Abstract of thesis entitled : 'A Project Management System (PMS) for Construction Projects in China - A Comparative Study Approach Based on Foreign Invested Industrial Projects in Guangzhou'

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Abstract

Considerable amounts of time and money was invested in the construction industry every year throughout the world. The Anglo-France tunnel, the Jubilee Line Extension in England, the Light Rail System in Malaysia and the Ø-Resund crossing between Denmark and Sweden are few of the examples. However, the problems of time and budget overrun seem quite common. Particularly in China, the projects with size over RMB5 million were reported having a budget overrun by at least 20% in 1995. Many foreign organisations also came across difficulties in managing Chinese construction projects. Therefore, the development of construction project management system for Chinese construction industry is important in reducing these adverse effects. However, the development of the modern construction project management in China only began after implementation of the "Chinese Style Market Economy System" since the early 1980s.

The aim of this study is to develop an appropriate construction project management system applicable to Chinese construction projects. This research is also the result of a Teaching Company Scheme project which draws on the experience of the external industry partner with a range of projects in China. In particular, it includes a comparative analysis of two similar foreign invested Joint Venture industrial projects in the

Guangzhou Economic and Trade Development District. By combining this comparative study, experiences and analysis of other projects, and the relevant review of related processes and techniques on construction project management, this research has developed and produced a management tool in the form of a project management handbook.

Identification of the handbook as an appropriate vehicle for the construction management procedure followed the analysis, ranking and categorisation of the construction project management problems identified in China. Subsequently, these problems were divided into "Government Determined" and "Project Manager Controllable" categories. Then the viable and feasible solutions which had been formed for the "Project Manager Controllable" problems were collated. A variety of options for presenting these pitfalