When reviewing the contract provisions of the Australian Standard Contract, each type shows different views about the responsibility of the risk. As a example of differing site conditions. E5b and MBW-1 read "the proprietor is responsible for the accuracy of all information given relevant to the site" (refer to page 221) while AS 2124 and NPWC-2 read "the contractor is deemed to have examined and have actual knowledge of information available and to have informed himself of all relevant physical conditions" (refer to page 226).

With the above contradictory provisions in mind, it should be noted that the result of this survey could indicate the directions of formulae in allocating the risk.

As shown in Figure 6.5, five risk factors, Differing Site Conditions (73.8%), Acts of God (67.0%), Weather (62.8%), Defective Design (75.1%), and Changes in the Work (85.1%), are rated predominantly allocated to the owner.

Especially in the risk of defective design, 11.3% of the respondents pointed that this risk is to be shared with the architect and the consultant; Architect (3.4%), Consultant (4.7%).
FIGURE 6.5 RISK SHARING OF CONSTRUCTION RELATED RISKS

* Note:  
A; Differing Site Conditions  
B; Acts of God  
C; Weather  
D; Availability & Productivity of Labor, Material and Equipments  
E; Late Completion  
F; Defective Design  
G; Changes in the Work  
H; Vandalism and Malicious Mischief  
I; Failure to Complete Contract according to Plans and Specifications  
J; Accidents  
K; Lack of Communications  
L; Local Conditions in Overseas Contracts  
M; Site Inspection  
N; Subcontract Failure
Out of 14 construction related risks, seven risk factors, which are the risk of Availability and Productivity of Labour, Material, and Equipment (94.2%), Late Completion (75.0%), Vandalism and Malicious Mischief (86.3%), Failure to complete Contract according to Plan and Specifications (97.7%), Accidents (90.9%), site Inspection (37.9%), and Subcontractor Failure (80.7%), were answered as risks which is the contractor's responsibility with high proportion.

Only two risk factors, Lack of Communication (68.2%) and Local conditions in Overseas Project (48.7%), are said to be shared with the owner and the contractor.

6.6.2. Risk Sharing of Contractual and Legal Risks

As can be seen in Figure 6.6, out of seven risk factors, only the risk of Delayed Payment on Contract (93.2%) is pointed as the risk which should be allocated to the contractor with relatively high proportion.

Most of the risks (71.2%) are said to be shared with the owner and the contractor. Those are the risk of Failure to enter into the Contract (75.6%), Delayed Dispute Resolution (69.3%), Lack of Contract Clarity (56.8%), Approvals (51.1%), and Cost of Dispute Settlement (85.2%). The risk of Labor Dispute (80.7%) is
FIGURE 6.6 RISK SHARING OF CONTRACTUAL AND LEGAL RISKS

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*Note:
A: Failure to enter into Contract  B: Acts of God
C: Delayed Dispute Resolution  D: Delayed Payment on Contract
E: Lack of Contract Clarity  F: Approvals
G: Cost of Dispute Settlement  H: Labor Disputes
pointed that it should be allocated to the contractor. In addition, the risk of Failure to enter in the Contract (1.1%) and Lack of Contract clarity (1.2%) are pointed that they should be shared with the consultant.

6.6.3. Risk Sharing of Economic Risks

All of the economic risks were answered they should be allocated to the owner predominantly. Theses were the risk of Inflation (75.0%), National and International Impact (77.3%), Exchange Rate Variation (64.8%), Interest Rate Variation (65.9%), and Funding (80.4%).

None were allocated to the contractor. However, it should be noted that all economic risks showed a relatively high percentage in sharing method (For more detailed percentage, refer to Appendix 12).

6.6.4. Risk Sharing of Public and Political Risks

The risk of Public Disorder (47.7%) is noted as the risk which should be allocated to the owner with a relatively high percentage while the risk of Local Conditions in Overseas Project (54.5%), Permits and Ordinances (45.9%), and Union Strikes (91.9%) were predominantly allocated to the contractor.
FIGURE 6.7 RISK SHARING OF ECONOMIC AND POLITICAL, PUBLIC RISKS

Economic Risks

Political & Public Risks

A B C D E F G H I J K

--- ; Owner
----- ; Contractor
----- ; Sharing

* Note: A; Inflation  B; Acts of God  C; Exchange Rate Variation
D; Interest Rate Variation  E; Funding  F; Public Disorder
G; Local Custom of Site in Overseas Contract
H; Permits and Ordinances  I; Government Acts and Regulations
J; Political Stability of Site in Overseas Projects
K; Union Strike
The risk of Government Acts and Regulation (57.5%) and Political Stability of Site in Overseas Project (40.0%) showed relatively high percentage as risks which should be shared with the owner and the contractor.

6.7 Effectiveness of Contract Type

After defining and analysing various contract type in Chapter V, Section 4 of the questionnaire examined each type of contract in terms of effectiveness in attaining three major goals of low cost, high quality, and rapid completion. Although different styles of contract type are relevant to different problems, this survey tries to approach a general concept about effectiveness of various contract types dominated in the Australian construction industry. Each respondent are asked to use the following scales in judging each contract type; A = Highest Effectiveness; B = Average to Good Effectiveness; C = Poor to Average Effectiveness; and F = Ineffectiveness or Deleterious.

Table 6.5 shows an enumeration of the effectiveness of each contract type to meet the three goals mentioned above. In general, the analysis of effectiveness of contract type indicated that "Cost Plus with Incentive Fee" contract is marked as the most preferable contract
<table>
<thead>
<tr>
<th>CONTRACT TYPE</th>
<th>LOW COST</th>
<th>HIGH QUALITY</th>
<th>RAPID COMPLETION</th>
<th>AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm Fixed Price</td>
<td>2.0</td>
<td>1.55</td>
<td>1.7</td>
<td>1.75</td>
</tr>
<tr>
<td>Firm Fixed Price with Completion Bonus</td>
<td>2.1</td>
<td>1.56</td>
<td>2.68</td>
<td>2.1</td>
</tr>
<tr>
<td>Firm Fixed Price with Target Estimate</td>
<td>1.75</td>
<td>1.75</td>
<td>2.08</td>
<td>1.86</td>
</tr>
<tr>
<td>Firm Fixed Price with Escalation</td>
<td>2.05</td>
<td>1.7</td>
<td>2.0</td>
<td>1.91</td>
</tr>
<tr>
<td>Cost Plus Percentage of Cost</td>
<td>1.12</td>
<td>2.4</td>
<td>1.31</td>
<td>1.61</td>
</tr>
<tr>
<td>Cost Plus with Fixed Fee</td>
<td>1.44</td>
<td>2.06</td>
<td>1.68</td>
<td>1.72</td>
</tr>
<tr>
<td>Cost Plus with Incentive Fee</td>
<td>1.64</td>
<td>2.2</td>
<td>2.73</td>
<td>2.19</td>
</tr>
<tr>
<td>Cost Plus with Award Fee</td>
<td>1.18</td>
<td>1.8</td>
<td>1.9</td>
<td>1.62</td>
</tr>
<tr>
<td>Time and Material</td>
<td>1.0</td>
<td>1.6</td>
<td>1.12</td>
<td>1.24</td>
</tr>
<tr>
<td>Labor/Equipment</td>
<td>0.85</td>
<td>2.0</td>
<td>1.13</td>
<td>1.32</td>
</tr>
</tbody>
</table>

Note: Average point in this table is counted as: A = 3, B = 2, C = 1, and F = 0

**TABLE 6.6 EFFECTIVENESS OF CONTRACT TYPE**
type. The second preferable contract type was "Firm Fixed Price with Completion Bonus" while all the cost plus contract types were marked below "B" scale.

However, in terms of quality, "Cost Plus Percentage of Cost" type was rated as the most preferable type. "Cost Plus with Fixed Fee" and "Cost Plus with Incentive Fee" contract type also showed the similar preference with "Cost Plus Percentage of Cost" contract type.

In terms of speed of completion, the most preferable contract type is "Cost plus with Incentive Fee" with relatively high point while three firm fixed price contract types showed a relatively strong preference. Those were "Firm Fixed Price with Completion Bonus", "Firm Fixed Price with Target Estimate", and "Firm Fixed price with Escalation" contract type.

Finally it should be noted that the firm fixed price contract type can achieve reasonable effectiveness with various non-traditional methods (refer to Grigg[94] for definition) which are characterised as "Completion Bonus", "Target Estimate", and "Escalation".
Summary

As a result of the descriptive and detailed study in previous chapters, methods of risk treatment were then identified and, with the intent of providing data from which to generate profiles of effective and practical risk treatment guidelines. This exercise resulted in the creation of the questionnaire (see Appendix 1) from which to obtain the data base for the empirical part of this study.

This chapter has described the administration of the survey including a detailed explanation of the result of each section of the questionnaire.

This survey, seen as the empirical approach to the final task of this study, is used to confirm the theoretical and descriptive background which was described in previous chapters. This has been done by comparing the result of the survey of each section represented each chapter of this dissertation; Section 1 is related to Chapter III, Section 2 and 3 are related to Chapter IV, and Section 4 is related to Chapter V.
CHAPTER VII
Conclusions

Post-graduate dissertations may evolve in several possible directions and their evaluation is not without consequence on the personality of the final product. In this case, what was first deemed a topic, Risk Treatment Methods in Construction Process and Contracts, developed a schizophrenic character. Both areas of risk treatment methods in construction process include risk identification and Risks in contractual relationships proved too interesting and important to abandon. Therefore this dissertation has been divided into two different investigations herein. Partioning the dissertation along these lines permits the two topics to be addressed seperately but the author believes that this approach can provide a coherent conceptual framework that will help into the recognition of the communality of their aims. Once this happens, it could be expected that the various movements to flow together and form a powerful force for the ultimate way to the risk management.

In order to maintain a clear focus on the conclusions it may be useful to list the stages which have been passed through to this point toward the provision of conclusive profiles of this dissertation.
Chapter I ; Introduction include Background, Objective, Methodology, Scope, and Limit of this study.

Chapter II ; The concept of Risk, Risk Management, and its Objectives in the sense of general theoretical background.

Chapter III ; Methods of Risk Identification and the Classification of the risks in the Construction Process.

Chapter IV ; Risk Treatment Methods; Avoidance, Abatement, Retention, Transfer and Sharing.

Chapter V ; Description of contractual relationships and arrangements by clarifying their characteristics, and limitations.

Chapter VI ; Questionnaire survey as a empirical approach to previous chapters which are characterised as Risk Identification, Risk Treatment Methods, Risks in Contractual Relationships and Arrangements was done and finally, summary of Questionnaire has drawn as the guideline of risk treatment methods.
In the light of the process mentioned above, the task remaining is to clarify the conclusions and contributions of the dissertation.

Figure 7.1 shows the result of questionnaire and suggestions as an ultimate risk treatment guideline in this research. The author believes it makes this chapter the logical as well as physical end to the dissertation.

The first figure of Figure 7.1 indicates the importance of risk factors and the second figure represents the opinions of various groups about risk sharing between the owner and the contractor. The first figure, The Importance of Risks, could be used as an indication to treat risk factors in the sense of importance. The second figure could be used as an indication in drawing out suitable formula to share the responsibility between the owner and the contractor. The third columns of Figure 7.1 is suggestions for risk treatment which were summarised from the results of Section 2 of the survey, named Risk Treatment Methods. It is believed that these suggestions could be a basic step in dealing with various risk factors.

In addition to Figure 7.1, the consensus (not unanimous) for the favored type of contract is "Firm
Fixed Price" with the various movements and modifications include Bonus, Target Estimate, and Escalation in compare with "Cost Plus" type of contract. However the most preferable contract type is chosen among the "Cost Plus" type of contract. It is "Cost Plus with Incentive Fee" contract type.

Final Comment

In this thesis, risk identification and risk treatment methods of construction processes and contracts have been examined. The path that this research has been taken has relied on developing a theoretical and practical risk treatment guideline by non-quantitative approach to provide a broad and general understanding of how different risk factors come to bear on the topic of this dissertation. Rather than arguing whether the non-quantitative or quantitative approach is superior, it should be acknowledged that no winner will prevail.

It is hoped this study will offer some guidelines for all parties of the construction industry reviewing their risk management programme.
APPENDIX 1: QUESTIONNAIRE
To the respondent

Dear Sir/Madam

I am currently conducting a research concerned with Risk Management mainly concentrated in the Method of Risk treatment in the construction Process and Contracts in attempting to provide ideal risk treatment models.

This survey contains four sections; (1) Identification and Nature of Risks, (2) Method of Risk Treatment, (3) Risk Sharing and (4) Effectiveness of Contract Type.

It is well suspected that you would have difficulty in answering the questions without some description of circumstances. Please answer the question with the particular project experience which is currently being done by your firm or authority and indicate that in the section below.

Your Professions

owner designer contractor consultant engineer legal insurance

or ________

other

Characteristic of the Project which is currently being done.

residential commercial industrial highway tunnel mass transit

other (please specify in detail)
The amount of the contract:

<table>
<thead>
<tr>
<th>Below $10,000</th>
<th>$10,000 - $100,000</th>
<th>$100,000 - million</th>
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<tbody>
<tr>
<td>million - 10million</td>
<td>10million - 100million</td>
<td>100million - billion</td>
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<td>more than billion</td>
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</tbody>
</table>

The site of project:

| Domestic | Overseas (please specify the place of site) |

The accompanying questionnaire is a pivotal part of the research. It would be greatly appreciated if you could complete the questionnaire and return to me by the end of July this year.

Thank you for your kind assistance.


The lower part of this page will be removed to retain confidentiality when the answers of this questionnaire are analyzed.

Name and Address of your firm or authority:

Name: _____________________________________________

Address: _____________________________________________

_____________________________________________________

Respondent:

Name: _____________________________________________

Position & Title: _____________________________________
QUESTIONNAIRE

Section I - Identification and Nature of Risk

The following is a list of construction risk. You are asked to rate the relative importance of each risk from 1 to 10 (1 is least important; 10 is the most important). Again, please answer the question with the particular project experience which is currently being done by your firm or authority that you stated in the previous page.

<table>
<thead>
<tr>
<th>RISK</th>
<th>IMPORTANCE</th>
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<tbody>
<tr>
<td></td>
<td>Not Very (1-3)</td>
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<tr>
<td>Construction Related Risks</td>
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<tr>
<td>Differing Site Conditions (include Subsurface conditions)</td>
<td></td>
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<tr>
<td>Acts of God (Flood, Earthquake, Disease ...etc)</td>
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<tr>
<td>Weather</td>
<td></td>
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<tr>
<td>Availability and Productivity of Labor, Materials, and Equipments</td>
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<tr>
<td>Late Completion</td>
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<tr>
<td>Defective Design</td>
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<td>Changes in the Work</td>
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<td>Vandalism and Malicious Mischief</td>
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<td>Failure to complete contract according to plans and Specifications</td>
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<tr>
<td>Accidents</td>
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<tr>
<td>Lack of Communication</td>
<td></td>
</tr>
<tr>
<td>Local Conditions in the Overseas Projects (Legal, Agents, Taxation, Work Methods...etc)</td>
<td></td>
</tr>
<tr>
<td>Site Inspection</td>
<td></td>
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<tr>
<td>Subcontractor Failure</td>
<td></td>
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<tr>
<td>Contractual and Legal Risks</td>
<td></td>
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<tr>
<td>Failure to enter into the contract</td>
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<tr>
<td>Delayed Dispute Resolution</td>
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<td>Delayed Payment on Contract</td>
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<td>Lack of Contract Clarity</td>
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<td>Approvals</td>
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<td>Cost of Dispute Settlement</td>
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<td>Labor Disputes</td>
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<td>Economic Risks</td>
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<td>Inflation</td>
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<tr>
<td>National and International Impacts (e.g. OPEC, Coal Strike, Devaluation...etc)</td>
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<tr>
<td>Exchange Rate Variations (in international projects)</td>
<td></td>
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<tr>
<td>Interest Rate Variations</td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td></td>
</tr>
</tbody>
</table>
### Political and Public Risks

<table>
<thead>
<tr>
<th>Risk Description</th>
<th>Not Very (1-3)</th>
<th>Important (4-7)</th>
<th>Very (8-10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Disorder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Custom of Site (in overseas project)</td>
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<tr>
<td>Permits and Ordinances</td>
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<tr>
<td>Government Acts and Regulations</td>
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<tr>
<td>Political Stability of Site (in Overseas Project)</td>
<td></td>
<td></td>
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<tr>
<td>Union Strike</td>
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</tbody>
</table>

### General Comments

In completing this section, please write below any additional comments
Section II - Method of Risk Treatment

You are asked to suggest how you believe risks ought be be treated in the given manner shown below. Following is an example of the answer. Please indicate the best preferred method in as much detail as possible.

Example

<table>
<thead>
<tr>
<th>Identified risks</th>
<th>Avoidance</th>
<th>Abatement</th>
<th>Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differing Site Conditions (with Subsurface Conditions)</td>
<td>Sufficient test bores &amp; Inspection of geological records</td>
<td>Rates payment on foundation work (Unit price contract)</td>
<td>Contractor to accept risks</td>
</tr>
<tr>
<td>Late Completion</td>
<td>Strong Programme clauses in contract</td>
<td>Offer bonus for early completion</td>
<td>Liquidated Damages</td>
</tr>
<tr>
<td>Delayed dispute Resolution</td>
<td>Delete arbitration provisions from contract</td>
<td>Seek legal advice early in disputes</td>
<td>Require contractor to carry on regardless of matter in disputes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identified risks</th>
<th>Avoidance</th>
<th>Abatement</th>
<th>Transfer</th>
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</thead>
<tbody>
<tr>
<td>Construction Related Risks</td>
<td>Act of God (Flood, Earthquake, Disease ...etc)</td>
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<td>Weather</td>
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<td></td>
<td>Availability and Productivity of labor, material, and Equipments</td>
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<td></td>
<td>Late Completion</td>
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<td>Methods</td>
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<td>Changes in the work</td>
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<td>Vandalism and Malicious Mischief</td>
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<td>Failure to complete contract according to plans and spec.</td>
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<td>Accidents</td>
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<td>Lack of communication</td>
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<td>Local conditions in overseas projects</td>
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<td>Site Inspection</td>
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<td>Subcontractor Failure</td>
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<td>Contractual and Legal Risks</td>
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<td>Lack of contract clarity</td>
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<td>Union Strikes</td>
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</table>

**General Comments**

In completing this section, please write below any additional comments.
Section III - Risk Sharing

You are asked to indicate how you believe risks ought to be shared as between the owner and the contractor. If you think any of risk should be allocated to the other party except the owner and the contractor, please mention that in "other" column with possible percentage.

<table>
<thead>
<tr>
<th>Risks</th>
<th>Owner (100%)</th>
<th>Shared</th>
<th>Contractor (100%)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Related risks</strong></td>
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</tbody>
</table>
## Political and Public Risks

<table>
<thead>
<tr>
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<th>Owner (100%)</th>
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<th>Contractor (100%)</th>
<th>Other</th>
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</thead>
<tbody>
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<td>Public Disorder</td>
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</tbody>
</table>

## General Comments

In completing this section, please write below any additional comments.
Section IV - Effectiveness of Contract Type

You are asked to evaluate each of the various recognized type of contract in terms of effectiveness in attaining the three goals of **low cost, high quality, and rapid completion**. Although different styles of contract are relevant to different problems, again, please answer the question with the particular project experience which is currently being done that you already stated at the previous page.

**Note:** please use the following scales; **A** = Highest Effectiveness; **B** = Average to Good Effectiveness; **C** = Poor to Average Effectiveness; and **F** = Ineffectiveness or Detectorious.

<table>
<thead>
<tr>
<th>Type of Contract</th>
<th>Relative Effectiveness in achieving your goal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Cost</td>
</tr>
<tr>
<td>Firm Fixed Price</td>
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<tr>
<td>Firm Fixed Price with Completion Bonus</td>
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<tr>
<td>Firm Fixed Price with Target Estimate</td>
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<tr>
<td>Firm Fixed Price with Escalation</td>
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<tr>
<td>Cost Plus Percentage of Cost</td>
<td></td>
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<tr>
<td>Cost Plus with Fixed Fee</td>
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<tr>
<td>Cost Plus with Incentive Fee</td>
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<tr>
<td>Cost Plus with Award Fee</td>
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<tr>
<td>Time and Material</td>
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<tr>
<td>Labor/ Equipment Hour</td>
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</tbody>
</table>

**General Comments**

In completing this section, please write below any additional comments.

Finally I would be most grateful for the following.

Thank you.
APPENDIX 2: "DESIGN AND BUILD" CONTRACT IN THE KINGDOM OF SAUDI ARABIA
Definitions

Clause (c) The name of the consultant has been stated where the Engineer's name would be stated in FIDIC.

Clause (f) The works are qualified by the word 'permanent' and the implications are seen in clause 1(b).

(b) The 'site' is limited to the site of the works (ie permanent works) and does not include areas for camps, housing, storage etc.

This is a very important statement where the significance may become apparent only when it is found necessary to purchase or rent land for temporary European camps, Asian labour camps and large materials stockyards which would normally be considered to be sited within the area of the building site made available to the contractor.

Clause (m) The Government Regulations issued by Royal Decree are included as contract documents and take precedence over all other documents. Careful study of these regulations is essential but it is not intended to elaborate upon them since here as it is the subject of a separate chapter.

Clause 2

The Consultant
The Consultant replaces the Engineer's Representative in FIDIC and is given additional duties to check and evaluate designs, engineering data, drawings and site programme.

Clause 4

Sub-letting
This may not be done without prior approval of the Employer. The FIDIC requirement that this approval will not be unreasonably withheld is not included.

The FIDIC clause that 'labour only' sub-contracts will not be considered as sub-letting is not included. It is therefore likely that the Employer's approval will be required for any such 'sub-contractor'.

Clause 7

Drawings
The Consultant is required to give approval of or comments on drawings within 15 days.

Clause 8

Additional Drawings
The Consultant may supply the contractor with such further drawings and instructions as may be necessary and the contractor shall at his own expense carry out and be bound by the same.

Clause 12

Sufficiency of Tender
The FIDIC clause regarding adverse physical conditions and obstructions has been omitted.

Clause 17

Setting Out
The FIDIC wording to the effect that if an error in setting out is based on incorrect data supplied (in writing) by the Consultant then the expense of rectification rests with the Employer has been omitted, and could lead to great unfairness to the contractor.

Clause 20

Care of works
FIDIC lists the 'excepted risks' which are excluded from the contract. In this clause of the Saudi Arabian contract all are grouped under 'force majeure', an undefined set of circumstances.

Clause 30

Extraordinary Traffic
FIDIC allows for the cost of any temporary strengthening at bridges, etc to be paid by the Employer, and the Employer will also settle any claims for damage. The clause is omitted in the Saudi Arabian contract.

Clause 31

Facilitating work by other contractors
No provision is made in this contract for any payment to the Contractor for permitting the use of his facilities.
Clause 34

Labour

1. Under this clause the Contractor is to allow for employing foreign labour only.

9. This paragraph states that the Contractor is to comply with Saudi labour laws including any future amendments thereto.

10. The Employer is to assist the Contractor where required in obtaining work and residence permits for his employees, but any delay in obtaining the same is not to constitute any ground for claim and compensation.

This is an onerous condition in view of the prohibition on the use of local labour. Whether the words 'claim and compensation' also cover extension of time is doubtful. The combination of this clause with clause 34(1) foreign labour only could render the contract impossible of fulfilment. This situation might fall under the heading of 'force majeure'. This is a legal point which might be explored as it is affected by Saudi law.

Clause 36

Materials and Workmanship

The Contractor has to provide at his expense all samples and tests required by the Consultant, including tests that the Consultant requires abroad. In the case of tests abroad the Contractor has to pay the Consultant’s expenses. This could prove expensive.

Clause 38

Examination of works before covering up

All work to be covered up is first to be inspected by the Consultant. If he considers this unnecessary his approval is to be in writing. The Contractor is to pay for uncovering and reinspecting any work as instructed by the Consultant, even though such work may be found to be in accordance with the Contract. This is most unfair.

Clause 42

Receipt and Possession of Site

The site is to be handed over to the Contractor as soon as possible. Provided delay does not exceed one month no claim by the Contractor will be accepted. Any claim is to be notified and substantiated by documentary evidence. The definition of 'site' in clause 1(b) is of particular significance.

Clause 44

Extension of Time for Completion

This is a much more restrictive clause than the FIDIC clause and relies largely on force majeure, which may be difficult to define (ie force majeure is to mean any incident resulting from external forces or unexpected causes which it is impossible to avoid or to rectify and which makes it impossible for the Contractor to implement any of his obligations).

Clause 45

No night work or Friday work

No permanent work is to take place during the night or on Fridays or on official holidays, save when the work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the works.

The Contractor is to request the Employer’s permission at least eight days in advance and if such permission is granted the Contractor is to bear the cost of extra supervision by the Employer.

How does one advise the occurrence of an emergency 8 days before it happens?

Clause 46

Rate of Work Progress

If the Contractor wishes to work at night and permission is refused for a ‘reasonable’ reason then contrary to FIDIC no extension of time will be granted and, rather ominously, the clause states that liquidated damages will be charged.

Some onerous requirements regarding planning are imposed. The Contractor is to provide all necessary information for the Employer’s computer, but no information is given indicating the nature or scope of this information.
Clause 47

Liquidated Damages for Delay

Should completion and provisional delivery of the Works be delayed beyond the agreed time or any extended time, and should the Employer feel that there is no justifiable reason to withdraw the Works from the Contractor, then the Contractor is to pay the liquidated damages calculated.

This paragraph introduces a threat that the Employer may withdraw the work from the Contractor if the Works are delayed, without specifying the extent of the delay or conditions precedent upon such withdrawal.

Clause 50

Variations

Regarding variations there is not much departure from the FIDIC conditions, except to rule that changes which come about because of drawings issued by the Consultant are not variations and do not rank for payment. This is an extraordinary situation and one that should be watched.

Clause 51

Valuation of Variations

The valuation of variations is firmly in the hands of the Consultant with appeal to the Employer—a rather odd and not very satisfactory situation?

Sub-clause 3 limits variations to 20% of the Contract Sum (FIDIC, 15%)

Sub-clause 3 indicates adjustment if work exceeds 20% of the Contract Sum, but says nothing about a bulk omission (of, say, 2 complete clusters of buildings).

Clause 59

Certificate of Completion of the Works

Certificate of completion is in the hands of a Taking Over Committee. There is no indication of the format of this committee except to the effect that the Consultant is a member.

The wording of the last paragraph of the clause indicates that the maintenance period on any part of the works does not commence until the take-over of the whole of the works.

Clause 60

Final Take Over

Final taking-over is to be in the hands of a Final Taking Over Committee. There is no indication of the format of this committee except to the effect that the Consultant is not a member, but will be present. Significantly the clause refers only to one date, one committee, one inspection and one set of minutes. Should the works be provisionally taken over in parts the maintenance period is to start from the provisional take over of the last part of the works.

Clause 61

Withdrawal of Work from Contractor

The Employer has the right to withdraw the works from the Contractor without relieving him of his obligations or liabilities under the contract.

The FIDIC Clause 63(1) is the basis of this clause but it has been stiffened up considerably as in 1(a) 'If the Contractor delays commencement of the works or shows insufficient progress to an extent which in the Employer's opinion will not enable him to meet the target completion date . . . ' This is very harsh and the Contractor is apparently at risk at any time if the Employer thinks he may not finish in time.

Clause 63

Force Majeure

This definition is likely to play a large part in arguments about extension of time. 'Force Majeure is to mean any incident resulting from external forces or unexpected causes which it is impossible to avoid or repel and which makes it impossible for the Contractor to implement any of his obligations, such as wars and acts of God'.

It could fairly be argued that this phrase is explanatory but not limiting, and the wider context could prevail. A legal opinion on this point would be desirable.
Any reasonable additional cost incurred by the Contractor as a result of force majeure (in the Kingdom of Saudi Arabia) is to be compensated for by the Employer, taking into consideration the provisions of the following sub-clause.

There is apparently no allowance for such things as an Arab-Israeli war, or closure of the Suez Canal.

Should the Employer approve work suspension for a period of 30 consecutive days because of force majeure then the Employer is to have the right to terminate the contract at any time during this period by written notice to the Contractor. This clause is comparable to FIDIC clause 40(2) but is heavily biased in favour of the Employer and takes no cognisance of a partial suspension.

The Employer's permission to remove plant is required even though the Contract has been terminated. It must be sincerely hoped that termination is never applied as the Contractor would be heavily penalised.

Clause 64

The Employer may terminate the Contract for 'any good cause'. This places a lot of trust in the goodwill of the Employer.

Clause 65

Disputes are to be settled in the first instance by the Employer, who is one of the parties to the Contract. This is a very strange and one-sided situation.

Reference to arbitration is likely to lead to judgement biased against a foreign contractor as presumably two out of three members of the Arbitration Committee would be Saudis.
APPENDIX 3 ; DEFINITION OF CONSTRUCTION MANAGEMENT

R.A.I.A. (Royal Australian Institute of Architect)
Practice Notes No. 77 (November, 1983)
CONSTRUCTION MANAGEMENT

1. WHAT IS IT?

Construction Management, as a generic term, simply means the management of the construction of a building project. In this primary meaning, the traditional management of the construction stage of a building, by a builder, is obviously a form of construction management. However, the term has come to be accepted in recent years as having a much more specific application and to contain two elements which make it unique in current usage. These may be stated as:

a. The person providing the construction management applies skills and expertise in management more than in construction. This is the reverse of the traditional situation. It does not mean, however, that construction knowledge is not essential. It only means that management ability is the primary attribute of the person being paid by the owner to provide construction management.

b. The person providing the construction management does so as a professional service and not as a commercial venture. He does not have a personal financial interest in the construction price, such as a profit margin, or any other personal interest in it, such as the capacity to improve his own capital gain from it. Instead, he is paid a fee according to a pre-agreed basis which can only be changed by further agreement with the client or owner.

A third element is usually also present, though it is not "of the essence" of construction management. This is the advisory service often given to the designers, before construction, on matters such as construction methods, procedures and programming and other matters on which the construction manager may influence design decisions in the interests of the owner, the designer and the project.

These three elements comprise construction management in the contemporary sense of the expression. As such, it is similar to "project management". A project manager, by his advisory skills, provides a professional service and advises the project designer. The difference between project management and construction management is usually that in the former the manager's role is from project inception to project completion whereas the construction manager's role is principally in the construction stage.

2. THE CONSTRUCTION MANAGER

The successful construction manager must obviously be an expert manager but as in the case of any good manager he must have a reasonably intimate knowledge of the field in which he is managing - in this case, building construction. He must have a knowledge of building materials, methods and procedures, the building industry, insurance, contract law, industrial law, common law, ethics, building economics and associated disciplines such as engineering, architecture, surveying, etc.

There is no particular course of study leading directly to the practice of construction management. Commonly, a construction manager is either:

a. A person, already experienced in one discipline, who adds to his knowledge in that discipline to acquire the necessary breadth of knowledge required in construction management, or

b. An organisation having the necessary breadth of knowledge within its own structure.

For these reasons, construction managers are usually, such as architects, building engineers, quantity surveyors or the like.

Statutory controls an eligibility to provide construction management services vary from place to place but are generally minimal or non-existent. An exception is in Western Australia, where a construction manager in certain areas of the state must be a person registered under the Builders' Registration Act.

3. INTEGRATED CONSTRUCTION MANAGEMENT

The expression "integrated construction management" is sometimes used with reference to the integration of the construction stage and the design stage, i.e. the overlapping of the two stages. The system is not peculiar to construction management and is really only a form of "fast-tracking" with the objective of achieving project completion at the earliest possible time. Nevertheless, it is a common feature of construction management and is usually, if not always, part of the benefits of construction management because it is easier to adopt in construction management than in the traditional builder-management system.
5. CONTRACTUAL ARRANGEMENTS

The construction manager is essentially in the position of a consultant. Contractual arrangements between him and his client or between him and other consultants vary considerably. Contractual arrangements involving trade contractors who undertake the building work generally fall into one of the following two categories.

a. Separate contracts entered into directly between the owner and the various contractors, or

b. Separate contracts with the various contractors, entered into by the construction manager acting as the owners' agent. This seems to be the more popular as it obviates the need for the owner to sign a multiplicity of contracts.

It follows from the foregoing that there is no "head contract" for the building work and therefore no "sub-contracts" in the normal sense. Instead, there are a number of separate contracts, in which there may of course be sub-contracts to the separate contracts.

It also follows from the foregoing that the construction manager does not himself undertake building work, nor act as a contractor for the performance of building work. An exception to this may occur when the construction manager arranges such "non-construction" (in the strict sense) items as temporary plant and equipment for use by several contractors, site cleaning, workmen's amenities and other matters which do not readily fall within the scope of a single trade contract.

A further development of the concept of separate contracts is that the various contract sums for them do not have to be determined before the start of construction as would be the case with sub-contract sums that make up a builder's tender. They may be determined, by tendering or negotiation or otherwise, in sequence and at times as required. Some of the separate contracts may lend themselves admirably to the cost-plus type of contract. All such considerations, of course, presume a high level of control on project estimates and budgeting which in any case is an absolute essential of any construction management arrangement because the overall responsibility for the total price is transferred from the traditional builder (excluded from the system) to one or more of others, depending on the contractual arrangements and obligations.

5. THE TENDERING AND CONTRACT ADMINISTRATION STAGES

In these stages of a project, the construction manager's role can be arranged to complement the architect's traditional role. In some cases, arrangements can be made for the construction manager to provide some of the services normally provided by the architect, thus freeing the architect of some of his commitments to a project to allow him to perform services which he may feel are more appropriate for his particular expertise eg. design.

Certainly, if the construction manager is to have a principal responsibility in the construction stage, then it is reasonable to involve him in the processes of selection of tenderers and evaluation of tenders.

In many cases, it could be appropriate for the construction manager to adopt the role of certifier and contract administrator in respect to the various separate contracts for the building work. The architect's role in the construction stage would then be limited to those actions which require design decisions although he should be retained for the purpose of allowing him, as the designer, to satisfy himself that his design intentions and decisions are being faithfully executed.

6. COMMON ACTIVITIES OF A CONSTRUCTION MANAGER

6.1 In the design stage or stages

Advice on: site use materials selection building systems building economics construction programming documentation requirements

6.2 At the tender stage or stages

Advice on: selection of tenderers tendering conditions tender evaluation

6.3 In the construction stage or stages

Arranging contracts Coordinating works of separate contracts Arranging work common to several contracts Programming and monitoring of program Cost control Arranging permits Inspection of the works Certification for payments and completion Link with designers Arranging shop drawings, samples & prototypes Link with industry unions Issuing instructions to contractors

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APPENDIX 4: DEFINITION OF PROJECT MANAGEMENT

R.A.I.A. (Royal Australian Institute of Architect)
Practice Notes No. 63 (August, 1983)
PROJECT MANAGEMENT

1. INTRODUCTION

The terms "project management" and "project manager" are not confined to the building industry. They are frequently used in a wide variety of contexts, from mining projects to research projects. This can be confusing because they have different meanings in different contexts. Even within the confines of the building industry, the two terms can have various meanings, depending on who uses them and why.

A project manager may be an on-site member of the builder's work force, whose responsibility is to serve his employer, the builder, by seeing that the project is managed satisfactorily on site in terms of budgeted costs, specified quality and contractual time. In this context, project management is by no means a new concept. It is very old.

Again, a project manager may be a staff member of the builder's organisation, responsible to his employer for the total conduct of the project, from his employer's viewpoint, not only on site but in all other aspects as well.

A project manager may also be a member of the proprietor's organisation, especially in the case of large client bodies, whose role is to liaise with the architect and be the voice of the client when required by the architect who is responsible for overall control of the project.

A more recent application is the one in which the project manager is the person having the widest span of controlled responsibility for the control of the project. He has a responsibility wider than the construction role of the builder and wider than the designing and certifying role of the architect. In its fullest sense, this type of project management comes into being before the architect is appointed and exists long after the builder has completed his responsibility. This category of project manager is usually fulfilling a professional role and is most usually independent of the client although he may also be a client's "in-house" project manager. As a professional person, he is either in addition to other professional persons involved in the project or he is one of them, performing two professional roles. In this last sense, the traditional role of the architect is as both designer and project manager, although the traditional project management role of the architect is narrower than the role of the modern specialist project manager.

The purpose of this note is to assist readers having difficulty with the inconsistent use of the term "project management" and, more importantly, to point towards the definition of project management in its most modern sense.

It is true of course that for many decades the architect has also been the project manager because he has been the "person having the widest span of responsibility", in his traditional role. What has happened is that there have recently emerged persons and organisations offering services wider in responsibility than the traditional scope of architects. It is these persons and organisations who have produced the concept and terminology of "project management" in its newest sense.

It is probably also true that architects themselves have helped to bring about "project management", either by offering wider-than-traditional services or by confirming themselves to the traditional role and thus giving others reason to act.

2. DEFINITION

2.1 In the fullest sense of the term in its most modern usage, project management is the management of a building project by a person who:

- acts in the interests of the owner yet acts impartially when the interests of equity between the various parties involved require such impartiality,
- performs his role for the entire duration of the project from inception to completion,
- provides single point of control for all parts of the project and its programmes, accountable only to the owner.

2.2 Ideally, project management starts at the time when the prospective building owner, having conceived a need for the building, takes the very first step towards fulfilling the need and continues until the completed building is in use and is being operated and maintained. In practice, this ideal is rarely, if ever, attained.

2.3 Project management in its true and most ideal form embraces a number of phases of sub-management. These are:

- pre-design management, including site selection, establishing consultancy contracts, arranging finance, briefing of consultants, etc.
- design management, including feasibility studies, environmental impact studies, schematic design, developed design, services design, cost planning, etc.
- documentation management, including constructional and contract documentation.
- pricing management, including selection of a builder able to erect the building at an acceptable price.
- construction management by a person responsible for the erection of the building.
- contract management by a person accountable to the owner for the administration of the contract(s) for erection of the building.
- post-contract management, including training of user and occupiers in the operation and maintenance of the building.

Unless substantially all of these phases are included, then the process is not project management in the sense used in this note.
2. THE PROJECT MANAGER

2.1 Given the definition used above, who are best qualified to be project managers? Architects, engineers, quantity surveyors and others all lay claim to having a good deal of the necessary qualifications. The truth, most likely, is that no single individual has the breadth of knowledge and expertise necessary for successful project management in its fullest sense. It is more likely that the successful project manager must be not an individual but an organisation.

It is also likely that successful project managers will never all belong to a particular profession either of the traditional or non-traditional kind. In a paper given to a Project Management Conference in England in February 1975, a Mr. James, a quantity surveyor and arbitrator, said: "I do not believe there is ever likely to be a genius of professional men whose sole occupation is project management. In its widest sense the job needs deep knowledge and skill in too many professional fields on too great a variety of projects. By the time anyone has obtained the necessary medium of skill and experience to do the job well, he must be approaching the end both of his career and the reserves of energy needed for it."

3.2 The project manager must have or have access to a wide variety of resources — management ability, financial backing, technical skills, knowledge of law, leadership qualities, and so on. A wide variety of levels from the smallest details to the broadest principles.

4. THE COST OF PROJECT MANAGEMENT

The project manager is either a professional person engaged solely as "project manager" or he is one of the traditional project team members who undertakes the project management role in addition to his professional role. In both cases, viewing the project management task as a professional consultancy, the cost of consultancy services is a cost to be borne by the owner. It can be asserted that the engagement of such a professional person will actually save the owner money but, nevertheless, it is a cost which becomes part of the overall project cost. Further, it increases the cost of consultancy services.

It may be argued that because of the presence of the project manager who, in the course of his role, lends the role of other consultants, then the cost of the other consultants' fees is reduced, thus helping to offset the cost of the project manager's fee. This is likely to be an exaggeration. The more consultants there are, the more co-ordination becomes necessary and the entitlement of co-ordination fees becomes more pertinent.

For example, a project manager being the primary consultant may undertake to write the building specification with the intention of reducing the cost of architectural services by reducing the architect's fees by an amount equal to the architect's fee component for the specification. Such an intention is likely to be misplaced. The project manager will not write the specification for nothing and, being less familiar with the building details than the designer, he may well find that his costs for the task are higher than the architect's would have been. In addition, the architect may well find that such an arrangement would lead to a degree of co-ordination not otherwise necessary and for which he believes himself to be entitled to an additional fee for the extra time involved. Such arrangement may also give rise to difficulty in establishing the boundaries of the areas of liability of the persons involved.

5. RESPONSIBILITIES AND LIABILITIES

From the lowest level of input to a building project, say for example a small sub-contract, to the highest level, that of the owner himself, there are three responsibilities to be exercised — cost control, time control and quality control. Responsibility of the contractor is attributable to the builder if he fails in control of those matters for which he is responsible. Similarly, the architect in his traditional role is answerable to his client. A hundred years or so of case studies have provided a catalogue of such responsibilities, readily accessible to architects, builders, sub-contractors, lawyers and the like. There is no such catalogue of responsibilities of project managers, either because the field of professional project management is too new or possibly because the fine print of project management agreements places the chief responsibilities on the shoulders of others.

Failure to perform agreed services is of concern to professional people of all kinds. The consequences of such failure in the case of professionals in their traditional role are, nevertheless, well known and acknowledged. One result of this is that professional indemnity insurers have some means of assessing the risks in insurance against the cost of such failures. They are usually agreeable to insuring within the scope of traditional services.

That they are not so agreeable in the case of project management services may be due to the lack of case studies by which to assess the risks. It may also be because the wider span of responsibility of project managers gives rise to greater risks. Whether insurance is available or not, it does seem that professional negligence in project management services is likely to lead to greater claims than in the case of the traditional services of, say, architects. In the absence of insurance, the project manager would need to be an organisation having considerable financial support of its own. That is, of course, unless the project manager so arranges matters contractually that professional liabilities are shared by all the others in the team. In this case, one may well question why an owner should engage a project manager who avoids liabilities.

These aspects of project management, responsibility and liability, are noticeably absent from most, if not all, of the literature introducing and promoting this new field of professional services.

6. PROFESSIONAL INDEPENDENCE

The value of professional advice is related to the independence and impartiality of the adviser. The less the professional adviser has an interest in the outcome, the more valuable the advice is likely to be. The value is not maximum unless the professional adviser has no personal interest whatever in the matter and is seen to have no such interest. The definition of a project manager in 2.1 above rests on this premise for its validity. This makes it difficult and sometimes impossible for certain persons to act as project manager in this sense.
For example, a commercial building company cannot be both the builder and the project manager in the same project. Similarly, a package dealer or designing construct organisation cannot fulfill the dual role.

It becomes more feasible if the party offering dual services of project management and something else is a professional person in both roles, e.g., project manager/architect or project manager/quantity surveyor but even in such cases the independence must not only exist in each role but must also be seen to exist.

7. PROJECT MANAGEMENT FEES
The scope of such services varies considerably from project to project and it would not be practicable to determine a standard for the setting of fees. It is thus imperative that an architect engaging in such services should have complete and thorough records of the costs of his practice and of each job, to enable him to estimate a satisfactory fee level based on reasonably expected costs and profit. It is also obviously necessary to establish a certain degree of preciseness in the scope of the services to be offered as project management. The looseness of the meaning of project management is an added reason why in any particular project the architect should establish the true extent and responsibilities of his services. This will also assist him in the determination of his fees. The same considerations apply whether the architect is to act as project manager himself or enter into an agreement involving another person acting as project manager. There is no RAIA percentage scale fee directly applicable to project management services.

Of particular importance in the establishment of a fee for project management by an architect are the scope and nature of those responsibilities lying outside the scope of normal architectural services. Because of the variability of project management services, there is no published check list of such responsibilities. They would often include such details as:
- advising on finance
- advising on site selection and acquisition
- cost benefit studies
- advice on different methods of contracting
- taxation advice
- preparation of non-standard contracts
- advising on legal matters such as leasing and conveyancing
- lettings and tenancies
- programming
- budgetting
- monitoring of activities of all other parties
- insurance.

8. OTHER MANAGEMENT METHODS
There are other methods of managing a building project, some of which are often confused with "project management" but of which none is identical to project management as defined in this note. Two common examples of such other methods are:

Construction management: As the name implies, the key objective is management of the construction phase within the total programme.

The traditional role of the builder is obviously a form of construction management but in recent years the phrase "construction management" has been adopted to describe management of the construction phase by means other than the traditional. In one such use, the construction manager's role is introduced in the design phase to provide consultancy services and advice concerning the relationship between design, construction and construction methods. In another, the construction manager's role is more of a manager than a builder. Instead of a builder having a number of sub-contracts, there is a person managing a number of separate contracts. In all cases, construction management is part of project management and is therefore not equal to the full scope of project management.

Design-and-construct management (or "package deal" management): Here again, the name implies the scope of the method - management of the design and construction phases at a single point of control. It is not uncommon for design-and-construct management to extend before and after these two phases, to include pre-design and post-construction services equal in scope to that of full project management. The important difference between this method and "project management" is that, in design-and-construct, all advice and decision-making usually mesh with the objectives of the design-and-construct manager rather than of the owner. Once the terms of a design-and-construct package have been set and accepted it becomes difficult to operate professional independence of advice, especially in matters relating to finance. The construction stage of any project, in any method, is a commercial operation, and in the package deal there is no party free to advise the owner independently of the package dealer and with impartiality.

Fast-track methods are those which differ from the traditional linear stage-by-stage process in that they are designed to accelerate completion by overlapping the traditional stages of design, construction, etc. Fast-tracking may be applied to any of the management methods referred to herein, including project management. In fact, good project management would seem to require a certain amount of fast-tracking in order to achieve the objective of completion in minimum time.

9. OVERALL OBJECTIVES
The overall objectives of any form of project management should be:
- quality control
- cost control
- time control

all in the interests of the owner. As such, the objectives are not different from those of traditional architectural services. The difference is not in the nature of the objectives but in the breadth of the field in which the objectives are pursued.

Project management in the full sense of the term requires not only considerable knowledge of modern technology, law, industrial relations, planning, art, social science, commerce,
environmental science and a host of other disciplines. It also requires an in-depth level of expertise in all the skills of modern management. It follows that no one should accept this role lightly or without adequate resources.

It may well be that, in many projects, the objectives are best achieved by no other than project management as described herein.

10. THE CONTRACT FOR SERVICES

In project management, an architect may enter into:

- In the role of architect, he may enter into a contract with the owner, directed by the project manager but accountable to the owner, or
- In the role of architect, he may enter into a contract with the project manager, directed by and accountable to the project manager, or
- In the role of project manager, he may enter into a contract with the owner, or
- In the role of both architect and project manager, he may enter into a contract with the owner.

There is no standard form of project management contract or agreement except those prepared by organisations for their own use and perhaps benefit.

The architect entering into any form of contractual arrangement involving project management services would be well advised to exercise extreme care before agreeing to the terms, to satisfy himself as to the terms, both explicit and implicit, and if necessary to seek legal advice. Architects may be generally unfamiliar with such agreements but, once having entered into such an agreement, the doctrine of contractual obligation applies. What is agreed to in a contract is what becomes binding on those who so agree.

11. CONCLUSION

11.2 Architects considering their own appointment as architects within a project management context, under a project manager, should give particular attention to the following considerations:

- Does the project manager have all the necessary resources adequately to perform his role?
- Will the project manager act in a professional capacity?
- Is the fee for the architectural services a reasonable one?
- What responsibility does the project manager accept?

11.3 Architects considering their own appointment as both project manager and architect in the same project should give particular attention to the question: Will our professional advice be truly professional and be seen to be so at all times?

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APPENDIX 5: EDITION E5b LUMP SUM CONTRACT AGREEMENT
AND CONDITIONS

R.A.I.A. (Royal Australian Institute of Architect)
16th, December, 1970
Edition 5th, Approved 16 December 1970 (First Print—January 1971)

Lump Sum Contract

Dated 19

Agreement and Conditions of building contract between

and

130853

Copyrighted in the name of The Royal Australian Institute of Architects
for and on behalf of the joint owners, namely

The Royal Australian Institute of Architects
and
The Master Builders' Federation of Australia Inc.
ARTICLES OF AGREEMENT made the day of ____________ 19__________ BETWEEN

of (or whose registered office is situate at)

(herinafter called "the Proprietor") of the one part and

of (or whose registered office is situate at)

(herinafter called "the Builder") of the other part WHEREAS the Proprietor is desirous of

(herinafter called "the Works") at

and has caused Drawings and/or Specifications and/or documents showing and/or describing the work to be done to be prepared by or pursuant to the instructions of

as Architect: AND WHEREAS the attached conditions form the Conditions herinafter referred to and together with the said Drawings numbered...

inclusive (herinafter referred to as "the Contract Drawings"), the said Specifications and these Articles of Agreement comprise the Contract Documents herinafter referred to, and have been signed by or on behalf of the parties hereto:

NOW IT IS HEREBY AGREED

1. For the consideration herinafter mentioned the Builder will upon and subject to the Conditions attached hereto execute and complete the whole of the works shown upon the Contract Drawings and/or described by or referred to in the said Specifications, and each of the provisions of this Contract shall be read and construed as subject to this primary responsibility.

2. The Proprietor will pay to the Builder the sum of ____________________________

(£ ) (herinafter referred to as "the Contract Sum") or such other sum as shall become payable hereunder at the times and in the manner specified in the said Conditions.

3. The term "the Architect" in the said Conditions shall mean ____________________________

of, provided that should the said Architect or any other Architect appointed pursuant to this clause cease to be the Architect for the purposes of this Contract, then the Proprietor shall appoint another Architect to be selected by him provided that he shall not appoint another Architect before first ascertaining that the Builder has no reasonable grounds for objection to such Architect. Each and every action of either party to this Contract necessary to give effect to this clause shall be taken within 7 days from the time when commencement of such action is proper. Any Architect who shall be so appointed under this Article shall not be entitled to disregard any decision, expression of reasonable satisfaction, consent or instruction given by any former Architect.
AS WITNESS the hands of the said parties

*Signed by the said Proprietor

In the presence of

Signature

Address

*Signed by the said Builder

In the presence of

Signature

Address

* If either or both parties to this Contract is a body corporate or public body, the authority under which it or they operate, such as memorandum of association, charter, proclamation or statute, etc., should be examined by the parties to ensure that authority exists to carry out the terms of the Contract.

NOTE:
At least two complete copies of all Contract Documents are required to be executed by both parties. Refer clause 2(a) of the attached Conditions.
The Conditions Hereinbefore Referred To

1(a) The Builder shall carry out and complete the Works in accordance with this Contract to the reasonable satisfaction of the Architect. The Architect may in his absolute discretion and from time to time issue further drawings, details and/or written instructions, and written explanations (all of which are in these Conditions collectively referred to as "Architect’s Instructions") respecting:
(i) The Works as shown and/or described in the Contract Documents including the work of nominated sub-contractors and nominated suppliers,
(ii) The variation of the Works,
(iii) Any errors, omissions or discrepancy in or divergence between the Contract Drawings and/or Specifications,
(iv) The removal from the site of the Works of any materials or goods brought thereon by the Builder for the Works and the substitution of any other materials or goods therefor,
(v) The removal and/or re-execution of any work executed by or for the Builder,
(vi) The postponement of any work to be executed under the provisions of this Contract,
(vii) The removal from the Works of any person employed thereon provided such instructions shall not be given vexatiously or frivolously,
(viii) The opening up for inspection of any work covered up whether or not the Works are practically complete as referred to in clause 25 of these Conditions,
(ix) The execution of any work to be carried out under this Contract whether or not the Works are practically complete as referred to in clause 25 of these Conditions,
(x) The amending and making good of any defects in the Works pursuant to clause 26 of these Conditions.

1(b) Oral instructions given to the Builder by the Architect shall have the force of Architect’s Instructions. If compliance with an oral instruction involves a variation and if written confirmation by the Architect has not been received by the Builder he may confirm the instruction in writing to the Architect and if not disallowed in writing by the Architect to the Builder such oral instructions referred to in the Builder's confirmation shall be deemed to be Architect’s Instructions.

1(c) If within a reasonable time after receipt of a written notice from the Architect requiring compliance with any Architect's Instructions previously given the Builder does not comply therewith, the Proprietor may employ and pay others to execute any work whatsoever which may be necessary to give effect to such Architect’s Instructions and all costs properly incurred in connection therewith shall be recoverable from the Builder by the Proprietor as a debt. Such costs may be deducted by him from any moneys due or to become due to the Builder under this Contract.

1(d) If compliance with Architect’s Instructions involves any variation, such variation shall be dealt with under clause 19 of these Conditions and the value thereof shall be added to or deducted from the Contract Sum as the case may require.

1(e) If because of Architect’s Instructions or because of the lack of Architect’s Instructions the Builder incurs loss, expense or damage beyond that otherwise provided for in or reasonably contemplated by this Contract then, unless such Instructions were issued or withheld by reason of some breach of this Contract by the Builder, the amount of such loss, expense or damage shall be ascertained by the Architect and added to the Contract Sum provided that within a reasonable time of its becoming aware that such loss, expense or damage is or may be involved the Builder shall notify the Architect in writing accordingly and shall notify the Architect as soon as practicable as to the amount of such loss, expense or damage.

2(a) The Contract Documents shall remain in the custody of the Architect so as to be available at all reasonable times for inspection by the Builder or the Proprietor. Upon the signing of this Contract the Builder shall provide to the Architect a blank copy of the Agreement and Conditions and a fully executed set of the Contract Documents shall thereafter be provided to the Builder.

2(b) In the event of any contradiction, discrepancy or ambiguity between anything contained in the Contract Drawings or Specifications and in these Conditions (including any special Conditions attached hereto) then save as to the quality and quantity of the Works the said Conditions shall prevail.

2(c) If the Builder shall find any errors, omissions or discrepancy in or divergence between the Contract Drawings and/or the Specifications he shall immediately give to the Architect a written notice specifying the same and the Architect shall issue instructions in regard thereto.

2(d) Any error in description or in quantity appearing in the Contract Drawings or Specifications or any work omitted therefrom shall not vitiate this Contract but shall be corrected and such correction shall be deemed to be a variation required by the Proprietor pursuant to Architect’s Instructions.

2(e) Upon the signing of this Contract the Architect shall without charge to the Builder furnish him (unless he shall have been previously furnished) with three copies of the Contract Drawings and
the Specifications and such other copies of documents and/or drawings as may be required from
time to time by Authorities having jurisdiction over the Works or with whose systems the same
are or will be connected. Such copies shall be additional to the signed copy of the Contract
Documents provided to the Builder.

2(f) The Architect without charge to the Builder shall furnish him with sufficient (but not less than three)
copies of such further drawings, details and/or written instructions and written explanations as are
reasonably necessary to enable the Builder to carry out and complete the Works as required by this
Contract.

2(g) The Builder shall keep on the Works at all reasonable times one copy of the Contract Drawings,
the Specifications and Architect's Instructions so as to be available as the Architect may require.

2(h) The Contract Drawings, the Specifications and further drawings shall not be used, copied or
reproduced other than for the purposes of this Contract.

3(a) No Bills of Quantities supplied by the Proprietor to the Builder prior to the signing of this Contract
shall form part of this Contract, provided that if

(i) Any item of quantity stated in any such Bill differs from the quantity needed to complete the
Works in accordance with the Contract Drawings and/or Specifications and the value of the
discrepancy exceeds five per centum of the value included in the Bill in respect of the said
item or $2,000, whichever is the lesser, or

(ii) Any item of quantity has been included therein which should have been omitted therefrom,
or

(iii) Any item of quantity has been omitted therefrom which should have been included therein,
then:

(A) In the case of (i) as aforesaid, where the Bill is deficient in quantity, or of (iii) as aforesaid,
upon application in writing to the Architect by the Builder after the date of completion of
the work described in any such item, or,

(B) In the case of (i) as aforesaid, where the Bill is excessive in quantity, or of (ii) as
aforesaid, upon notification thereof in writing to the Builder by the Architect,
an amount calculated in accordance with clause 19 of these Conditions but excluding sub-clause (e)
of that clause shall be added to or deducted from the Contract Sum as the case may require, provided
that the final net addition to or deduction from the Contract Sum pursuant to this sub-clause shall
not on balance exceed one per centum of the Contract Sum.

The word "quantity" shall be deemed to include description and the method of measurement shall
be that adopted or described in the Bill of Quantities.

3(b) Any discrepancy between any provision of the nature described in clause 18 of these
Conditions in any Bills of Quantities supplied by the Proprietor to the Builder prior to the signing
of this Contract and the Contract Documents shall be corrected either by deducting the amount of
the discrepancy from the Contract Sum or by adding the said amount together with five per centum
thereof to the Contract Sum as the case may require.

3(c) Any claim made pursuant to this clause for addition to or deduction from the Contract Sum shall
be supported by details sufficient to substantiate the claim.

3(d) Any measurement fee properly incurred by reason of any claim pursuant to this clause shall be the
responsibility of the Proprietor, provided that in the event of any claim made by the Builder not being
established the amount of the measurement fee shall be deducted from the Contract Sum.

3(e) Any priced Bill of Quantities supplied by the Builder to the Architect shall be used only for purposes
of this Contract and shall not without the written permission of the Builder be copied or reproduced.

4(a) The Builder shall comply with and give all notices required by any Act of Parliament, ordinance,
regulation or by-law of any Authority which has jurisdiction over the Works or with whose systems
the same are or will be connected, and he shall pay and indemnify the Proprietor against any loss or
charges legally demandable under any such Act of Parliament, ordinance, regulation or by-law in
respect of the Works. Prior to the issue of the Final Certificate pursuant to clause 31 of these
Conditions or upon the determination of the employment of the Builder pursuant to clauses 22 or
23 of these Conditions, the Builder shall surrender to the Architect any documents in his possession
issued by or evidencing the approval of Authorities in connection with the Works.

4(b) Should compliance with any requirement condition or order made under any Act of Parliament,
ordinance, regulation or by-law of any Authority involve a variation the Builder, before proceeding
with such variation, shall promptly give written notice thereof to the Architect and may apply for
instructions in regard thereto.

4(c) If the Builder within 7 days of his giving notice to the Architect pursuant to sub-clause (b) of this
clause does not receive Architect's Instructions in regard thereto he shall be entitled to proceed
with the Works so as to comply with any and every requirement, condition or order referred to in
the said notice, and any variation involved shall be dealt with in accordance with clause 19 of these
Conditions. The Builder shall not be obliged to proceed with the Works prior to receiving Instructions
applied for pursuant to sub-clause (b) of this clause.
In any case where the Architect shall issue instructions on the grounds that the quality of any work, materials or goods supplied by the Builder is not in accordance with this Contract and by such instructions it is required that the Builder remove and/or re-execute and/or replace any such work materials or goods or that he amend and make good any alleged defect, the Builder shall be bound to carry out any such instructions but he shall nevertheless be entitled, provided that prior to carrying out any such instructions he shall give to the Architect written notice of his intention so to do, to refer to arbitration pursuant to clause 32 of these Conditions the question of whether he shall be allowed payment for such removal, re-execution, replacement, amendment or making good pursuant to clauses 10 of these Conditions.

11(a) Should the Proprietor elect to secure day to day inspection of the Works he may, by the Architect, appoint a Clerk of Works and the Architect shall forthwith advise the Builder of such proposed appointment.

11(b) The Builder shall have the right of reasonable objection to the appointment of any person nominated as a Clerk of Works.

11(c) Any Clerk of Works so appointed shall act solely as an inspector under instructions given by the Architect and the Builder shall afford him reasonable facility for the performance of that duty.

12(a) Whilst the site of the Works remains in the Builder's possession, such possession shall include the right to exclude or remove unauthorised persons therefrom. The Architect or any person authorised by him shall be an authorised person for the purposes of this clause.

12(b) Authorised persons shall at all reasonable times have access to the Works or other places of the Builder where work is being done for the Contract, and in so far as materials or goods in virtue of any sub-contract are being prepared for the Works the Builder shall so far as possible secure a similar right of access and do all things necessary to make such right effective.

12(c) The Architect shall not authorise or continue to authorise any person for the purposes of this clause against whom the Builder may raise objection which the Architect considers to be reasonable. The provisions of this sub-clause shall be subject to the provisions of sub-clauses (b) of clauses 11 of these Conditions.

13(a) Neither party to this Contract shall assign the same without the written consent of the other party.

13(b) The Builder may sub-let any part of the Works subject to the consent of the Architect which consent shall not be unreasonably delayed or withheld.

13(c) The Builder shall not be relieved of responsibility under this Contract for such parts of the Works as are sub-let to sub-contractors or suppliers pursuant to this clause or to nominated sub-contractors or nominated suppliers pursuant to clauses 15 and 16 of these Conditions.

14(a) The Proprietor, by the Architect, shall have the right to arrange for artists and their assistants to enter upon the Works to execute sculpatures, mosaics, mosaics, and the like, and/or for special tradesmen and their assistants to enter upon the Works to execute work not included in the Contract, provided that such right shall relate only to work of a special character not usually undertaken by the Builder either directly or by sub-contractor.

14(b) No such artists or special tradesmen or their respective assistants against whom the Builder shall make objection which the Architect considers reasonable shall be allowed upon the Works.

14(c) Any work pursuant to this clause shall not be executed at any time whether during normal working hours or otherwise against which time the Builder makes objection which the Architect considers to be reasonable and in any case such work shall be executed so as not to damage or impede the progress of the Works.

14(d) Without prejudice to the Builder's obligation to exercise due care, all costs properly incurred by him in providing for protection of the work of artists and special tradesmen and their respective assistants pursuant to Architect's instructions and not otherwise provided for in the Contract Documents shall be added to the Contract Sum.

14(e) The Builder shall not responsible for any damage to the Works caused by any act or default of artists or special tradesmen or their respective assistants employed pursuant to this clause.

14(f) No artists or special tradesmen, or their respective assistants, entering upon the Works pursuant to this clause shall be regarded as being servants of or under contract to the Builder and, for the purposes of clause 20 of these Conditions, shall be persons for whom the Proprietor is responsible.
The provisions of this clause shall apply wherever any sum of the nature referred to in clause 18 of these Conditions is included in the Contract Sum for persons to be nominated by the Architect to supply and to execute work or to fabricate or manufacture and supply materials of goods particular to and exclusively for the Works.

15(a) Such sums shall be expended in favour of such persons as the Architect shall nominate who are hereby declared to be sub-contractors employed by the Builder and are referred to in these Conditions as nominated sub-contractors provided that the Architect shall not nominate a sub-contractor unless he shall first have announced that the Builder has no reasonable objection to that sub-contractor and that further the Architect and Builder shall enter into an agreement with such sub-contractor a copy of which is annexed hereto.

(i) That the nominated sub-contractor shall carry out and complete the sub-contract Work in every respect to the reasonable satisfaction of the Builder and of the Architect, and in conformity with all the reasonable directions and requirements of the Builder and within the period or periods to which they are to be completed or subject to periods specified.

(ii) That the nominated sub-contractor shall observe perform and comply with all the provisions of this Contract in the same manner as if they were the Orders and apply to the sub-contract Works or to any portion of the same in all respects and in all respects of the decisions of the Architect or the Arbitrator or of the Deputy referred to in clause 30 of these Conditions, so far as such decisions may concern the sub-contract Works.

(iii) That the nominated sub-contractor shall indemnify the Builder against any liabilities in respect of the sub-contract Works as those for which the Builder is liable to indemnify the Proprietor under this Contract.

(iv) That the nominated sub-contractor shall indemnify the Builder against any liabilities in respect of the sub-contract Works as those for which the Builder is liable to indemnify the Proprietor under this Contract.

(v) That the nominated sub-contractor shall perform the sub-contract Works, or where the same are to be completed in stages any stage thereof, within the period specified or within any extended period to which the nominated sub-contractor may be entitled under the provisions of his sub-contract, the nominated sub-contractor shall pay or allow to be paid to the Builder, all loss and/or damage thereby suffered, and any sums to be paid by the Builder to the nominated sub-contractor shall be paid by the Builder to the nominated sub-contractor within 7 days after receipt by the Builder of the sums mentioned in the next succeeding paragraph.

(vi) That payment in respect of any work, materials or goods supplied in the sub-contract shall be made within 7 days after receipt by the Builder of payment of any Certificates of the Architect which includes an evaluation of any work done or materials or goods supplied for the sub-contract. The amount of such payment shall include the amount of all sums paid by the Builder to the nominated sub-contractor up to the maximum amount of five per centum of the sub-contract sum, except that where the Builder has provided to the Proprietor a security pursuant to sub-clause (c) of clause 30 of these Conditions in lieu of retention, then the nominated sub-contractor shall be entitled to provide to the Builder an equivalent form of security equal to the amount which otherwise would be retained by the Builder pursuant to this clause.

(vii) That the Builder or the Architect or any person authorised by either shall have the right of access to the workshops and other places of the nominated sub-contractor as reasonably required for the purposes of this Contract or of the sub-contract.

15(b) Where in any Certificate issued pursuant to clause 26 of these Conditions an amount is included in respect of the value of the work, materials or goods executed or supplied by a nominated sub-contractor, the Architect shall, upon request by the nominated sub-contractor or the Builder, provide the Builder and the nominated sub-contractor with particulars of the said amount and the same shall be paid by the Builder to the nominated sub-contractor within 7 days after receipt by the Builder of payment of the Certificate in which the amount was included less only:

(i) any amount which the Builder is entitled to retain under the terms of the sub-contract, and

(ii) any amount which the Builder is entitled to deduct on account of any loss and/or damage suffered or incurred by the Builder in respect of delay by the nominated sub-contractor in the completion of the sub-contract Works or any stage thereof, and

(iii) any other proper withholding.

15(c) Before issuing any Certificate pursuant to clause 26 of these Conditions the Architect may request the Builder to furnish to him reasonable evidence that amounts in respect of work executed or materials or goods supplied by nominated sub-contractors included in the calculation of the amount of any previous Certificate issued pursuant to the said clause and paid by the Proprietor to the Builder have been paid or otherwise discharged by the Builder to such nominated sub-contractors subject to the provisions of sub-clause (b) of this clause and if the Builder does not satisfy such request the Architect may notify the Proprietor in writing (a copy of which shall serve on the Builder) of his failure to be so satisfied and the Proprietor himself may pay such amounts or any of them to any nominated sub-contractor concerned and after payment but not otherwise may deduct the amounts so paid from any sum due or to become due to the Builder provided that the Proprietor shall not make any such payment to a nominated sub-contractor unless and until
the Architect shall have given to the Builder 7 days notice in writing of the Proprietor's intention so to do.

15(g) The Builder shall be entitled to retain the benefit of any discount that may be allowed by a nominated sub-contractor for prompt payment and any such discount shall not be taken into account in any adjustment between the Builder and the Proprietor and the Architect shall not invite tenders from persons to be nominated sub-contractors in such a way as to prevent the Builder from obtaining prompt payment discounts.

15(a) Where the Builder in the ordinary course of his business carries out work of the same nature as that for which a sum of the nature referred to in clause 18 of these Conditions is included in the Contract Sum then, provided that the Builder shall have given to the Architect a notice in writing of his desire so to do, he shall be permitted to tender for any such work for which tenders are invited without prejudice to the right of the Proprietor or the Architect to reject the lowest or any tender.

15(f) If a nominated sub-contractor shall default in his sub-contract with the Builder in such manner as would, if such default were a default of the Builder enable the Proprietor to determine the employment of the Builder under this Contract pursuant to clause 22 of these Conditions, the Builder shall advise the Architect in writing and the Architect shall thereupon issue instructions to the Builder. All costs and expenses necessarily incurred by the Builder in complying with such instructions shall be deemed to have been incurred or expended under or by virtue of the sub-contract concerned and the Contract Sum shall be adjusted in accordance with the provisions of clause 18 of these Conditions as if all such costs and expenses consisted wholly of sums expended by the Builder in favour of another party pursuant to a provision of this Contract. Should the Proprietor so desire he may proceed against the defaulting nominated sub-contractor in such manner as he may choose and in the name of the Builder for recovery of his damages arising out of the default aforesaid provided he shall have first adequately indemnified the Builder against all costs or expenses of the Builder arising out of or incidental to such proceedings and the Proprietor shall be entitled to retain for his own benefit the amount of damages that may be awarded or recovered in any such proceedings.

15(g) In the case of any nominated sub-contract:

(i) in respect of which the Architect has before calling for tenders for the nominated sub-contract submitted for the approval of the Builder both the list of proposed tenderees and the terms and conditions under which it is proposed that tenders be called, and has also before nominating a sub-contractor submitted to the Builder copies of all tenders received and agreed in consultation with the Builder the selection of the nominated sub-contractor; or

(ii) in respect of which the Architect at the time of issue to the Builder of tender documents for this Contract notified the Builder in writing of the name and address of the proposed nominated sub-contractor, the specified terms and conditions of the sub-contract and the amounts of all tenders received in respect of the sub-contract, and supplied to the Builder copies of all relevant documents submitted by the proposed nominated sub-contractor with his tender,

the provisions of sub-clause (f) of this clause (except in the case of the bankruptcy or liquidation of the nominated sub-contractor) shall not apply, and the provision of paragraph (a) of sub-clause (g) of clause 24 shall apply only where delay is due to any of the causes referred to in paragraphs (i) to (iv) and (vi) and (vii) of the said sub-clause.

15(h) Subject to sub-clause (a) of this clause the Builder shall enter into a sub-contract with each nominated sub-contractor on terms and conditions consistent with this Contract and including paragraphs (f) to (vii) inclusive of sub-clause (a) of this clause.

16 The provisions of this clause shall apply where any sum of the nature referred to in clause 18 of these Conditions is included in the Contract Sum in respect of the supply of any materials or goods to be fixed by the Builder excepting in respect of the fabrication or manufacture and supply of materials or goods particular to and exclusively for the Works.

16(a) Such sum shall be expended either:

(i) as the Architect shall instruct but so that the Builder may select his own supplier, or

(ii) in the manner required by the Specifications, or

(iii) in favour of persons to be nominated by the Architect and subject to the provisions of sub-clause (d) of this clause,

and the sum expended shall be deemed to be the net cost to the Builder and shall include sales tax (where applicable), and the cost of packing, carriage and delivery and also where in the opinion of the Architect the Builder has properly incurred the same the cost of special packing and special carriage and provided that the Builder shall be entitled to retain the benefit of any discount that may be allowed for prompt payment and any such discount shall not be taken into account in any adjustment between the Builder and the Proprietor. The Architect shall not invite tenders from persons to be nominated suppliers in such a way so as to prevent the Builder from obtaining prompt payment discounts.
16(b) Any specialists, merchants, tradesmen or others nominated by the Architect pursuant to this Contract to supply materials or goods are, save as is otherwise provided in clause 15 of these Conditions and this clause, hereby declared to be suppliers to the Builder and are referred to in these Conditions as "nominated suppliers" provided that the Architect shall not nominate a supplier unless he shall first have ascertained that the Builder has no reasonable objection to that supplier and that (unless the Architect and Builder shall otherwise agree) such supplier is willing to enter into an Agreement which provides inter alia

(i) That the materials or goods to be supplied shall be to the reasonable satisfaction of the Builder and of the Architect;

(ii) That such materials or goods are warranted to be in accordance with the express requirements of this Contract and consistent with any representations expressed or implied upon which the Builder and/or the Proprietor may be entitled to rely;

(iii) That the nominated supplier shall make good by replacement or otherwise any defects in the materials or goods supplied if such defects appear within an agreed period and shall bear any expenses reasonably incurred by the Builder as a direct consequence of such defects, but only if (where the materials or goods have been used on site) such defects are not due to faulty workmanship on the part of the Builder or to the use of an unsuitable material in the materials or goods supplied and shall not have been caused by improper storage by the Builder or by reason of any act or neglect of either the Builder, the Architect or the Proprietor or any person or persons for whom they may be responsible;

(iv) That delivery of the materials or goods shall be commenced and completed at the times stated in the said Agreement or as the Builder may reasonably direct;

(v) That the nominated supplier shall allow the Builder such discount for prompt payment as is usual for the nominated supplier to allow in other sales of similar materials or goods in the case of any nominated supply agreement.

16(c) In the case of any nominated supply agreement,

(i) in respect of which the Architect has before calling for tenders for nominated supplies submitted for the approval of the Builder both the list of proposed tenders and the terms and conditions under which it is proposed that tenders be called, and has also before nominating a supplier submitted to the Builder copies of all tenders received and agreed in consultation with the Builder the selection of the nominated supplier; or

(ii) where the provisions of paragraph (i) of sub-clause (a) of this clause apply, or

(iii) where the provisions of paragraph (b) of sub-clause (a) of this clause apply and the Architect at the time of issue to the Builder of tender documents for this Contract notified the Builder in writing of the name and address of the proposed nominated supplier, the specified terms and conditions of the supply agreement and the amounts of all tenders received in respect of that nominated supply item and supplied to the Builder copies of all relevant documents submitted by the proposed nominated supplier with his tender,

the provisions of paragraph (iii) of sub-clause (a) of clause 24 shall apply only where delay is due to any of the causes referred to in paragraphs (i) to (iii) and (vii) and (viii) of the said sub-clause.

16(d) Subject to sub-clause (b) of this clause, the Builder shall enter into an agreement with each nominated supplier on terms and conditions consistent with this Contract and including paragraphs (i) to (v) inclusive of sub-clause (b) of this clause.

17 If prior to the date of this Contract the Proprietor has entered into an agreement for the supply and fixing or for the supply only of any materials or goods for the purposes of this Contract and if reasonable notice thereof and opportunity to examine the agreement so entered into by the Proprietor was allowed to the Builder prior to such date then:

17(a) If the Builder on or before the execution of this Contract has given to the Architect or to the Proprietor written notice that he will not agree to take over the obligations of the Proprietor under and be bound by the terms of the agreement so entered into by the Proprietor then notwithstanding any provisions that may be contained in the Contract Documents in that regard he shall not be bound to do so and shall be deemed to have consented and shall raise no objection to the said agreement being performed and carried out as a separate contract provided that the work of the Builder shall not be thereby adversely affected or interfered with; and

17(b) If the Builder has not given any such notice as is provided in sub-clause (a) of this clause then he is bound to comply with any provisions of this Contract relating to the said agreement and in particular with regard to the taking over and carrying out of the same and the indemnifying of the Proprietor in relation thereto; and

17(c) The Contract Sum shall be adjusted as the case may require.

16 Any Prime Cost Sum, Provisional Sum or the monetary provision included in the Contract Sum shall be dealt with as follows.
18(a) Where any such sum is expended by the Builder in favour of a nominated sub-contractor or a nominated supplier pursuant to a provision of this Contract then:

(i) in the event of the sub-contract amount or supply agreement amount expended in respect of any such provision exceeding the amount included in the Contract Sum in respect thereof the amount of the excess together with five per centum of such excess shall be added to the Contract Sum, and

(ii) in the event of the sub-contract amount or supply agreement amount expended in respect of any such provision being less than the amount included in the Contract Sum in respect thereof then the amount of the difference shall be deducted from the Contract Sum.

18(b) Variations to any sub-contract or supply agreement entered into by the Builder pursuant to the provisions of clauses 15, 16 or 17 of these Conditions shall be dealt with under clause 19 of the said Conditions and in no such case shall the five per centum referred to in paragraph (i) of sub-clause (a) of this clause apply.

18(c) Where the Builder pursuant to a provision of this Contract executes work or provides materials or goods for which a Prime Cost Sum, Provisional Sum or like monetary provision is included in the Contract Sum the procedure for the valuation of such work materials or goods unless otherwise agreed shall be in accordance with clause 19 of these Conditions and in the event of such valuation exceeding or being less than the relevant Prime Cost Sum, Provisional Sum or like monetary provision the amount of the difference shall be added to or deducted from the Contract Sum as the case may require.

19(a) No variation shall vitiate this Contract.

19(b) All variations authorised or sanctioned by the Architect or required by the Conditions shall be valued and the amounts added to or deducted from the Contract Sum as the case may require.

19(c) Unless otherwise agreed variations including variations to the works of nominated sub-contractors and nominated suppliers shall be valued as follows:

(i) Where there is a priced Bill of Quantities the unit prices contained therein shall determine the valuation of work of similar character executed under similar conditions in all respects as work so priced. If it is unreasonable to apply the said prices such prices may be used as a basis for valuation or if there is no priced Bill of Quantities then a fair valuation of the variation shall be made.

(ii) If in the opinion of the Architect the value of any variation cannot be ascertained pursuant to any other provision of this clause, or if the Architect so instructs, the Builder shall proceed with the work and shall present in such form as the Architect may require a proper record of the cost of the variation together with supporting evidence. Rates chargeable for labour shall be appropriate current rates.

(iii) The Builder shall submit to writing to the Architect a reasonable price for each variation supported by measurements and/or other evidence of cost provided that it may be agreed that such measurements be made otherwise for pricing by the Builder.

(iv) If the Architect does not dissent from the price submitted by the Builder that price shall be used for the purposes of the Contract as the valuation of the variation. If the Architect does dissent he shall either request the Builder to submit a revised price having informed the Builder of his reasons for dissonance or provide the Builder with his own valuation of the variation.

(v) If the Builder be dissatisfied with any Architect's valuation of a variation provided pursuant to this clause he shall so notify the Architect in writing.

(vi) If the Builder does not dissent in writing from any Architect's valuation made pursuant to paragraph (iv) of this sub-clause the Architect's valuation shall be deemed to have been accepted by the Builder.

(vii) Paragraphs (iv), (v) and (vi) of this sub-clause shall not be interpreted to prevent the parties from referring any matters arising therefrom to arbitration in accordance with clause 32 of these Conditions.

19(d) Fees properly payable to any persons appointed for the purposes of sub-paragraph (iii) of sub-clause (c) of this clause or any like persons required to be employed by the Builder by Architect's instructions shall be paid by the Builder and be added to the Contract Sum.

19(e) In determining the value of a variation a reasonable allowance shall be credited to the Builder for overhead and profit on all items whether omitted or added.

For purposes of this clause overhead shall be deemed to include, but not limited to, relevant items included in preliminary or general clauses in the Specification.

20(a) Damage to Property—Except for such loss or damage as is at the sole risk of the Proprietor pursuant to paragraph (b) of sub-clause (e) or sub-clause (e) of clause 21 of these Conditions the Builder
shall be liable for and shall indemnify the Proprietor against any legal liability, loss claim or proceedings in respect of any injury or damage whatsoever and howsoever caused or incurred or damage arising out of or in the course of or by reason of the execution of the Works provided always that the same is due to any act, negligence, omission or default of the Builder, his servants or agents, or of any sub-contractor, his servants or agents and subject also to the provisions of sub-clause (c) of this clause.

20(b) Injury to Persons. The Builder shall be liable for and shall indemnify the Proprietor against any legal liability, loss, claim or proceedings whatsoever arising under any statute or at Common Law in respect of personal injury to or death of any person whomsoever arising out of or in the course of or caused by the execution of the Works unless due to any act or neglect of the Proprietor or of any person or persons for whom the Proprietor is responsible including persons employed pursuant to clause 14 of these Conditions and excluding personal injury to or death of any person other than the Builder for whom the Proprietor is responsible in the circumstances by virtue of any statute relating to Workers’ Compensation or Employers’ Liability and subject also to the provisions of sub-clause (c) of this clause.

20(c) Exemption from Indemnity Liability—Should the Proprietor or any person or any person authorised by him enter into occupation of the Works or any portion thereof and use the same the Builder shall not be liable for any injury to or death of any person or loss or damage to property (including the Works) which may be occasioned by such occupation and use.

21(a) If the Works of this Contract comprise the erection and completion of a new building then paragraph (A) of this sub-clause shall apply. If the Works of this Contract comprise the alteration, extension, or addition to or repair of an existing building then paragraph (B) of this sub-clause shall apply. No insurance arranged in accordance with this clause shall be modified amended or cancelled unless the Architect shall have given prior notice to the Insurer and such requirement shall be included as a condition of each such insurance policy.

(A) The Builder shall in the joint names of himself and the Proprietor (hereinafter referred to as "the insured") for their respective rights, interests and liabilities effect insurance under a Contractor's All Risk Insurance Policy which shall cover:

(i) the whole of the Works together with all associated temporary works and including materials incorporated or to be incorporated therein the property of the insured or for which they are responsible and whilst on or adjacent to the site of the Works in respect of loss, destruction or damage or to the property insured arising from any cause whatsoever for not less than the full amount of the Contract Sum plus an amount of not less than that stated in the Appendix to these Conditions to provide for additional costs of demolition and of removal of debris plus the percentage stated in the said Appendix to cover the fees of Architects, Engineers, Quantity Surveyors and Consultants; and

(ii) liability to the public for an amount not less than that stated in the Appendix to these Conditions in respect of accidents arising out of or in the course of or caused by the execution of the Works in the event of:

(1) death of or bodily injury (including illness) to any person not being a person who at the time of the accident is engaged in or upon the service of the insured under a contract of service or apprenticeship, and

(2) damage to property not belonging to nor held in trust by nor in the custody or control of the insured, all the foregoing being subject to such exclusions, conditions and excesses as shall be agreed by the insured.

(B) The existing structures together with all the contents thereof and the Works including materials and goods incorporated or to be incorporated therein whilst on or adjacent to the site of the Works (excluding the plant, machinery, tools and equipment of the Builder) shall be at the sole risk of the Proprietor who shall maintain insurance against the risk of any loss or damage thereto (including consequential loss to the Proprietor resulting therefrom) by fire, explosion, earthquake, lightning, storm and tempest and civil commotion.

(iii) The Builder shall effect Public Liability Insurance of the Proprietor as principal, for an amount not less than that stated in the Appendix to these Conditions in respect of accidents arising out of or in the course of or caused by the execution of the Works in the event of:

(1) death of or bodily injury (including illness) to any person not being a person who at the time of the accident is engaged in or upon the service of the insured under a contract of service or apprenticeship, and

(2) damage to property (other than the Works) not belonging to nor held in trust by nor in the custody or control of the insured, subject to any exclusions, conditions and excesses as agreed between the Proprietor and the Builder.

Notwithstanding any terms of statute affecting the Works occur then either party may by a notice in writing by certified mail to the other party determine the Contract subject to the right of
the other party to refer to arbitration pursuant to clause 32 of these Conditions. The question of whether such determination would be just and equitable having regard to the extent of such loss or damage and to the effect thereof upon the further performance of the Contract. Upon determination of the Contract as aforesaid or as a result of an award by the Arbitrator, Arbi-
trators or Umpire, as the case may be, the Builder shall be entitled to payment of an amount computed in accordance with the provisions of sub-paragraph (ii) of sub-clause (b) of clause 23 of these Conditions.

21(b) Workers’ Compensation and Employers’ Liability—The Builder shall insure for an amount not less than that stated in the Appendix to these Conditions against any liability loss, claim or proceedings whatsoever arising by virtue of any statute relating to Workers’ Compensation or Employers’ Liability or at Common Law by any person employed by him in or about the execution of the Works and shall ensure that every sub-contractor (whether or not a sub-contractor nominated pursuant to clause 15 of these Conditions) is insured against any such liability in the case of employees of such sub-contractor. Insurance effected by the Builder pursuant to this sub-clause shall be extended to include the interests of the Proprietors.

21(c) Joint Venture of Claims.—In the event of any occurrence resulting in loss or damage to the Works, material or goods incorporated or to be incorporated therein in respect of which either the Builder or the Proprietor is required to insure under this Contract all monies received by either party in settlement of any claim under the insurance policies shall, if requested in writing by the other party (unless the Contract shall have been determined pursuant to sub-paragraph (iii) of paragraph (b) of sub-clause (a) of this clause), be paid into a bank mutually agreed upon by the parties in an account in the joint names of the Builder and the Proprietor. The Builder shall not be entitled to any payments pursuant to this sub-clause other than the monies received under the aforesaid policies exclusive of the sum provided for the fees of Architects, Engineers, Quantity Surveyors and Consultants, which shall be payable to the Proprietor.

21(d) Period of Insurance.—The insurance referred to in this clause shall be effected before the Works are commenced and shall be maintained effective in respect of damage to the Works until practical completion of the Works pursuant to clause 25 of these Conditions and in respect of Public Liability and of Workers’ Compensation until the issue of the final certificate pursuant to clause 31 of these Conditions.

21(e) Partial Occupation.—Should the Proprietor or any tenant or other person authorised by him enter into occupation of the Works or any portion thereof and use the same before practical completion of the Works pursuant to clause 25 of these Conditions any such portion of the Works so occupied and used shall be at the sole risk of the Proprietor in respect of injury to or death of persons and damage to property. Should any additional insurance premium be payable by the Builder in respect of such occupation and use then the total amount thereof shall be added to the Contract Sum.

21(f) Insurers and Policies.—The Builder shall effect the insurance required under sub-clause (a) of this clause with an insurer nominated by him and approved by the Proprietor and the Builder shall deposit with the Architect certified copies of the cover notes, policies and premium receipts, failing which the Proprietor may effect such insurance and the premiums therefor shall be deducted from the Contract Sum. Where the Proprietor is required to effect insurance pursuant to sub-clauses (a) of this clause he shall provide certified copies of cover notes, policies and premium receipts to the Builder failing which the Builder may effect such insurance and the premiums therefor shall be added to the Contract Sum. Either party may require the other party to produce evidence of currency of any insurance required to be effected under this Contract.

21(g) Cross Liability.—Wherever pursuant to the provisions of this clause insurance is effected in joint names then the policy of such insurance shall provide that insurer as the policy may cover more than one insured, all insuring agreements and endorsements with the exception of limits of liability shall operate in the same manner as if there was a separate policy of insurance covering each name insured.

22(a) Determination of Default.

If the Builder shall make default in any one or more of the following respects, that is to say:

(i) if he, without reasonable cause, wholly suspends the carrying out of the Works before practical completion thereof, or

(ii) if he fails to proceed with the Works with reasonable diligence or in a competent manner, or

(iii) if he refuses or persistently neglects to comply with written notice from the Architect requiring him to remove defective work or improper materials or goods and by such refusal or neglect the Works are materially affected,

then in any such case the Architect may send to him by certified mail, a written notice specifying the default and stating the intention of the Proprietor to determine the employment of the Builder and if the Builder fails to remedy such default in a bona fide manner within 14 days after receipt of such notice, then the Proprietor without prejudice to any other rights or remedies may within 14 days after such continuance of default on the part of the Builder, by written notice delivered by
certified mail to the Builder, forthwith determine the employment of the Builder under this Contract provided such notice shall be given reasonably or vexatiously. If the Proprietor is at the time of such notice himself in breach of this Contract, then the said notice of determination of the employment of the Builder shall be deemed to be void and of no effect.

22(b) In the event of the Builder having an execution levied against him or becoming bankrupt or entering or attempting to enter into any composition or arrangement with his creditors or being a company having an execution levied against it or a winding up order made or (except for the purposes of reconstruction) passing or attempting to pass a Resolution for winding up or being a party to the appointment of or having an Official Manager appointed or on the appointment of a Receiver of the whole or any part of its property or undertaking or being a party to or attempting to enter into any composition or Scheme of Arrangement then the Proprietor may forthwith without prejudice to any other rights or remedies by written notice delivered by certified mail to the Builder determine the employment of the Builder under this Contract.

22(c) In the event of the employment of the Builder being determined pursuant to this clause the following shall be the respective rights and liabilities of the Proprietor and the Builder:

(i) The Proprietor may employ and pay other persons to carry out and complete the Works and the Proprietor or any such persons or any of their servants or agents, as the case may be, as an agent of the Proprietor may enter upon the Works and use the temporary buildings, plant, tools, equipment, goods and materials intended for delivery to and placed on or adjacent to the Works and may purchase all materials and goods necessary for the carrying out and completion of the Works in accordance with this Contract.

(ii) The Builder shall, if so required by the Proprietor or Architect within 14 days of the date of determination assign to the Proprietor without payment the benefit of any agreement for the supply of materials or goods and/or for the execution of any work for the purposes of this Contract on the terms that a supplier or sub-contractor shall be entitled to make any reasonable objection to any further assignment thereof by the Proprietor. In any case the Proprietor may pay any supplier or sub-contractor for any materials or goods delivered or works executed for the purposes of this Contract (whether before or after the date of determination) in so far as the price therefor has not already been paid by the Builder. The Proprietor's rights under this paragraph are in addition to his rights to pay nominated subcontractors as provided in these Conditions and payments made under this paragraph may be deducted from any sum due to or become due to the Builder.

(iii) The Builder shall as and when required in writing by the Architect so to do (and not before) remove from the Works any temporary buildings, plant, tools, equipment, materials, and goods. If not removed within a reasonable time after receipt of such request the Builder does not remove, then the Proprietor may, not less than 14 days after notifying the Builder in writing of his intention (but without being responsible for any loss or damage) remove and/or sell any such property of the Builder holding the proceeds less all reasonable costs incurred to the credit of the Builder.

(iv) Until completion of the Works pursuant to paragraph (i) of this sub-clause, the Proprietor shall not be bound by any provision of this Contract to make any further payment to the Builder but as soon as is reasonable thereafter, having regard to the rights of the Proprietor under the said paragraph, the Architect shall ascertain the amount of costs properly incurred by the Proprietor pursuant to the said paragraph and the amount of any direct loss and/or damage caused to the Proprietor by the determination and any other liability of the Builder to the Proprietor under this Contract and shall certify all of such amounts when added to the moneys paid to the Builder before the date of determination result in a total amount in excess of that which would have been otherwise payable under this Contract. The amount so payable shall be a debt payable by the Proprietor to the Builder; and if the said amount when added to the said moneys result in a lesser total than that which the Proprietor would otherwise have been required to pay under this Contract, then the difference shall be a debt payable by the Proprietor to the Builder.

(v) The Builder and/or any person authorised by him and approved by the Architect shall be granted access to the Works at all reasonable times for the purpose of inspecting, surveying or measuring the same.

Without prejudice to any other rights and remedies which the Builder may possess, if [23a]

(i) The Proprietor, having failed to pay to the Builder the amount due on any Certificate issued by the Architect pursuant to these Conditions within the period for payment of Certificates pursuant to sub-clause (a) of clause 26 of these Conditions does not thereafter pay such amount within 7 days of receipt of a notice from the Builder, stating that notice of determination under these Conditions may be served if payment is not made within such 7 days, or

(ii) The Proprietor interferes with or obstructs the issue of any Certificate due under this Contract, or

(iii) The carrying out of the whole or substantially the whole of the Works (other than the execution of any work required pursuant to clause 26 of these Conditions) is delayed for more than 26 consecutive days by one or more of the causes as follow:  

(A) by reason of the Builder not having received in appropriate time any necessary Architect's Instructions (as defined in clauses 10 of these Conditions) for which he shall have specifically applied in writing to the Architect; or

(B) by reason of proceedings being taken or threatened by or disputes with adjacent or neighbouring owners or occupants not arising from any act or neglect for which the Builder is responsible,
(C) by reason of the failure of the Proprietor to appoint an Architect as required by Article 3 of the Agreement;

(D) by reason of delay on the part of any such artists or their assistants or any such special tradesmen or their assistants as are referred to in clause 14 of these Conditions or on the part of any separate contractor or supplier who is a party to such an agreement as is referred to in sub-clause (e) of clause 17 of these Conditions;

(E) by reason of the Builder not being given possession of the site of the Works pursuant to clause 5 of these Conditions; provided that any period of delay amounting in all to more than 28 days shall for the purpose of this paragraph be deemed to have occurred consecutively if only interrupted by a resumption of resumptions of the carrying out of the Works which is or are not bona fide and substantial resumptions of the carrying out of the Works; or

(iv) The Proprietor shall have an execution levied against him or become bankrupt or enter or attempt to enter into any composition or arrangement with his creditors or being a company have an execution levied against it or have a winding up order made or (except for the purposes of reconstruction) pass or attempt to pass a Resolution for winding up or be a party to the appointment of or have an Official Manager appointed or have a Receiver of the whole or any part of its property or undertaking appointed or be a party to or attempt to enter into any composition or Scheme of Arrangement; or

(v) The Architect shall fail to issue any Certificate pursuant to these Conditions for a period of 7 days after the same shall have become due and continues such failure beyond a further 14 days after receipt of a written notice from the Builder (a copy of which the Builder shall forward to the Proprietor) requesting the issue of the same and stating that notice of determination under these Conditions may be served if such Certificate is not issued within the said 14 days, then the Builder by written notice by certified mail to the Proprietor (a copy of which shall be given to the Architect) may forthwith either suspend operations of the Works or determine the employment of the Builder under this Contract provided that such notice shall not be given unreasonably or vexatiously. Any suspension of the Works by the Builder shall not prevent him determining his employment under this Contract during the period that the Works are suspended.

23(b) Upon such determination by the Builder and without prejudice to the accrued rights or remedies of either party or to any liability of the classes mentioned in clause 20 of these Conditions which may accrue either before the Builder or any sub-contractor shall have removed or cause to be removed temporary buildings, plant, tools, equipment, goods or materials, or by reason of his so removing the same, the respective rights and liabilities of the Builder and the Proprietor shall be as follows:

(i) All sums paid to the Builder with all reasonable expenses and in such manner and with such precautions to avoid injury, death or damage of the classes in respect of which before the date of determination he was liable to indemnify the Proprietor under clause 20 of these Conditions remove from the Works all his temporary buildings, plant, tools, equipment, goods and materials and shall give facilities for his sub-contractors to do the same and any loss damage or expense thereby incurred by the Builder shall fall within the provisions of sub-paragraph (c) of paragraph (b) of this sub-clause.

(ii) After taking into account amounts previously paid under this Contract the Builder shall be paid by the Proprietor:

(A) the contract value of work completed at the date of determination.

(B) the contract value of work begun and executed but not completed at the date of determination.

(C) the cost of materials or goods properly ordered for the Works for which the Builder shall have paid or for which the Builder is legally bound to pay and on such payment by the Proprietor any materials or goods so paid for shall become the property of the Proprietor.

(D) the reasonable cost of removal under paragraph (b) of this sub-clause.

Provided that in addition to all other remedies the Builder upon such determination may take possession of and shall have a lien upon all unbilled goods and materials which may become the property of the Proprietor under clause 29 of these Conditions until payment of all monies due to the Builder have been paid by the Proprietor.

24(a) Upon it becoming evident to the Builder that the completion of the Works is likely to be delayed, he shall forthwith notify the Architect.

24(b) In the event of any such delay being caused by one or more of the causes described in sub-clause (g) of this clause, the Builder shall be entitled to claim and shall be allowed an extension of time, subject to the provisions of this clause.

24(c) Within a reasonable time of it being practicable to do so in respect of delay arising from any cause described in sub-clause (g) of this clause, the Builder shall give written notice to the Architect setting out the cause of delay and stating a fair and reasonable period by which in his opinion the Date for Practical Completion of the Works as stated in the Appendix to these Conditions, or such later date as previously fixed pursuant to this clause, (the latest such Date being hereinafter in this clause referred to as the 'Date for Practical Completion') should be extended to. The Architect shall be deemed to extend the Date for Practical Completion unless the Architect shall within a reasonable time of receipt of such notice advise the Builder in writing that he disagrees with the period stated by the Builder and advises the Builder in writing of his determination as to a fair and reasonable
period by which the Date for Practical Completion should be extended.

24(d) In the event of the Architect invoking the applicable provisions of sub-clause (c) of this clause, the Date for Practical Completion shall be deemed extended by the period determined by him pursuant to the said sub-clause unless the Builder shall within a reasonable time of receipt of advice of the Architect's determination give notice in writing to him that he disagrees with the same in which case the matter shall be referred to arbitration pursuant to clause 32 of these Conditions.

24(e) The right of either party to this Contract to at any time refer to arbitration pursuant to clause 32 of these Conditions the question of what is a fair and reasonable period by which the Date for Practical Completion should be extended pursuant to this clause shall not be affected by the provisions of sub-clauses (c) and (d) of this clause.

24(f) Notwithstanding any other provisions of this clause, from time to time and at any time after the occurrence of any delay or delays in the progress of the Works from any cause referred to in sub-clause (g) of this clause the Architect shall make a fair and reasonable extension of the Date for Practical Completion should he be of the opinion that the Builder is entitled to the same.

24(g) The causes of delay as referred to in sub-clauses (b), (c) and (f) of this clause are:

(i) By reason of Architect's instructions or variations, excepting instructions issued pursuant to Clause 10 of these Conditions;
(ii) By reason of the Builder not having received or been provided with in a timely manner plans or instructions as defined in clause 1 of these Conditions for which he shall have specifically applied in writing to the Architect;
(iii) By reason of delay of any local or other authority in giving any necessary approval;
(iv) By reason of non-compliance with sub-clause (b) of clause 4 of these Conditions;
(v) By reason of inclement weather or conditions resulting from inclement weather;
(vi) By reason of any loss or damage resulting from the causes referred to in clauses 20 and 21 of these Conditions;
(vii) By reason of proceedings being taken or threatened by or disputes with adjacent or neighbouring owners or occupiers;
(viii) By reason of civil commotion, any combination of workmen, or strikes or lockouts affecting the progress of the Works;
(ix) By reason of failure of the Proprietor to appoint an Architect as required by Article 3 of the Agreement;
(x) By reason of delay on the part of any such architects or their assistants or any such special tradesmen or their assistants as are referred to in sub-clause (a) of these Conditions or on the part of any separate contractor or supplier who is a party to such an agreement as is referred to in sub-clause (a) of clause 17 of these Conditions;
(xi) By reason of the Builder not being given possession of the site of the Works pursuant to clause 6 of these Conditions;
(xii) By reason of delay on the part of any nominated sub-contractor or nominated supplier which the Architect in the opinion of the Architect has taken all practicable steps to avoid, but subject to the provisions of sub-clause (a) of clauses 15 and sub-clauses (c) of clause 16 of these Conditions;
(xiii) By reason of the Builder suspending operations of the Works pursuant to clause 23 of these Conditions;
(xiv) By reason of any other matter, cause or thing beyond the control of the Builder.

24(h) The Builder shall constantly use his best endeavours to avoid delay in the progress of the Works and shall do all that may be reasonably required by the Architect to expedite the completion of the Works.

24(i) The Builder shall be entitled to reimbursement of loss or expense incurred by him as a result of a delay in the progress of the Works where all the following apply:

(i) Delay was caused by:
   (A) one or more of the causes numbered (i), (ii), (vi), (ix), (x) and (xx) in sub-clause (g) of this clause; or
   (B) one or more of the causes numbered (ii), (vi), (vii) and (xx) in sub-clause (g) of this clause, as far as in the opinion of the Architect the Builder has so acted that he should be reimbursed for such expenses;

(ii) An extension of the Date for Practical Completion has been made or should properly have been allowed pursuant to this clause;
(iii) The delay is not due to any default of the Builder or to any act of the Builder other than an act proper for the performance of this Contract;
(iv) The Builder has taken all practicable steps to avoid or reduce the delay and to keep expenses resulting from the delay to a minimum;
(v) The loss or expense has not been and should not be included in the values of any variation;
(vi) The Builder in giving notice to the Architect pursuant to sub-clause (c) of this clause has had his attention to the effect of the delay on the progress of the Works;
(vii) The Builder has given to the Architect details in writing of the nature of the claim as soon as practicable after commencement of the delay and at a time when details could be checked;
(viii) Within a reasonable time of the Date for Practical Completion being extended or being deemed to be extended the Builder has given to the Architect in writing details of the items of expense and the amounts thereof or a close estimate thereof;
and in any such circumstance, the loss or expense incurred shall be ascertained by the Architect and the Contract Sum shall be adjusted accordingly.

25(a) On or before the Date for Practical Completion of the Works stated in the Appendix to these Conditions, subject to clause 24 of the said Conditions, the Builder shall practically complete the Works, i.e. bring them to a stage of being reasonably fit for use and/or occupation by the Proprietor.

25(b) When the Builder is of the opinion that the Works are practically completed he shall so advise the Architect in writing and within a reasonable time but not exceeding 14 days of receipt of such advice, the Architect shall either:
(i) if reasonably satisfied that the Works are practically completed issue both to the Builder and to the Proprietor a written Notice of Practical Completion which shall state the Date of Practical Completion of the Works, or
(ii) if not reasonably satisfied that the Works are practically completed give to the Builder written notice of matters and things required to be done for practical completion.

25(c) When the Builder considers that he has complied with a notice issued pursuant to paragraph (ii) of the preceding sub-clause or with paragraph (ii) of this sub-clause he shall so advise the Architect in writing and within a reasonable time of receipt of such advice but not exceeding 7 days the Architect shall either:
(i) issue the Notice of Practical Completion as provided by the preceding sub-clause, or
(ii) if not reasonably satisfied that the Builder has complied with a notice given in pursuance of paragraph (ii) of the preceding sub-clause give to the Builder a further written notice of matters and things still required to be done for practical completion limited to matters and things contained in the said notice in pursuance of paragraph (ii) of the preceding sub-clause or that have arisen in consequence of any act of the Builder subsequent to the said last mentioned notice.

25(d) If upon receipt of any written advice from the Builder pursuant to this clause no action is taken by the Architect as required by this clause, the Works shall be deemed to have been practically completed upon the date stated in such advice.

25(e) If in the opinion of the Architect the Works are practically completed and the Builder has not given advice pursuant to sub-clause (b) or sub-clause (c) of this clause, the Architect may issue the Notice of Practical Completion referred to in paragraph (i) of sub-clause (b) of the said clause.

25(f) In the absence of written agreement between the Proprietor and the Builder, if the Proprietor occupies and/or uses the Works prior to the issue by the Architect of the Notice of Practical Completion pursuant to this clause, the Works shall be deemed to have been practically completed on the date of commencement of such occupancy and/or use.

25(g) The Date of Practical Completion shall be the date of commencement of the Defects Liability Period hereinafter referred to and shall be the dates referred to in Clauses 27 and 30 hereof.

25(h) After the Date of Practical Completion it shall not be competent for the Architect to require any variation not previously instructed or authorised unless in pursuance of Clause 26 hereof.

26 Any defects, shrinkages, or other faults in the Works which may be evident and be notified in writing by the Architect to the Builder within the Defects Liability Period stated in the Appendix to these Conditions shall upon the issue of Architect’s Instructions be made good by the Builder within a reasonable time and:
(a) where such defects, shrinkages, or other faults are due to materials and/or workmanship not being in accordance with this Contract, such making good by the Builder shall be at no cost to the Proprietor; or
(b) where such defects, shrinkages, or other faults occur notwithstanding that materials and/or workmanship be in accordance with this Contract, such making good shall be dealt with in accordance with clause 19 of these Conditions.

27 if the Builder shall fail to bring the Works to practical completion as defined in sub-clause (a) of clause 25 of these Conditions by the Date for Practical Completion of the Works stated in the Appendix thereto or within any extended time fixed pursuant to clause 24 of these Conditions and the Architect gives notice in writing to the Builder and the Proprietor at the date of issue of the Notice
of Practical Completion pursuant to the said clause 26 of these Conditions or within 28 days thereafter that in his opinion the Works ought reasonably to have been practically completed on some earlier date to be specified by him not being earlier than the said Date for Practical Completion or such other date as may result from the fixing of any extended time as aforesaid then the Builder shall pay or allow to the Proprietor a sum calculated and certified by the Architect at the rate stated in the said Appendix as Liquidated and Ascertained Damages for the period (commencing from the date so specified) during which the Works shall so remain or have remained not practically completed.

In the event of no further monies being payable to the Builder or in the event of such sum as aforesaid exceeding the amount remaining payable to the Builder, the Proprietor shall be entitled to recover the same, or any such excess, as a debt due by the Builder to the Proprietor.

28(a) Progress payments shall be paid by the Proprietor to the Builder and save as to the provisions of Clause 30(e) the Builder shall on presenting any such certificate to the Proprietor be entitled to payment thereof within the period named in the Appendix if not otherwise stated in the Appendix the payment shall be made within 7 days.

28(b) Whenever the contract value of work executed (including variations) together with the value of any unissued materials and/or goods intended for and delivered on or adjacent to the Works after deducting the total amount of any previous progress Certificates issued pursuant to sub-clause (c) of this clause exceeds the amount stated in the Appendix to these Conditions as the Minimum Amount for Progress Certificates (or a lesser amount at the Architect’s reasonable discretion) the Builder may submit to the Architect a progress claim which shall show:

(i) His valuation of work executed (including variations) included in such claim,

(ii) His valuation of any unissued materials and/or goods intended for and delivered on or adjacent to the Works included in such claim,

(iii) Any amounts which the Proprietor is entitled to withhold at that time pursuant to clause 30 of these Conditions.

(iv) The total amount previously certified pursuant to sub-clauses (c) of this clause.

(v) The amount claimed by the Builder.

If the Architect so requires the Builder shall submit his valuation of work executed under each section or trade heading designated in the Specifications together with variations included in such claim.

28(c) The Architect shall in respect of each claim fix his estimate of the contract value of the work executed including variations and any unissued materials and/or goods intended for and delivered on or adjacent to the Works and therefrom determine the amount which in his opinion is due to the Builder from the Proprietor in the terms of the Contract and issue a progress Certificate to the Builder for such amount within 7 days of receipt of such progress claim pursuant to sub-clause (b) of this clause.

Such progress Certificate shall show:

(i) The Architect’s estimate of the contract value of work executed fixed by the Architect pursuant to this sub-clause,

(ii) The amount which the Proprietor is entitled to withhold at that time pursuant to clause 30 of these Conditions.

(iii) The total amount previously certified pursuant to this sub-clause,

(iv) The amount certified as being due for payment to the Builder by the Proprietor.

28(d) Should the amount of any progress Certificate issued by the Architect pursuant to sub-clause (c) of this clause be at variance with the amount claimed by the Builder, the Architect shall in writing at the time issue of such Certificate provide the Builder with particulars of such variance.

28(e) In fixing his estimate of the contract value of work executed pursuant to sub-clause (c) of this clause, the Architect shall in respect of any unissued materials and/or goods take into account only such materials and/or goods which, in his opinion, have reasonably but not prematurely been delivered on or adjacent to the Works and subject thereto to materials and/or goods being properly stored and adequately protected.

28(f) No progress Certificate issued by the Architect pursuant to sub-clauses (c) of this clause shall be deemed evidence that any work, materials and/or goods to which such Certificate relates are in accordance with this Contract.

28(g) Should the Architect fail to issue to the Builder within the time specified in sub-clause (c) of this clause a progress Certificate showing the estimate and amounts referred to in that sub-clause, or should the Proprietor fail to pay to the Builder the amount of any progress Certificate as provided in sub-clause (a) of this clause, then the Builder shall be entitled to interest at the rate of fifteen per centum per annum on the amount to which he was entitled from the date such payment would have become payable under this clause had the Architect or the Proprietor not so failed as aforesaid until the date of payment of the same to the Builder by the Proprietor.

29 When any unissued materials and/or goods intended for and delivered on or adjacent to the Works have been taken into account by the Architect in fixing his estimate of the contract value of work executed and in the determining of the amount of any progress Certificate issued pursuant to clause 28 of these Conditions, such materials and/or goods shall become the property of the Proprietor.
30(a) An amount referred to in these Conditions as the Retention Fund shall be retained by the Proprietor in accordance with sub-clause (b) of this clause as security that the Builder shall carry out his obligations under this Contract.

30(b) The amounts certified by the Architect for payment by the Proprietor to the Builder pursuant to clause 28 of these Conditions shall be exclusive of the retainable percentage as stated in the Appendix to these Conditions of the Architect’s estimate of the contract value of the work executed provided that when the total amount thereby retained reaches the amount stated in the said Appendix as the Limit of Retention Fund (which shall not exceed five per centum of the Contract Sum) or that amount as reduced pursuant to any provision of this Contract or any agreement, no further amounts may be retained by the Proprietor by virtue of this sub-clause.

30(c) Should the Proprietor so agree, the Builder may provide a bank guarantee, guarantee bond or other form of security acceptable to the Proprietor equivalent (unless otherwise agreed) to the amount stated in the Appendix to these Conditions as Limit of Retention Fund and in such event same shall be effective as security in lieu of the Retention Fund referred to in sub-clause (a) of this clause and the provisions of sub-clause (b) of this clause shall not apply.

30(d) Where the Limit of Retention Fund as stated in the Appendix to these Conditions is $4,000 or greater, the amounts which the Proprietor is entitled to retain progressively pursuant to sub-clause (b) of this clause shall, unless otherwise agreed, be paid by him to the credit of an interest bearing deposit in the joint names of the Proprietor and the Builder at a bank nominated by the Builder and approved by the Proprietor. Such payments to such joint deposit shall be made by the Proprietor within 7 days of the presentation to him by the Builder of any progress Certificate issued pursuant to clause 28 of these Conditions to which the provisions of sub-clause (b) of this clause have been applied and evidence of such payment shall be provided to the Builder by the Proprietor within a further 7 days. The amount to be held in the aforesaid joint deposit shall be upon trust for the Proprietor subject to the provisions of sub-clauses (e) and (f) of this clause except that in the event of the Builder determining his employment pursuant to clause 23 of these Conditions, the rights and interests of the Proprietor in respect of such amount shall be and are hereby transferred to the benefit of the Builder.

30(e) Within 7 days of the issue of the Notice of Practical Completion pursuant to clause 25 of these Conditions, or within 21 days of the date on which the Works are deemed practically completed pursuant to the said clause, the Architect shall issue a progress Certificate to the Builder for one half of the amount held in the Retention Fund (or such lesser amount after taking into account any sums retained by the Proprietor pursuant to any provision of this Contract to the Proprietor pursuant to any provision of this Contract) to the Builder.

(i) Where the Retention Fund is held in a joint deposit pursuant to sub-clause (d) of this clause, the Proprietor and the Builder shall within a further 7 days jointly arrange for the payment to the Builder from such joint deposit the amount of the said progress Certificate together with all interest accrued on such joint deposit; or

(ii) Where the Retention Fund is held by the Proprietor, he shall within 7 days of presentation of the said progress Certificate to him by the Builder pay to the Builder the amount of such progress Certificate.

30(f) The amount held in the Retention Fund following the operation of sub-clause (e) of this clause shall be taken into account by the Architect in determining the amount of the Final Certificate pursuant to sub-clause (6) of clause 31 of these Conditions to be issued to the Builder pursuant to that sub-clause provided that if any of the circumstances described in clause 23 of the said Conditions arise, the amount so held, if in a joint deposit pursuant to sub-clause (d) of this clause, together with the interest accrued thereon, shall be deemed to be in trust for release to the Builder.

30(g) Where the limit of Retention Fund as stated in the Appendix to these Conditions is less than $4,000 the amounts retained by the Proprietor pursuant to sub-clause (b) of this clause shall be held by the Proprietor in trust for the Builder but without any obligation on the part of the Proprietor either to invest the same at interest or to account to the Builder for any advantages derived by the Proprietor through his retention thereof. The Builder’s beneficial interest therein shall however be subject only to the right of the Proprietor to have recourse thereto from time to time for payment of any amount to which he is entitled under the provisions of this Contract to deduct from any sum due or to become due to the Builder.

30(h) Where the Builder with the Proprietor’s agreement provides a security pursuant to sub-clause (c) of this clause thus rendering the Retention Fund provisions of this clause not applicable such security shall be maintained effective until the issue by the Architect of the Notice of Practical Completion pursuant to clause 25 of these Conditions or until the date the Works are deemed to be practically completed pursuant to that clause and thereafter, upon the Builder providing a further security equal to one half of the first-provided security, such first-provided security shall be
Final Certificate

31 Final payment under this Contract shall be made as provided in this clause.

31(a) As soon as it is practicable so to do the Builder shall submit to the Architect a detailed statement of the amount claimed as the final payment under this Contract.

31(b) The Architect shall issue a Final Certificate to the Builder and a copy thereof to the Proprietor and a statement to the Builder showing the difference (if any) between the amount of the claim submitted by the Builder pursuant to sub-clause (a) of this clause and the amount of the Final Certificate within 14 days of the last to occur of the following:

(i) The end of the Defects Liability Period,
(ii) The completion of the making good of defects pursuant to clause 26 of these Conditions,
(iii) The receipt by the Architect of the detailed statement by the Builder pursuant to sub-clause (a) of this clause,
(iv) The receipt by the Architect of information substantiating the Builder's claim if requested under sub-clause (c) of this clause and
(v) The receipt by the Architect of all warranties, certificates, records, drawings and other documents called for under this Contract.

31(c) The Architect may request further information necessary to substantiate the Builder's claim but only within 14 days of receipt by him of the Builder's detailed statement.

31(d) Notwithstanding any provision of this clause the Builder shall not be entitled to receive the Final Certificate until and unless he has provided to the Architect, if so requested by him in writing within 14 days of receipt of the Builder's detailed statement pursuant to sub-clause (a) of this clause, a signed statement that all wages due to his employees engaged on the Works have been paid up to the date of the statement referred to in sub-clause (a) of this clause.

31(e) The Final Certificate referred to in sub-clause (b) of this clause shall state:

(i) The Contract Sum as adjusted as necessary according to the terms and conditions of this Contract, and
(ii) The total value of all previous Certificates issued pursuant to clauses 28 and 30 of these Conditions.

The difference (if any) between the two sums shall be expressed in the said Certificate as a balance payable to the Builder by the Proprietor or to the Proprietor by the Builder as the case may be. Unless notice in writing of a dispute or difference shall have been given pursuant to sub-clause (f) of this clause the said balance as from the fourteenth day after the presentation of the Final Certificate by the Builder to the Proprietor shall be a debt due and payable by the Proprietor to the Builder or as the case may be as from the fourteenth day after receipt by the Builder of the said Final Certificate shall be a debt due and payable by the Builder to the Proprietor.

31(f) Should any amount included in the Final Certificate be held in any joint deposit as referred to in sub-clause (d) of clause 30 of these Conditions and be payable to the Builder, the Proprietor shall release his interest in such amount to the Builder within 7 days of the presentation of the Final Certificate to him by the Builder.

31(g) Should any amount included in the Final Certificate be held in any joint deposit as referred to in sub-clause (d) of clause 30 of these Conditions and be payable to the Proprietor, the Builder shall release his interest in such amount to the Proprietor within 14 days of the issue of the Final Certificate to the Builder.

31(h) Any interest which may have accrued on the amount held in any joint deposit as referred to in sub-clause (d) of clause 30 of these Conditions shall be disbursed at the direction of the Builder.

31(i) Unless notice in writing of a dispute or difference shall have been given pursuant to clause 22 of these Conditions by either the Proprietor or the Builder before the Final Certificate has been issued or within 14 days of presentation of same by the Builder to the Proprietor (provided that time shall not run against the Builder until he receives the Certificate), the said Certificate shall be conclusive evidence in any proceedings arising out of this Contract (whether by arbitration under clause 22 of these Conditions or otherwise) that the Works have been completed in accordance with the terms of this Contract to the reasonable satisfaction of the Architect and that any necessary work has
been given to all the terms of this Contract which require an adjustment to be made to the Contract Sum, except insofar as it is proved in any such proceedings that any sum included in the said Final Certificate is erroneous by reason of:

(i) Fraud, dishonesty or fraudulent concealment relating to the Works or any part thereof or to any matter dealt with in the said Certificate, or

(ii) Any defect (including any omission) in the Works or any part thereof which reasonable inspection during the carrying out of the Works or before the issue of the said Certificate would not have disclosed, or

(iii) Any accidental or erroneous inclusion or exclusion of any work, materials, goods or figure in any computation, or any arithmetical error in any computation.

31(d) If the Builder has provided security to the Proprietor for the purposes of this Contract then within 7 days of the presentation of the Final Certificate:

(i) If the final balance is nil or shows an amount due by the Proprietor to the Builder, the Proprietor shall do all things necessary to secure release of the said security to the Builder, and

(ii) If the final balance shows an amount due by the Builder to the Proprietor the Proprietor upon receiving payment of the amount due by the Builder shall do all things necessary to secure release of the said security to the Builder.

32(a) In the event of any dispute or difference arising between the Proprietor, or the Architect on his behalf, and the Builder (subject to the provisions of clause 10 of these Conditions) either during the progress of the Works or after the determination, or abandonment, or breach of the Contract as to the construction of the Contract or as to any matter or thing of whatsoever nature arising thereunder or in connection therewith (including but not limited to any matter or thing left by the Contract to the decision, opinion, discretion, ascertainment or valuation of the Architect or the withholding by the Architect of any Certificate to which the Builder may claim to be entitled or the amount of any Certificate whether issued or withheld or the measurement and valuation mentioned in clause 19 of these Conditions or the rights and liabilities of the parties under clauses 22 or 23 of these Conditions) then either party shall give to the other notice in writing by certified mail of such dispute or difference. At the expiration of 7 days from the date of receipt of such notice by the Builder or the Proprietor as the case may be such dispute or difference (unless settled) shall be and is hereby referred to the arbitration of an architect member of the Royal Australian Institute of Architects being the President for the time being of the Chapter or Area Committee of that Institute in the State or Territory in which this Contract is made, or his nominee, and a member of the Master Builders' Association being the President for the time being of the Master Builders' Association of the State or Territory in which this Contract is made or his nominee. If the said Arbitrators shall fail to agree or to make an award within one month of the completion of the hearing or within such further period as the parties may in writing determine upon, an Umpire to be appointed by the Arbitrators upon entering upon the reference shall enter upon the reference in lieu of them. Provided that if the Builder and Proprietor so agree the dispute or the difference shall be referred to an Arbitrator mutually appointed by them or in the event of disagreement on such appointment the aforesaid Presidents shall appoint an Arbitrator if so requested by the parties. The term President as employed in this sub-clause shall include any person so acting.

32(b) In serving notice of dispute or difference and demand for arbitration pursuant to sub-clause (a) of this clause the party serving such notice shall provide evidence that he has deposited with the Secretary of a Chapter or Area Committee of the Royal Australian Institute of Architects or the Secretary of the Master Builders' Association of the State or Territory in which the Contract is made the sum of $200 by way of security for costs of the arbitration proceedings. The Arbitrator, Arbitrators or Umpire may at any time in the event of the deposit of such security being insufficient, in order to make good the same, order the party in default to deposit further security for the costs of the arbitration proceedings. Such security shall be applied in accordance with the direction from time to time of the Arbitrator, Arbitrators or Umpire.

32(c) If the reference referred to in sub-clause (a) of this clause is made in the State of Queensland the same may be made a rule of the Supreme Court upon application being made therefor in the manner provided in the Interests Act 1957.

32(d) The award made by the Arbitrator, Arbitrators or Umpire as the case may be appointed pursuant to sub-clause (a) of this clause shall be final and binding on both the Builder and the Proprietor and neither party shall be entitled to commence or maintain any action upon the dispute or difference until such matter has been referred or determined as hereinbefore provided and then only for the amount of relief to which the Arbitrator, Arbitrators or Umpire by his or their award finds either party is entitled and the costs of the submission, reference and award and the apportionment thereof shall be in the discretion of the said Arbitrator, Arbitrators or Umpire, as the case may be.

33 Any notice necessary or required to be given in accordance with these Conditions shall be deemed to be sufficiently given if delivered by hand or alternatively if sent by pre-paid post and where so required by this Contract by certified mail addressed to the person to whom it is necessary or required to be given at the address appearing in the Articles of Agreement. In the case of a notice sent by pre-paid post receipt of such notice shall be deemed to have occurred 2 days after the time of posting.

34 Where under any provision of this Contract any notice is to be given or any other action matter or thing is to be done in a stated period of days the following days shall not be counted, namely:

Saturdays, Sundays, Statutory or Public Holidays.
The Appendix hereinbefore referred to:

Data for Possession of the Site of the Works

Amount to be included in the sum insured to provide for costs of demolition and removal of debris

Amount to be included in the sum insured to provide for fees of Architect, Engineer, Quantity Surveyor and Consultants (if not otherwise stated—5% of Contract Sum)

Public Liability Insurance

Workers' Compensation and Employer's Liability Insurance

Date for Practical Completion of the Works

Defects Liability Period (If none stated shall be for 26 weeks after practical completion)

Liquidated and Ascertained Damages

Period for payment of progress payments (If none stated shall be 7 days)

Maximum Amount for Progress Certificates

Percentage of estimated Contract Value Retainable

Limit of Retention Fund shall not exceed five per cent of the Contract Sum

Name and Branch of Bank nominated by Builder

Clause No

6

21 (a) (A) (i) $...

21 (a) (ii) 2% of the Contract Sum

21 (b) not less than $...

21 (c) not less than $...

24 (c)

25 (a)

25 (b)

26

27

28

29 (c)

29 (d)

30 (a)

30 (b)
APPENDIX 6: DEFINITION OF LUMP SUM CONTRACTS

R.A.I.A. (Royal Australian Institute of Architects)
Practice Notes No. 37
LUMP SUM CONTRACT FOR SIMPLE BUILDING WORKS

The following notes have been prepared by the Joint Contracts Committee of the Royal Australian Institute of Architects and the Master Builders' Federation of Australia for the information of members of both bodies.

For some considerable time, there has been a demand for a shorter and simpler form of contract than the standard RAIA-MBFA Lump Sum Contract. Edition 5a and its predecessors. In response to this, the RAIA-MBFA Joint Contracts Committee has produced the new "Lump Sum Contract for Simple Building Works". As stated on the cover, it is intended for building works (including alterations) of a simple nature where the Proprietor has appointed an architect. It is not suitable for use where bills of quantities are provided by the Proprietor, where the works are other than of a simple nature or where there is no architect.

Whilst it has not been considered practicable to make any recommendation in monetary terms as to the maximum size of project for which this form should be used, its main use is seen as being for domestic work and other work of a comparable nature (e.g. suburban offices or shops) without complex services. Other uses could be for simple industrial work or for site works such as paving, fencing, retaining walls and drainage.

It should be particularly noted that this form is not a replacement for Edition 5a, which will continue to be available, but an alternative for use on occasions where Proprietors and Builders may consider it appropriate.

Anyone considering using or recommending the use of the document, should read it fully and carefully before doing so. However, the following list of clause headings, which reflect some of the particular points, may be of assistance in obtaining a general understanding of the contents.

The preamble at the top of page 2 provides for filling-in the basic information — names and addresses of Proprietor and Builder, brief description (including location) of the Works and identification of the drawings.

1. Basic Obligations — The Builder to build and the Proprietor to pay, with provision for the Contract Sum to be filled-in.
2. Architect — Provides for filling-in the name and address of the Architect. It should be noted that the contract is incapable of operation without an Architect.
3. Architect's Instructions and Variations — In valuing extra work resulting from variations, alterations in labour rates are to be taken into account in applying rates and prices shown in the Schedule.

5. Drawings, Specifications and Setting-out — Two complete sets of the Contract Documents require to be executed — one to be held by the Architect and one given to the Builder. Additionally, the Builder is entitled to three copies of Drawings and Specifications, plus any further copies required for lodging with Authorities. The Architect is to provide the information necessary for the preparation.

6. Prime Cost Sums — In keeping with the intention that the document is for simple works, nominated sub-contracts are limited to electrical installations, cupboards and other joinery fittings, and heating and air-conditioning. There is no limit on nominated supplies.

7. Statutory Obligations, Fees and Charges — The Builder is to comply with regulations, give notices, pay fees, etc.

8. Site Conditions — If conditions differ from those described, the Builder is to inform the Architect and seek his instructions.

9. Builder to Superintend — The Builder is to provide necessary supervision.

10. Artists and Special Tradesmen — The Proprietor may employ artists and special tradesmen to carry out work of a special nature.

11. Assignment — Assignment by either party requires the consent of the other.

12. Sub-letting — The Builder may sub-let parts of the Works but this does not relieve him of responsibility.

13. Commencement, Progress and Completion — The Builder is to be given possession of the site on, and practically complete the Works by, the due dates. Subject to extensions of time to be granted by the Architect for delays due to causes beyond the reasonable control of the Builder, in some circumstances, the Builder is entitled to reimbursement of loss or expense due to such delays.

Should the Builder be late in reaching practical completion, he is liable to pay liquidated damages to the Proprietor.

14. Indemnity of the Proprietor — The Builder indemnifies the Proprietor generally against claims, etc., in respect of injury to persons or damage to property arising from the execution of the Works.

15. Insurance — The Builder is to insure the Works for the full Contract Sum plus allowances (to be stated in the Schedule) for demolition costs, fees, materials supplied by the Proprietor and escalation costs. The Builder is to insure against liability to the public in respect of injury to persons or damage to property for an amount to be stated in the Schedule. It should be noted that this includes the Proprietor's property, other than the Works.

There is no separate provision for alteration jobs unlike Edition 5a, the Builder always insures the Works. Any existing buildings belonging to the
Proprietor are to be covered by the Builder's Public Liability insurance in respect of accidents arising from the execution of the Works. The Proprietor should consider any other effect of the Works in relation to the existing buildings and obtain any extra cover he considers desirable.

The Proprietor is to be insured in respect of Workers' Compensation and Employers' Liability, again for an amount to be stated in the Schedule.

Insurance of the Works is to be maintained until Practical Completion and then for Public Liability and Workers' Compensation until issue of the Final Certificate (there are special provisions in the event of occupation before Practical Completion).

16. Practical Completion — The Architect is to notify the Proprietor and the Builder when the Works have reached Practical Completion (with the special provision that if the Proprietor occupies the Works, Practical Completion is deemed to have been reached).

17. Defects Liability — The Builder is to make good defects apparent during the Defects Liability Period, which is to be stated in the Schedule.

18. Retention Fund — Where there is a Retention Fund, the amount of this is to be stated in the Schedule. As an alternative to a Retention Fund, the Builder may provide a Bank Guarantee or other form of security acceptable to the Proprietor. Half of the Retention Fund or security as the case may be is to be paid or released to the Builder within two weeks of Practical Completion.

In some projects (such as dwelling units in the states of N.S.W. and Victoria) there will be no necessity for a Retention Fund because of local legislation affording adequate protection to Proprietors. In such cases the appropriate part of the Schedule should be completed by inserting the word 'nil'.

19. Progress Certificates — The Builder is to make progress claims at intervals of not less than one month. The Architect is to issue a certificate within one week.

20. Final Certificate — Within two weeks of the end of the Defects Liability Period and the making-good of defects (and subject to the Builder supplying necessary information, documents, etc.) the Architect is to issue a Final Certificate.

21. Payments — The Proprietor is to pay Progress Certificates within the time stated in the Schedule (or if not stated, one week) and the Final Certificate within three weeks.

In respect of money certified or otherwise payable but not paid, the Builder may claim a charge on the Proprietor's interest (if any) in the land on which the Works are situated. It should be noted that the Builder cannot do this until the amount is certified or payable and also that, in law, if he does this without due cause and as a result the Proprietor suffers loss, he could be liable to the Proprietor for damages.

22. Determination by Proprietor — This provides for the Proprietor to determine the employment of the Builder in the event of his default.

23. Determination by Builder — This provides for determination by the Builder in the event of the Proprietor's default.

24. Determination in the event of Loss or Damage — This provides for determination in the event of damage to the Works of such extent and in such circumstances as to make continuance unreasonable.

25. Arbitration — This provides for arbitration in the event of disputes. (In South Australia this clause is not applicable to certain classes of houses, flats and home units).

26. Addresses for Notices — Defines where notices are to be sent.

27. Special Clauses — Space for inserting any special provisions, e.g. rise and fall, which may be required.

Schedules — For inserting variables referred to in the body of the document. All items should be filled-in (or struck-out if not applicable) and initialed.

Signing page — This should be signed and/or sealed by both parties and witnessed, all as may be necessary in relation to their nature, e.g. individuals, companies, statutory bodies, etc.

These notes are issued by the Royal Australian Institute of Architects and without responsibility on the part of the Royal Australian Institute of Architects or the Master Builders Federation of Australia or any of their Councillors, officers, members or staff.
APPENDIX 7: DEFINITION OF COST-PLUS CONTRACT
   FOR BUILDING WORKS

R.A.I.A. (Royal Australian Institute of Architects)
Practice Notes No. 52
PRACTICE NOTE
Issued by the R.A.I.A. Prestigio Division
No. PN 52 June 1976 (HB 4.120)

COST-PLUS CONTRACT FOR BUILDING WORKS

In 1952 the institute issued two forms of Cost-plus Contract, Edition C1 provided for the Builder's fee to be calculated as a percentage of the cost of the works and Edition FF1 for the fee to be a lump sum. Apart from the change to decimal currency, these forms have remained unaltered since first issued. Until the early 1970s there had been a steady decline in the demand for cost-plus contract forms, but over the past two years the position has been reversed. In view of this, and the long time since the forms were issued, it was decided that they should be reviewed.

This review resulted in two decisions:

(i) That the long term aim should be the production of a completely new Cost-plus Contract, to form part of and be consistent with the series of new contracts which it is envisaged will be produced to meet various needs and circumstances.

(ii) That as an interim measure, the current documents should be revised and consolidated into one, but maintaining the same general principles and format.

Following the second decision, the Cost-plus Contract FF/C - Revised Edition has now been issued jointly by the RAIA and MBFA to replace Editions FF1 and C1.

Before use on any particular project, the form should be reviewed to check whether it is appropriate and adequate for the particular circumstances or whether additions or amendments may be necessary. This applies particularly in the case of large or complex projects for which the form as it stands may not be appropriate. Matters in respect of which special provisions might be required could include retention and time for completion (with the related matters of extensions, costs and liquidated damages). In making this review the document should be read fully and carefully. However, the following list of headings, with brief notes on some particular points, may be of assistance in obtaining a general understanding of the contents.

The "Agreement" on page 2 provides for filling-in the basic information — names and addresses of Proprietor and Builder, brief description (including location) of the Works and name and address of Architect. It should be noted that the contract is capable of operation without an Architect.

1. Consideration — The Builder is to be paid the actual cost of the Works plus a fee to cover overheads and commission. This fee may be either a lump sum or a percentage of the cost of the Works. Alternative sections (A) or (B) must be completed as appropriate and initialled by both parties.

2. Architect's Instructions, Drawings, Access to Works — Provides for Architect's instructions and the supply of drawings, etc., setting-out of the Works, access to the Works for the Architect and replacement of the Architect in the event of his resignation, dismissal, death, etc.

3. Variations — The Builder is to carry out all variations instructed by the Architect.

4. Tools — The Builder is to provide tools and plant at his own expense, subject to exceptions stated elsewhere.

5. Supply of Labour and Materials — The Builder is to supply all materials and labour and to remove and replace any defective work. He may not sub-contract any part of the Works without the Architect's consent. The Proprietor may send artists or workmen on to the site to carry out work not included in the Agreement.

6. Nominated Sub-contracts — This clause sets out the way in which nominated sub-contracts are to be handled. (No specific provision in previous editions.) Under sub-clause 6(b)(ii) the Builder is entitled to hold retention against the nominated sub-contractor, for whose performance he is responsible. The amount so retained is to be treated as part of the "cost" of the sub-contract under sub-clause 14(k). (As an alternative, provision could be written-in for a bank guarantee or other security to be provided in lieu of retention.)

7. Nominated Suppliers — This clause sets out the way in which nominated supplies are to be handled. (No specific provision in previous editions.)

8. Notices to Authorities — The Builder is to give notices, etc., and comply with the requirements of Authorities.

9. Foreman — The Builder is to keep a foreman on the Works.

10. Clerk of Works — The Proprietor may employ a Clerk of Works and the Builder shall afford him necessary facilities.

11. Indemnity of the Proprietor — This clause (previously clause 8) and the succeeding clause (previously clause 10) have been completely re-written and are now generally similar to those in Contract SBW1.

12. Insurance — The Builder is to insure the Works for a stated amount plus allowances for demolition costs, fees, materials supplied by the Proprietor and escalation costs, all to be stated in the Appendix. The Builder is to insure against liability to the public in respect of injury to persons or damage to property for an amount to be stated in the Appendix. It should be noted that this includes the Proprietor's property other than the Works.

There is no separate provision for alteration jobs. Under the更加 Edition SB, the Builder always insures the Works. Any existing buildings belonging to the Proprietor are to be covered by the Builder's Public Liability Insurance in respect of accidents arising from the execution of the Works. The Proprietor should consider any other effect of the Works in relation to the existing buildings and obtain any extra cover he considers desirable.
The Builder is entitled to insurance in respect of Workers' Compensation and Employers' Liability, again for an amount to be stated in the Appendix.

Insurance of the Works is to be continued during the Practical Completion and then for Public Liability and Workers' Compensation until issue of the Final Certificate (these are special provisions in the event of occupation before Practical Completion). Items to be filled-in in the Appendix should be particularly noted.

Since insurance is a complex matter it is generally advisable that the Proprietor, either directly or through his Architect, seek advice from his Insurance Broker or other expert in respect of the requirements for the particular project, as these may well differ from the standard.

13. Determination arising from Loss or Damage — This provides for determination in the event of loss or damage to the Works of such extent and in such circumstances as to make continuance unreasonable.

14. Actual Cost of the Works — This is one of the most important clauses and contains a number of modifications from the previous editions. It should be studied carefully. Note that the percentage for "on-costs" as referred to in sub-clause 14(a) must be entered in the Appendix.

15. Items not included in Cost — An important clause to be included in conjunction with clause 14.

16. Certificates and Payments — This clause sets out the procedure for Builder's claims, certification and payment. It should be particularly noted:
   (i) That the method by which the amount of the Builder's fees to be paid with progress certificates is to be calculated must be entered in the Appendix.
   (ii) As in the previous editions, there is no provision for retention as such, although if the entry in the Appendix provides for the Builder's fees to be included in progress certificates to be less than pro-rata to the overall amount set out in clause 1, the difference would in effect constitute a retention.

16(f) Notice of Practical Completion — This provides for the Architect to notify both Proprietor and Builder of Practical Completion in the usual way. It should be noted that occupation by the Proprietor does not result in Practical Completion being deemed to have occurred. However, such occupation does have an effect on the Indemnity and Insurance provisions. The Builder is to make-good defects which appear and are notified within the Defects Liability Period to be stated in the Appendix.

17. Determination by Builder — This provides for determination by the Builder in the event of the Proprietor's default.

18. Determination by Proprietor other than Default by or Bankruptcy of Builder — This gives the Proprietor the right to suspend or discontinue the Works at any time and for the Builder to be properly compensated.

19. Determination by Proprietor for Default by or Bankruptcy of Builder — This provides for determination by the Proprietor in the event of the Builder's default or bankruptcy.

20. Arbitration — This provides for arbitration in the event of disputes. (In South Australia this clause is not applicable to certain classes of houses, flats and home units.)

21. Notices — Defines where notices are to be sent.

22. Periods of Days — Defines days to be excluded in respect of periods for issue of certificates and notices. It does not apply to other matters.

Signing page — This should be signed and/or sealed by both parties and witnessed, all as may be necessary in relation to their nature, e.g. individuals, companies, statutory bodies, etc.

Appendix — For inserting variables referred to in the body of the document. All items should be filled-in (or struck-out if not applicable) and initialled.

These notes are issued by the Royal Australian Institute of Architects and without responsibility on the part of the Royal Australian Institute of Architects or any of its Councilors, officers, members or agents.
APPENDIX 8: COST-PLUS CONTRACTS FOR BUILDING WORKS

R.A.I.A. (Royal Australian Institute of Architects)
Issued at 10th of May, 1976
Cost-plus Contract
for building works

AGREEMENT

between .................................................................
and .................................................................
dated .................................................................

This form of contract is intended for building works (including alterations) where the contract is to be administered by an architect and where payment to the Builder is to be on the basis of the actual cost of the Works plus a fee. This fee may be either a lump sum or a percentage of the cost of the Works. Alternatives are provided in Clause 1 for these two conditions. One of these should be completed and the other struck out as appropriate.

Attention is also drawn to Clause 12. This should be considered in relation to the individual project, as (particularly in the case of alteration jobs) there may be a requirement for provisions differing from the standard.

Copyright - The Royal Australian Institute of Architects and
The Master Builders' Federation of Australia Inc.
AGREEMENT made the ................................ day of .................. 197 ...

BETWEEN .................................................................

of (or whose registered office is situated at) ..............................................

(hereinafter called "the Proprietor") of the one part and ................................

of (or whose registered office is situated at) ..............................................

(hereinafter called "the Builder") of the other part, in respect of ..................

...............................................................................................................

at ............................................................................................................

(which, together with any variations as herein provided are hereinafter called "the
Works") and whereas Drawings and Specifications for such Works have been prepared by

...............................................................................................................

of ............................................................................................................

(hereinafter referred to as "the Architect" which expression shall also include the
architect or architects from time to time employed by the Proprietor as hereinafter
provided in connection with the Works) and have been signed by the parties for the
purpose of identification and whereas the Builder has agreed to carry out and complete
the Works according to the terms and conditions hereinafter appearing and in consider-
ation thereof the Proprietor has agreed to pay to the Builder the actual cost of the said
Works as defined in the said conditions together with a fee as provided for in Clause 1
and/or such other sum or sums as hereinafter provided, subject to the terms and condi-
tions hereinafter appearing.
IT IS HEREBY AGREED

CONSIDERATION 1.

The Builder agrees to execute and complete the Works in a thorough and workmanlike manner and with all reasonable expedition and in accordance with the said Drawings and Specifications or any authorised variations thereof and in all respects to the reasonable satisfaction of the Architect and in consideration of such agreement the Proprietor shall, subject as hereinafter provided, pay or allow to the Builder —

(i) the actual cost of the Works as hereinafter defined, and

(ii) a fee to cover overheads and commission

(A)*
of ........................................

........................................

(B)* calculated at the rate of ..............

........................................

($ .............) provided that one centum (............. %) on the actual cost of the Works.

if in the event of any authorised additions or alterations being required to the Works as specified the Builder shall be entitled to a further fee computed at the rate of ...............

........................................ per centum on the actual cost of such additions and alterations as assessed by the Builder and confirmed by the Architect after deducting therefrom the value as assessed by the Builder and confirmed by the Architect of all omitted works or failing agreement as may be determined by arbitration as hereinafter provided.

*NOTE: (A) and (B) are alternatives. One should be completed and the other struck out as appropriate.

ARCHITECT’S INSTRUCTIONS, DRAWINGS, ACCESS TO WORKS

2(a) The Architect may in his absolute discretion and from time to time issue further drawings, details and/or written instructions and written explanations in regard to (I) the Works generally; (II) the postponement of any work to be executed under the provisions of this Agreement; (III) the dismissal from the Works of any person employed thereupon who may be incompetent or misconduct himself and the Builder shall forthwith comply with the Architect’s instructions.
2(b) Upon the signing of this Agreement the Architect shall without charge to the Builder furnish him (unless he shall have been previously furnished) with copies as required up to six of the Contract Drawings and the Specifications (and also of any bills of quantities where applicable) and such other copies of documents and/or drawings as may be required from time to time by Authorities having jurisdiction over the Works or with whose systems the same are or will be connected. Such copies shall be additional to the signed copy of the Contract Documents provided to the Builder.

2(c) The Architect without charge to the Builder shall similarly furnish him with copies of such further drawings, details and/or written instructions and written explanations as are reasonably necessary to enable the Builder to carry out and complete the Works as required by this Agreement.

2(d) The Architect shall furnish or cause to be furnished to the Builder by accurately dimensioned drawings and/or on-site instruction such information as will enable the Builder to set out the Works. Such information shall also establish levels by way of fixed datum or benchmark on or adjacent to the Works. Unless the Architect shall otherwise instruct, the Builder shall be responsible and shall at his own cost amend any errors arising from his own inaccurate setting out. The Builder shall not be responsible for any errors or inadequacies in such information furnished by the Architect or caused to be furnished on behalf of the Proprietor, and the Proprietor shall pay or allow to the Builder any additional costs due to or caused thereby.

2(e) The Architect and his representatives shall at all reasonable times have access to the Works and/or to the workshops or other places of the Builder where work is being prepared for this Agreement, and in so far as work in virtue of any sub-contract is to be so prepared in workshops or other places of a sub-contractor the Builder shall also by a term in the sub-contract so far as possible secure a similar right of access to those workshops or places for the Architect and his representatives and shall do all things reasonably necessary to make such right effective.

2(f) Should the Architect hereinbefore named or any other Architect appointed pursuant to this clause cease to be the Architect for the purposes of this Agreement, then the Proprietor shall as soon as practicable notify the Builder and shall within a reasonable time appoint another Architect to whom the Builder does not object for reasons considered sufficient by the Arbitrators or Umpire as the case may be in accordance with Clause 20. Any Architect so appointed shall not be entitled to disregard any decision, expression of reasonable satisfaction, consent or instruction given by any former Architect.

VARIATIONS

3. The Builder shall execute any variations required on the written authority of the Architect and such variations whether involving addition to, omission from or alteration of the Works shall not vitiate this Agreement and the Builder shall not have any claim to compensation by reason of such variation as aforesaid other than any resulting addition to actual cost and Builder's fee assessed as provided in Clause 1 hereof.
4. The Builder shall subject to the provisions of sub-clauses (m), (n), (a) and (p) of Clause 14 hereof provide at his own cost and expense all tools and plant of every description necessary for the proper performance of this Agreement.

5. Save as herein otherwise provided —

5(a) The Builder shall supply deliver and pay for all materials and provide all labour required for the efficient performance of this Agreement and shall at his own expense and with all reasonable expedition remove and replace with best quality any defective work and any work not in accordance with this Agreement. The Builder shall have no authority to pledge the Proprietor’s credit for the purchase of any materials or the employment of any labour.

5(b) The Builder shall not enter into any sub-contract for the doing of the Works or any portion thereof without the consent of the Architect provided that such consent shall not be unreasonably withheld. In any case in which the Architect refuses to consent to a sub-contract which the Builder is desirous of entering into the Architect may by written notice require the Builder to enter into such sub-contract as the Architect shall nominate and in this event the Builder shall subject to the provisions of Clause 6 hereof enter into such sub-contract accordingly.

5(c) The Proprietor by the Architect shall have full power to send artists or workmen upon the premises to execute fittings and other works that are not included in this Agreement provided that such operations shall be carried on during ordinary working hours and in such manner as not to impede the progress of the Works included in this Agreement but the Builder shall not be responsible for any damage that may happen to any such fittings or other works by reason of any act or default of such artists or workmen. The fittings and works referred to in this clause shall be limited to those of a special character not usually undertaken by the Builder.

5(d) Neither party shall assign this Agreement without the written consent of the other.

6(a) The following provisions of this clause shall apply where

(i) it is in any way indicated in the Specification that the Architect may nominate persons to supply and fix materials or goods or to execute work or to fabricate or manufacture and supply materials or goods particular to or exclusively for the Works, or

(ii) the Architect shall require the Builder to enter into a sub-contract of the nature of that referred to in sub-clause (b) of Clause 5 hereof.

6(b) Any persons so nominated by the Architect or in respect of whom the Builder shall be required to enter into a sub-contract as aforesaid are hereby declared to be sub-contractors employed by the Builder and are referred to herein as ‘nominated sub-contractors’ provided that the Architect shall not nominate nor require that the Builder enter into a sub-contract with a sub-contractor against whom the Builder shall
make reasonable objection or (save where the Builder and the Architect shall otherwise agree) who will not enter into a sub-contract which provides (Inter alia): –

(i) That the nominated sub-contractor shall carry out and complete the sub-contract works in every respect to the reasonable satisfaction of the Builder and of the Architect, and in conformity with all reasonable directions and requirements of the Builder and within the period, or where they are to be completed in stages, periods specified.

(ii) That the nominated sub-contractor shall observe, perform and comply with all the provisions of this Agreement on the part of the Builder to be observed, performed and complied with so far as they relate and apply to the sub-contract works or to any portion of the same including acceptance of the decisions of the Architect or the Arbitrator, Arbitrator or Umpire referred to in Clause 20 of these Conditions, so far as such decisions may concern the sub-contract works.

(iii) That the nominated sub-contractor shall indemnify the Builder against like liabilities in respect of the sub-contract works as those for which the Builder is liable to indemnify the Proprietor under this Agreement.

(iv) That the nominated sub-contractor shall indemnify the Builder against claims in respect of any negligence of such sub-contractor, his servants or agents or any misuse by him or them of any scaffolding or other plant, and shall insure himself against all such risks and produce the policy or policies and receipts in respect of premiums paid as and when required by the Builder.

(v) That if the nominated sub-contractor shall fail to complete the sub-contract works, or where the same are to be completed in stages any stage thereof, within the period specified or within any extended period to which the nominated sub-contractor may become entitled under the provisions of his sub-contract, the nominated sub-contractor shall pay or allow to the Builder the amount of all loss and/or damage thereby suffered or incurred by the Builder.

(vi) That payment in respect of any work, materials or goods comprised in the sub-contract shall be made within seven days after receipt by the Builder of payment of any Certificate of the Architect which includes an evaluation of any work done or material or goods supplied under the sub-contract and the amount payable to the sub-contractor shall be such amount as is included in respect of the sub-contract works in the payment received by the Builder subject to retention by the Builder of the sums mentioned in the next succeeding paragraph.

(vii) That the Builder shall retain ten per centum from progress payments due to the nominated sub-contractor up to a maximum amount of five per centum of the sub-contract sum, half to be accounted for on practical completion of the Works and the balance on issue of the Final Certificate.

(viii) That the Builder or the Architect or any person authorised by either shall have the right of access to the workshops and other places of the nominated sub-contractor as reasonably required for the purposes of this Agreement or of the sub-contract.
7(a) The following provisions of this clause shall apply where it is in any way indicated in the Specification that the Architect may nominate persons to supply materials or goods for incorporation in the Works.

7(b) Any persons so nominated by the Architect as aforesaid are hereby declared to be suppliers to the Builder and are referred to herein as 'nominated suppliers' provided that the Architect shall not nominate a supplier against whom the Builder shall make reasonable objection or (save where the Builder and the Architect shall otherwise agree) who will not enter into a contract for sale which provides (inter alia): 

(i) That the materials or goods to be supplied shall be to the reasonable satisfaction of the Builder and of the Architect.

(ii) That such materials or goods are warranted to be in accordance with the express requirements of this Agreement and consistent with any representations expressed or implied upon which the Builder and/or the Proprietor may be entitled to rely.

(iii) That the nominated supplier shall make good by replacement or otherwise any defects in the materials or goods supplied if such defects appear within an agreed period and shall bear any expenses reasonably incurred by the Builder as a direct consequence of such defects, but only if (where the materials or goods have been used or fixed) such defects are not such that examination by the Builder ought to have revealed them before such use or fixing and provided further that such defects are due to defective workmanship or material in the materials or goods supplied and shall not have been caused by improper storage by the Builder or by misuse or any act or neglect of either the Builder, the Architect, or the Proprietor or any person or persons for whom they may be responsible.

(iv) That delivery of the materials or goods shall be commenced and completed at the times stated in the said contract for sale or as the Builder may reasonably direct.

(v) That the nominated supplier shall allow the Builder such discount for prompt payment as it is usual for the nominated supplier to allow in other sales of similar materials or goods.

8. The Builder shall comply with and give all notices required by any Act of Parliament or by any regulation or by law of any local authority or of any public service company or authority which has any jurisdiction with regard to the Works or with whose systems the same are or will be connected and before receiving the Final Certificate for payment hereunder shall surrender to the Architect all plans and certificates issued by such authorities.

Should any such compliance involve a variation the Builder shall forthwith give written notice to the Architect applying for instructions in reference thereto.

9. The Builder shall constantly keep upon the Works a competent general foreman and any instructions given to him by the Architect shall be deemed to be given to the Builder.
10. The Proprietor by the Architect may appoint a Clerk of Works and shall give notice forthwith in writing to the Builder of such appointment. The Builder shall have the right of reasonable objection to the appointment of any person nominated as a Clerk of Works. The Clerk of Works shall be considered to act solely as inspector under the Architect and the Builder shall afford him every facility for examining the Works and materials.

11(a) Damage to Property
The Builder shall be liable for and shall indemnify the Proprietor against any legal liability loss claim or proceeding in respect of any injury loss or damage whatsoever to any property real or personal insofar as such injury loss or damage arises out of or in the course of or by reason of the execution of the Works provided always that the same is due to the negligence omission or default of the Builder his servants or agents or of any sub-contractor his servants or agents.

11(b) Injury to Persons
The Builder shall be liable for and shall indemnify the Proprietor against any liability loss claim or proceeding whatsoever arising under any statute or at Common Law in respect of personal injury to or death of any person whatsoever arising out of or in the course of or caused by the execution of the Works unless due to any act or neglect of the Proprietor or of any person other than the Builder for whom the Proprietor is responsible and excepting personal injury to or death of any person for whom the Proprietor is responsible by virtue of any Statute relating to Workers' Compensation or Employers' Liability.

12(a) Insurance of the Works
The Builder in the joint names of himself and the Proprietor (both of whom are referred to in this sub-clause as 'the Insured') for their respective rights and interests shall have or effect insurance upon such terms and conditions as shall be agreed by the Proprietor and the Builder under a Contractor's Risks Insurance Policy or Policies which shall cover the whole of the Works including any associated temporary works and including material incorporated or to be incorporated therein the property of the Insured or for which they are responsible and whilst on or adjacent to the site of the Works in respect of loss destruction or damage of or to the property insured for not less than the amount stated in the Appendix plus an amount of not less than that stated in the Appendix to provide for additional costs of demolition and of removal of debris plus the percentage stated in the said Appendix to cover the fees of the Architect and other Consultants plus the value stated in the said Appendix of any materials or things to be supplied by the Proprietor for the purpose of the Works.

12(b) Public Liability Insurance
The Builder shall have or effect insurance which shall cover liability to the public (including the Proprietor) for an amount not less than that stated in the Appendix in respect of any accident arising out of or in the course of or caused by the execution of the Works in the event
of death or bodily injury to any person not being a person who at the
time of the accident is engaged in or upon the service of the Insured
under a contract of service or apprenticeship and damage to property
including property (other than the Works) belonging to the Proprietor
or in which he is interested.

12(c) Workers' Compensation & Employers' Liability Insurance

The Builder shall insured for an amount not less than that stated in the
Appendix against any liability loss claim or proceeding whatsoever
whether arising by virtue of any statute relating to Workers' Compen-
sation or Employers' Liability or at Common Law by any person employed
by him in or about the execution of the Works and shall ensure that
every sub-contractor (whether or not a sub-contractor nominated pur-
suant to clause 6) is insured against any such liability in the case of
employees of such sub-contractor. Insurance effected by the Builder
pursuant to this sub-clause shall be extended to include the interests
of the Proprietor.

12(d) Settlement of Claims

Subject to the provisions of sub-clause (a) of Clause 13 hereof upon
settlement of any claim under the insurance specified by sub-clause (a)
hereof all monies received shall if requested by either party be paid
into a bank mutually agreed upon by the parties in an account in the
joint names of the Builder and the Proprietor. The Builder shall there-
upon proceed to reinstate the Works and replace and repair the materi-
als or goods destroyed or damaged and the Architect shall certify in
accordance with the provisions of this Agreement against the aforesaid
joint account for the cost of reinstating the Works and replacing and
repairing the materials or goods destroyed or damaged provided that the
Builder shall not be entitled to any payments pursuant to this sub-clause
other than the monies received in settlement of the aforesaid claim
exclusive of the sum provided for the fees of the Architect and other
Consultants which shall be payable to those persons.

12(e) Periods of Insurances

The insurances referred to in this clause shall be effected before the
Works are commenced and shall be maintained effective in respect of
damage to the Works until Practical Completion of the Works and in
respect of Public Liability and of Workers' Compensation until issue of
the Final Certificate.

12(f) Occupation

Should the Proprietor or any tenant or other person authorised by him
enter into occupation of the Works or any portion thereof and/or use
the same before Practical Completion of the Works, then in respect of
injury to or death of persons and damage to property the Works shall be
at the sole risk of the Proprietor. The Proprietor shall upon entering
into occupation or using as aforesaid forthwith effect insurance to cover
such risk and provide evidence of the same to the Builder and in default
of his so doing the Builder may effect insurance in the name of the
Proprietor and the premium paid or payable by the Builder together with
any additional premium paid or payable by the Builder in respect of
such occupation shall be regarded as part of the cost of the Works under
sub-clause 14(f).
12(g) Insurers and Policies

The Builder shall have or effect the insurances required under this clause with an insurer or insurers nominated by him and approved by the Proprietor and the Builder shall:

(i) maintain such insurance in full force and effect for the periods of insurance referred to in sub-clause (e) of this clause,

(ii) deposit with the Architect on request certified copies of the cover notes, policies and premium receipts or other evidence of compliance, and

(iii) deposit with the Architect certificates of currency as may be requested by the Architect or Proprietor failing which the Proprietor may effect such insurances and the premiums therefor may be deducted from the Contract Sum.

12(h) Cross Liability

Wherever pursuant to the provisions of this clause insurance is effected in joint names then the policy of such insurance shall provide that insofar as the policy may cover more than one insured all insuring agreements and endorsements with the exception of limits of liability shall operate in the same manner as if there were a separate policy of insurance covering each party comprising the insured. Such policy further shall provide that the insurer waives all rights remedies or relief to which it might become entitled by subrogation against any of the parties comprising the insured.

DETERMINATION ARISING FROM LOSS OR DAMAGE

13(a) Should any loss or damage affecting the Works occur either party may by notice in writing left at or forwarded by certified mail addressed to the address of the other party determine this Agreement subject to the right of the other party to refer to arbitration pursuant to Clause 20 the question of whether such determination would be just and equitable having regard to the extent of such loss or damage and to the effect thereof upon the further performance of this Agreement but any such reference to arbitration may not be made after the lapse of fourteen days after receipt of the notice hereinbefore mentioned.

13(b) Upon such determination as aforesaid or as a result of an Award by the Arbitrator, Arbitrators or Umpire as the case may be the Builder shall be entitled to payment of an amount computed in accordance with the provisions of sub-clause (b) of clause 16 hereof.

ACTUAL COST OF THE WORKS

14. The actual cost of the Works shall include only costs attributable to this Agreement and as follows:

14(a) The actual wages or other remuneration (including allowances) paid to workmen and other employees at Award rates or such higher rates as shall be paid generally by the Builder in accordance with arrangements notified by him prior to entering into this Agreement or as approved by the Architect prior to the execution of the work concerned in respect of services and labour supplied wholly in connection with the Works together with the requisite allowance or on-cost for annual leave, public holidays, sick pay, payroll taxes, long service
leave or payments and/or other benefits provided for in current
Awards, Ordinances or Acts of Parliament, which on-costs as at the
date of this Agreement are represented by the percentage figure
shown in the Appendix.

14(b) The actual wages, or other remuneration or allowances paid to,
together with on-costs as referred to in sub-clause (a) of this clause
in respect of, one general foreman and foremen, casting clerks,
bookkeepers or others where approved of by the Architect as being
necessary for the proper execution of the Works.

14(c) Where the Builder is an individual, such periodical amounts in the
nature of remuneration as may be agreed upon between the Architect
and the Builder in respect of work actually performed by him on the
Works.

14(d) Cost of board and/or lodging, fares and travelling time of workmen
and others employed in the Works which is legally payable by the
Builder or agreed to by the Architect as reasonable and necessary for
the proper execution of the Works.

14(e) Fee of Licensed Surveyor or Quantity Surveyor as may be approved
by the Architect.

14(f) Premiums paid for insurances as set out in Clause 12 hereof.

14(g) Reasonable cost of advertising incurred for labour for the Works.

14(h) The nett cost (after deducting all discounts other than 2½% cash
discunt) of all building materials or goods (including materials or
goods supplied by any nominated supplier) including concrete form-
work purchased for and used only in the Works, such materials and
goods to become the property of the Proprietor whether or not
incorporated in the Works.

14(i) Freight charges or cost of cartage paid or incurred by the Builder for
transporting all building materials to the site including the use of
Builder's own trucks and utilities at rates approved by the Architect.

14(k) The cost of all authorised sub-contracts and prime cost items.

14(l) Cost of transport to and from the site and cost of erection and disman-
tling of plant and temporary buildings used in the Works, but not
including the costs of dismantling and temporary removal from the
site or its subsequent return after temporary removal unless the
consent of the Architect for such temporary removal is first obtained.

14(m) Cost of replacement of small tools including hand-held electric tools
ropes and brushware and other similar items used on the Works and
costs of sharpening and repairing small tools.

14(n) Current market hire charges for the hire of tubular steel scaffolding,
scaffolding boards, concrete formwork and plant and machinery
which is hired expressly for the Works and particulars of which are
notified to the Architect prior to the hiring thereof.
14(a) Charges for the use of such items of the Builder’s plant and equipment as are set out in the Appendix hereto at the rates stated in the Appendix, or if no such rates be stated then at current market rates.

14(p) Costs of running, maintenance and repair of plant and equipment while used on the Works which are normally part of a builder's equipment subject to such plant and equipment being in good working condition when taken to the Works.

14(q) Installation and running cost of temporary electric and other power and lighting.

14(r) Cost of water, oil, petrol or other fuel used on the Works.

14(s) Cost of the installation and charges for telephones located on the Works.

14(t) Any fees paid by the Builder to municipal and/or other authorities.

14(u) Sales tax or any other tax legally payable on building materials or construction.

14(v) Cost of making good defects and faults (including all costs and expenses of the replacement of materials or goods supplied by a Nominated Supplier) which are not due to materials or workmanship not in accordance with this Agreement.

14(w) Cost of work manufactured at the Builder's workshop at such prices as shall be approved by the Architect.

14(x) Cost of clearing away debris, replacement, repair and/or rebuilding after any damage due to causes beyond the control of the Builder.

14(y) Any other expense incurred by the Builder in carrying out the Works, not being an expense which is expressly disallowed by this Agreement, which shall be approved by the Architect.

ITEMS NOT INCLUDED IN COST

15. Subject to Clause 14 hereof, the actual cost of the Works shall not include:

15(a) Cost and expenses incurred by the Builder in providing plant and machinery other than as provided in sub-clause (a) of Clause 14 hereof necessary for the efficient performance of the Works and being plant and machinery not used exclusively for those Works and in relation to such plant and machinery such items as depreciation, interest, insurance, replacement and any charges or outgoings whatsoever in relation thereto.
15(b) Expenses incurred by the Builder for the first cost of small tools (including hand-held electric tools) ropes brushware and other similar items.

15(c) Any overhead or other expenses incurred by the Builder including Directors' fees, salaries of the Builder, partners or corporate officers of the Builder's organization, interest on monies, patent rights, general advertising, entertaining, head and branch office administration, commissions, travelling expenses, bonuses, superannuation funds, Government taxes, rents, rates or any other "off the job" costs.

15(d) Salaries of clerical or other staff incurred 'off-the-job' in checking and submission of accounts and statements correspondence and other administrative duties unless such staff are specifically approved by the Architect under the provisions of clause 14(b).

15(e) Cost of making good defective work or work not in accordance with this Agreement as provided in Clause 5(a) hereof.

16(a) The Builder may at the end of the first four weeks work and thereafter at intervals of not less than four weeks submit to the Architect a statement accompanied, if the Architect shall so require, by wages sheets, delivery dockets, invoices and other relevant data setting out the cost of the materials and labour provided by the Builder and of all other items claimed under Clause 14 hereof in respect of the period covered by the statement and shall without delay give to the Architect all such further information as the Architect reasonably requires in relation to the statement.

16(b) The Architect shall in the case of statements during the progress of the Works within seven days of the receipt thereof and of the accompanying documents and any further information required by him determine the cost of materials labour and other items provided by the Builder during the period under review and issue a progress certificate for the amount so determined plus a proportion of the Builder's fee calculated as detailed in the Appendix hereto less a reasonable allowance in respect of any defective work or work not in accordance with this Agreement which the Builder has not removed or replaced in accordance with the provisions of clause 5(a). On presentation of any such certificate by the Builder to the Proprietor the latter shall within ten days pay to the Builder the amount therein certified to be due. And in default of payment the Builder shall be entitled to interest on the sum to which he is entitled at the rate of one and one half percentum per month compounding and may in addition to all other remedies suspend the Works until payment and charge against the cost of the Works all expenses and losses attributable to such suspension.

16(c) Unless disputed by notice in writing within ten days of issue any such certificate shall be conclusive evidence of the cost of materials, labour and other items provided by the Builder during the period under review except in the case of fraud, dishonesty or error in computation.
16(d) The Architect shall within fourteen days of receiving the final statement of the Builder including such documents and further information as aforesaid (and provided that any work required under the provisions of sub-clause (g) of this clause has been completed) determine the total amount payable by the Proprietor to the Builder according to the terms and conditions of this Agreement and shall issue to the Builder a Final Certificate for such amount less the value of all certificates which may have been previously issued and on presentation of such Final Certificate by the Builder to the Proprietor the latter shall within fourteen days pay to the Builder the amount so certified to be due.

16(e) Such Final Certificate shall unless disputed by notice in writing served within fourteen days of the issue of the same be conclusive evidence that the Works have been completed in accordance with the terms of this Agreement and any proper adjustments made between the Proprietor and the Builder except in the case of fraud dishonesty or error in computation of the amounts due or defect in or omission of any of the Works not apparent at date of issue of the Final Certificate.

NOTICE OF PRACTICAL COMPLETION 16(f) When in the opinion of the Builder the Works have reached the stage of Practical Completion, the Builder shall give to the Architect notice thereof in writing.

(i) If, upon receipt of such notice, the Architect is satisfied that the Works have reached the stage of Practical Completion, he shall within seven days (unless otherwise stated in the Appendix) issue both to the Builder and to the Proprietor a notice (hereinafter called 'Notice of Practical Completion') stating the date upon which the Works reached such stage and the Defects Liability Period referred to in Clause 16(g) hereof shall commence as from such date.

(ii) If, upon receipt of such notice, the Architect is not satisfied that the Works have reached the stage of Practical Completion, he shall within seven days (unless otherwise stated in the Appendix) give to the Builder notice in writing of the matters and things to be done for Practical Completion, and the Builder shall thereupon comply therewith and thereafter shall give to the Architect notice in writing that he has so complied, and upon such last-mentioned notice, or any subsequent similar notice being given by the Builder, the like procedure shall be followed as is prescribed in the case of the notice firstly hereinbefore mentioned.

(iii) In the event of failure by the Architect to comply with the provisions of this clause, the Works shall be deemed to have reached the stage of Practical Completion, and a Notice of Practical Completion shall be deemed to have been issued by the Architect on the date of the notice, or, if more than one, the last of such notices given by the Builder to the Architect.

(iv) For the purposes of this clause the Works are deemed to have reached the stage of Practical Completion when they are reasonably fit for occupation and/or use by the Proprietor.

(v) If in the opinion of the Architect the Works have reached the stage of Practical Completion and the Builder has not given notice pursuant to this clause the Architect may issue the Notice of Practical Completion.
machinery, appliances, goods or materials or by reason of his or their
so removing the same, the respective rights and liabilities of the
Builder and the Proprietor shall be as follows, viz.:

(1) The Builder shall with all reasonable despatch and in such
manner and with such precautions as will prevent injury or
damage of the classes for which before such determination he was
liable under Clauses 11 or 12 of these conditions remove from the
site all his temporary buildings, plant, machinery, appliances,
goods and materials and shall give facilities for his sub-contract-
ors to do the same but subject always to the provisions of
sub-clause (2) (iii) of this clause.

(2) The Proprietor shall pay to the Builder

(i) The actual cost of the Works as at the date of such deter-
mination together with the Builder's fee provided in
Clause 1 hereof in so far as such actual cost and fee have
not been previously dealt with under Clause 16 hereof.

(ii) The cost of materials or goods properly ordered for the
Works for which the Builder shall have paid or of which
the Builder is legally bound to accept delivery and on
such payment by the Proprietor any materials or goods so
paid for shall become the property of the Proprietor.

(iii) The reasonable cost of removal under sub-clause (1) of
this clause, and

(iv) Any other loss or damage caused to the Builder owing to
such determination.

17(d) In addition to all other remedies the Builder upon such determination
may take possession of and shall have a lien upon all unfinished
materials intended for the Works which may have become the proper-
ity of the Proprietor under this Agreement until payment of all monies due
to the Builder from the Proprietor.

DETERMINATION
BY PROPRIETOR
OTHER THAN
DEFAULT BY OR
BANKRUPTCY
OF BUILDER

18(a) The Proprietor reserves the right to suspend or discontinue the whole or
any part of the Works at any time by giving notice in writing of such
discontinuance or suspension to the Builder through the Architect and
upon receipt of such notice the Builder shall discontinue or suspend (as
the case may be) the whole or such portion of the Works as shall be
specified in such notice and shall lodge with the Architect as soon as
practicable a statement with accompanying documents and such further
information as the Architect shall reasonably require of the actual cost
of the Works to date.

18(b) The Architect shall within fourteen days after receiving such statement
and further information, certify the balance payable by the Proprietor
to the Builder, including:

(i) The actual cost of the Works as at the date of such suspension or
discontinuance together with the proportion of the Builder's fee
which is payable in respect of the work to date, including in
such fee the cost and expense referred to in sub-clause (ii) hereof.
(ii) The amount of the cost and expense to which the Builder has been put in supplying plant, generally organising the Works and planning of the job ahead.

(iii) The cost of goods or materials properly ordered for the Works, for which the Builder shall have paid or of which the Builder is legally bound to accept delivery, and on such payment by the Proprietor any materials or goods so paid for shall become the property of the Proprietor.

(iv) The reasonable cost of removal of plant, equipment and materials which are the property of the Builder, and

(v) Any other loss or damage caused to the Builder owing to such suspension or discontinuance.

18(c) The amount of such certificate shall be agreed to by the Architect and the Builder, before issue, and failing such agreement shall be referred to arbitration in accordance with the provisions of Clause 20 hereof.

18(d) In the event of discontinuance of the Works the Builder shall accept the amount certified under this clause or as varied by arbitration as the final balance payable to him under the provisions of this Agreement.

18(e) In addition to all other remedies the Builder upon such determination may take possession of and shall have a lien upon all unfixed materials intended for the Works which may have become the property of the Proprietor under this Agreement until payment of all monies due to the Builder from the Proprietor.

DETERMINATION
BY PROPIETOR
FOR DEFAULT BY
OR BANKRUPTCY
OF BUILDER

19(a) Default. If the Builder shall make default in any of the following respects, viz.:

(1) If without reasonable cause he wholly suspends the Works before completion,

(2) If he fails to proceed with the Works with reasonable diligence,

(3) If he refuses or persistently neglects to comply with a notice in writing from the Architect requiring him to remove defective work or improper materials and by such refusal or neglect the Works are materially affected,

(4) If where the Builder is required to be registered as a builder pursuant to any Act in that behalf for the purposes of the execution of the Works that registration is cancelled, withdrawn or suspended,

and if he shall continue such default for fourteen days after a notice by certified mail specifying the default has been given to him by the Architect, the Proprietor may, without prejudice to any other rights or remedies, thereupon by notice by certified mail determine the employment of the Builder under this Agreement; provided that notice in pursuance of this clause shall not be given unreasonably or vexatiously and shall be void if the Proprietor is at the time of the notice in breach of this Agreement.
19(b) Bankruptcy of Builder. If the Builder commits an act of bankruptcy or executes a Deed of Assignment or Deed of Arrangement or enters into a composition or other arrangement with his creditors or being a company enters into liquidation whether compulsory or voluntary the Proprietor may, without prejudice to any other rights or remedies, by notice by certified mail determine the employment of the Builder under this Agreement.

19(c) In either of the cases for which the two preceding sub-clauses provide the following shall be the respective rights and duties of the Proprietor and Builder, viz.:

1. The Proprietor may employ and pay another builder or other person or persons to carry out and complete the Works and he or they may enter upon the site and use all temporary buildings, plant, machinery, appliances, goods and materials thereon, and may purchase all materials necessary for the carrying out and completion of the Works.

2. The Builder shall, if so required by the Proprietor or Architect, assign to the Proprietor without further payment the benefit of any agreement for the supply of materials and/or for the execution of any works for the purposes of this Agreement and the Proprietor shall pay for any such materials or works supplied or executed under such agreement after the said determination the price fixed by such agreement in so far as it has not been already paid by the Builder.

3. The Builder shall during the execution or after the completion of the Works under this clause remove from the site as and when required, within such reasonable time as the Architect may in writing specify, any temporary buildings, plant, machinery, appliances, goods or materials belonging to or hired by him, and in default the Proprietor may (without being responsible for any loss or damage) remove and sell any such property of the Builder, holding the proceeds less all costs incurred to the credit of the Builder.

4. Until after completion of the Works under this clause the Proprietor shall not be bound by any other provision of this Agreement to make any payment to the Builder, but upon such completion as aforesaid and the verification within a reasonable time of the accounts therefore the Architect shall certify the amount of expenses properly incurred by the Proprietor and, if such amount added to the monies paid to the Builder before such determination exceeds the total amount which would have been payable on due completion in accordance with this Agreement, the difference shall be a debt payable to the Proprietor by the Builder; and if the said amount added to the said monies be less than the said total amount, the difference shall be a debt payable by the Proprietor to the Builder.

5. The Builder and/or any one person nominated from time to time by him and approved by the Architect may have access to the Works at reasonable times to inspect, survey and measure the same.
20(a) If any dispute or difference concerning this Agreement shall arise between the Proprietor, or the Architect on his behalf, and the Builder then either party may give to the other notice in writing thereof and at the expiration of one week unless it shall have been otherwise settled such dispute or difference shall be and is hereby submitted to the arbitration of a person to be agreed between the parties or failing agreement within three weeks after either party has given to the other a written request to concur in the appointment of an Arbitrator then to the arbitration of two Arbitrators one of whom shall be the nominee of the President of the Chapter or Area Committee of the Royal Australian Institute of Architects in the State or Territory in which the Works are situated and the other of whom shall be the nominee of the President of the Master Builders' Association in the State, Territory or place in which the Works are situated and if the Arbitrators shall fail to agree then to an Umpire to be appointed by them.

20(b) In serving such notice of dispute or difference the party so serving the same shall provide evidence that he has deposited with the Chapter or Area Committee of the Royal Australian Institute of Architects in the State or Territory in which the Works are situated or a Master Builders' Association the sum of $200 by way of security for costs. The Arbitrator, Arbitrators or Umpire shall have the power to make from time to time any order in regard to further security for the costs of the arbitration proceedings. Such security shall be applied in accordance with the direction of the Arbitrator, Arbitrators or Umpire.

20(c) Any Award made in any arbitration proceedings as aforesaid shall be final and binding on both Builder and Proprietor and neither party shall be entitled to commence or maintain any action upon any such dispute or difference until such matter shall have been referred or determined as hereinbefore provided, and then only for the amount of relief to which the Arbitrator, Arbitrators or Umpire by his or their award finds either party is entitled, and the costs of the submission, reference and award shall be in the discretion of the said Arbitrator, Arbitrators or Umpire.

NOTICES

21. Except as otherwise provided herein any notice necessary or required to be given hereunder shall be deemed to be sufficiently given if sent by prepaid post addressed to the person to whom it is necessary or required to be given at the address appearing in this Agreement or if any address has been notified by the party concerned to the other as to which he has removed or at which notices are to be served then to the address so notified.

PERIODS OF DAYS

22. Where under any provision of this Agreement any certificate or notice is to be issued or any payment made in a stated period of days the following days shall not be counted, namely:

Saturdays, Sundays, Statutory or Public Holidays.
AS WITNESS the hands of the parties hereto

Signed by the Proprietor

in the presence of

Signature: ........................................................................................................

Address ........................................................................................................

Signed by the Builder

in the presence of

Signature ........................................................................................................

Address ........................................................................................................

*NOTE: If the Agreement is to be executed under seal, this clause and the words following it must be altered accordingly.
APPENDIX

Insurance of the Works
Costs of demolition and removal of debris
Percentage to cover fees of the Architect and other Consultants
Materials and things to be supplied by Proprietor (If any)
Public Liability Insurance
Workers' Compensation and Employers' Liability Insurance
Percentage for on-costs
Charges for hire of Builder's plant and equipment

Proportion of Builder's fee to be paid with Certificates

Varied period for issue of Notice of Practical Completion
Varied period for notification of incomplete items
Defects Liability Period (if none other stated is 6 months from Practical Completion)

12(a) not less than $ .........................
12(a) not less than $ .........................
12(a) ........................................ %
12(a) $ ........................................
12(b) not less than $ .........................
12(c) not less than $ .........................
14(a) ........................................ %
14(a)* ........................................
16(b) Progress certificates issued prior to Practical Completion ............................
16(f)(i) ........................................ days
16(f)(ii) ........................................ days
16(g) ........................................

*NOTE: If insufficient space, refer to and attach schedule.
APPENDIX 9 : PILOT QUESTIONNAIRE
Reference:

To the Respondent

Dear Sir/ Madam

I am currently conducting a research concerned with Risk Management mainly concentrated in the Methods of Risk Treatment in the Construction Process and Contracts in attempting to provide ideal risk treatment guideline(s).

This survey contains 4 Sections; (1) Identification and Nature of Risks; (2) Methods of Risk Treatment; (3) Risk Sharing; and (4) Effectiveness of Contract Type.

The accompanying questionnaire is a pivotal part of the research. It would be greatly appreciated if you could complete the questionnaire and return to me by the end of June this year.

Thank you for your kind assistance.

D.H. Kim  B.Arch, M.Arch.Eng.

The lower part will be removed to retain confidentiality when answers of this questionnaire are analysed.

Name and Address of your Firm or Authority

Name________________________________________

Address________________________________________

Name and Position of Respondent

Name________________________________________

Position/Title________________________________________

Please return to D.H.Kim
Department of Architecture
University of Sydney
N.S.W. 2006
Section 1. Identification and Nature of Risk

The following is a list of construction risk. You are asked to rate the relative importance of each risk from 1 to 10 (1 is least important; 10 is most important). It is recognised that the importance of these risks will vary from one project to another. Your response reflect your assessment in general.

<table>
<thead>
<tr>
<th>Risks</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction related</td>
<td></td>
</tr>
<tr>
<td>Weather</td>
<td></td>
</tr>
<tr>
<td>Acts of God</td>
<td></td>
</tr>
<tr>
<td>Availability &amp; Productivity of Labor, Material, Equip.</td>
<td></td>
</tr>
<tr>
<td>Delayed Completion</td>
<td></td>
</tr>
<tr>
<td>Differing site Conditions</td>
<td></td>
</tr>
<tr>
<td>Changes in the Work</td>
<td></td>
</tr>
<tr>
<td>Local Conditions in Overseas Projects</td>
<td></td>
</tr>
<tr>
<td>Vandalism and Malicious Mischief</td>
<td></td>
</tr>
<tr>
<td>Failure to complete contract according to plans and specifications</td>
<td></td>
</tr>
<tr>
<td>Accidents</td>
<td></td>
</tr>
<tr>
<td>Subcontractor Failure</td>
<td></td>
</tr>
<tr>
<td>Contractual and Legal Risks</td>
<td></td>
</tr>
<tr>
<td>Failure to enter into the Contract</td>
<td></td>
</tr>
<tr>
<td>Settlement of Disputes</td>
<td></td>
</tr>
<tr>
<td>Labor Contracts</td>
<td></td>
</tr>
<tr>
<td>Lack of Contract Clarity</td>
<td></td>
</tr>
<tr>
<td>Economic Risks</td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td></td>
</tr>
<tr>
<td>National and International Impacts</td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td></td>
</tr>
<tr>
<td>Interest Rate Variation</td>
<td></td>
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<tr>
<td>Exchange Rate Movement</td>
<td></td>
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<tr>
<td>Political and Public Risks</td>
<td></td>
</tr>
<tr>
<td>Political and Religious Influence</td>
<td></td>
</tr>
<tr>
<td>Theft, Burglary, and Fidelity Hazards</td>
<td></td>
</tr>
<tr>
<td>Public Disorder</td>
<td></td>
</tr>
</tbody>
</table>
Section 2 - Methods of Risk Treatment

You are asked to suggest how you believe risks ought to be treated as listed below. The following is an example of an answer. Please indicate the best preferred method in as much as possible.

Example

<table>
<thead>
<tr>
<th>Identified Risks</th>
<th>Method of Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to Complete Contract According to Plans and Spec.</td>
<td>Avoidance</td>
</tr>
<tr>
<td></td>
<td>Contractor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risks</th>
<th>Avoidance</th>
<th>Abatement</th>
<th>Retention</th>
<th>Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Related Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weather</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acts of God</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availabili-ty &amp; Productivity of Labor, Material, and Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delayed Completion</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Defective Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differing Site Conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes in the Work</td>
<td>Avoidance</td>
<td>Abatement</td>
<td>Retention</td>
<td>Transfer</td>
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<td>---------------------</td>
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</tr>
<tr>
<td>Local Conditions in Overseas Projects</td>
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<td></td>
</tr>
<tr>
<td>Vandalism and Malicious Mischief</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure to complete Contract according to Plans, and Spec.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accidents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sub-Contractor Failure</th>
<th>Avoidance</th>
<th>Abatement</th>
<th>Retention</th>
<th>Transfer</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Contractual and Legal Risks</th>
<th>Avoidance</th>
<th>Abatement</th>
<th>Retention</th>
<th>Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to enter into Contract</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Settlement of Dispute</th>
<th>Avoidance</th>
<th>Abatement</th>
<th>Retention</th>
<th>Transfer</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Labor Contract</th>
<th>Avoidance</th>
<th>Abatement</th>
<th>Retention</th>
<th>Transfer</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Lack of Contract Clarity</th>
<th>Avoidance</th>
<th>Abatement</th>
<th>Retention</th>
<th>Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Risks</td>
<td>Avoidance</td>
<td>Abatement</td>
<td>Retention</td>
<td>Transfer</td>
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<td>-------------------------------------</td>
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<tr>
<td>Inflation</td>
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<tr>
<td>National &amp; International Impact</td>
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<tr>
<td>Funding</td>
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<td>Interest Rate Variation</td>
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<tr>
<td>Exchange Rate Movement</td>
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<tr>
<td>Political and Public Risks</td>
<td></td>
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<tr>
<td>Political and Religious Influences</td>
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<tr>
<td>Theft, Burglary, and Fidelity Hazards</td>
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<tr>
<td>Public Disorder</td>
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<td></td>
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<tr>
<td>Local Work Method</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Union Strike</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 3 - Risk Sharing

You are asked to indicate how you believe, in general, risks ought to be shared as between the owner and contractor. If you think any of risk should be allocated to other party except the owner or contractor, please mention in "other" column with possible percentage.

<table>
<thead>
<tr>
<th>Risks</th>
<th>Sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Owner</td>
</tr>
<tr>
<td>Construction Related Risks</td>
<td></td>
</tr>
<tr>
<td>Weather.......................</td>
<td></td>
</tr>
<tr>
<td>Acts of God...................</td>
<td></td>
</tr>
<tr>
<td>Availability &amp; Product of Labor, Material, and Equip.</td>
<td></td>
</tr>
<tr>
<td>Delayed Completion.........</td>
<td></td>
</tr>
<tr>
<td>Defective Design............</td>
<td></td>
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<tr>
<td>Differing Site Condition.</td>
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<tr>
<td>Local Conditions in</td>
<td></td>
</tr>
<tr>
<td>Overseas Contract.........</td>
<td></td>
</tr>
<tr>
<td>Vandalism and Malicious Mischief.</td>
<td></td>
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<tr>
<td>Failure to complete contract according to Plans and Spec.</td>
<td></td>
</tr>
<tr>
<td>Accidents....................</td>
<td></td>
</tr>
<tr>
<td>Subcontractor Failure.....</td>
<td></td>
</tr>
<tr>
<td>Contractual and Legal Risks</td>
<td></td>
</tr>
<tr>
<td>Failure to enter into the contract.................................</td>
<td></td>
</tr>
<tr>
<td>Settlement of Disputes...</td>
<td></td>
</tr>
<tr>
<td>Labor Contracts............</td>
<td></td>
</tr>
<tr>
<td>Lack of Contract Clarity...........................................</td>
<td></td>
</tr>
<tr>
<td>Economic Risks</td>
<td></td>
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<tr>
<td>Inflation....................</td>
<td></td>
</tr>
<tr>
<td>National and International Impact...................................</td>
<td></td>
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<tr>
<td>Funding.......................</td>
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<td>Interest Rate Variation................................................................</td>
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<tr>
<td>Political and Public Risks</td>
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<tr>
<td>Political and Religious Influences.....................................</td>
<td></td>
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<tr>
<td>Theft, Burglary and Fidelity Hazards.................................</td>
<td></td>
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<tr>
<td>Public Disorder..............</td>
<td></td>
</tr>
<tr>
<td>Local Work Methods in Overseas Projects...............................</td>
<td></td>
</tr>
<tr>
<td>Union Strikes................</td>
<td></td>
</tr>
</tbody>
</table>
## Section 4 - Effectiveness of Contract Type

You are asked to evaluate each of the various recognised types of contract in terms of effectiveness in attaining the three goals of low cost, high quality, and rapid completion.

**Note:** Please use the following scales: A = Highest Effectiveness; B = Average to Good Effectiveness; C = Poor to Average Effectiveness; and F = Ineffectiveness or deleterious.

<table>
<thead>
<tr>
<th>Type of Contract</th>
<th>Relative Effectiveness in Achieving your goals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Cost</td>
</tr>
<tr>
<td>Firm Fixed Price</td>
<td></td>
</tr>
<tr>
<td>Firm Fixed Price with Completion</td>
<td></td>
</tr>
<tr>
<td>Bonus</td>
<td></td>
</tr>
<tr>
<td>Firm Fixed Price with Target</td>
<td></td>
</tr>
<tr>
<td>Estimate</td>
<td></td>
</tr>
<tr>
<td>Firm Fixed Price with Escalation</td>
<td></td>
</tr>
<tr>
<td>Cost plus Percentage of Cost</td>
<td></td>
</tr>
<tr>
<td>Cost plus with Fixed Fee</td>
<td></td>
</tr>
<tr>
<td>Cost plus with Incentive Fee</td>
<td></td>
</tr>
<tr>
<td>Cost plus with Award Fee</td>
<td></td>
</tr>
<tr>
<td>Time and Material</td>
<td></td>
</tr>
<tr>
<td>Labor / Equipment Hour</td>
<td></td>
</tr>
</tbody>
</table>

Finally I would be most grateful for the following.

Your Profession(s); ____________

Owner, Designer, Contractor

Legal, Insurance, Engineer, Other (specify in detail)

Your Principal Construction Activity; ____________

Residential

Commercial, Industrial, Other (specify in detail)

THANK YOU
<table>
<thead>
<tr>
<th>Risks</th>
<th>Not Very Important</th>
<th>Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Rate (%)</td>
<td>No.</td>
</tr>
<tr>
<td>Differing Site Conditions</td>
<td>12</td>
<td>14.1</td>
<td>55</td>
</tr>
<tr>
<td>Acts of God</td>
<td>53</td>
<td>60.9</td>
<td>25</td>
</tr>
<tr>
<td>Weather</td>
<td>29</td>
<td>33.4</td>
<td>34</td>
</tr>
<tr>
<td>Availability &amp; Productivity of Labor, Equip.</td>
<td>33</td>
<td>37.3</td>
<td>37</td>
</tr>
<tr>
<td>Late Completion</td>
<td>9</td>
<td>10.4</td>
<td>18</td>
</tr>
<tr>
<td>Defective Design</td>
<td>22</td>
<td>24.5</td>
<td>31</td>
</tr>
<tr>
<td>Changes in the Work</td>
<td>18</td>
<td>20.2</td>
<td>46</td>
</tr>
<tr>
<td>Vandalism &amp; Malicious Mischief</td>
<td>73</td>
<td>83.4</td>
<td>15</td>
</tr>
<tr>
<td>Failure to Complete Contract according to Plans</td>
<td>21</td>
<td>24.5</td>
<td>39</td>
</tr>
<tr>
<td>Accidents</td>
<td>51</td>
<td>58.1</td>
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APPENDIX 10: RESULT OF IDENTIFICATION AND NATURE OF CONSTRUCTION RELATED RISKS
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<th>Contractual &amp; Legal Risks</th>
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<th>Very Important</th>
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**APPENDIX 11: RESULT OF IDENTIFICATION AND NATURE OF CONTRACTUAL AND LEGAL RISKS**
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</table>

| Political & Public Risks                   |           |                        |                |               |      |         |
|                                            | No.       | Rate(%)                | No.            | Rate(%)       | No.  | Rate(%) |
| Public Disorder                            | 88        | 100.0                  |                |               |      |         |
| Local Custom of Site in Overseas Contract  | 9         | 64.3                   | 5              | 35.7          |      |         |
| Permits and Ordinances                     | 41        | 46.8                   | 36             | 41.8          | 11   | 11.4    |
| Government Acts & Regulations              | 33        | 37.2                   | 46             | 52.7          | 9    | 10.1    |
| Political Stability of Site                | 5         | 45.5                   | 5              | 45.5          | 1    | 9.0     |
| in Overseas Projects                       |           |                        |                |               |      |         |
| Union Strike                               | 21        | 24.6                   | 29             | 32.6          | 33   | 42.8    |

APPENDIX 12 : RESULTS OF IDENTIFICATION AND NATURE OF ECONOMIC RISKS AND POLITICAL & PUBLIC RISKS
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<td>%</td>
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APPENDIX 13 : RESULT OF RISK SHARING SURVEY
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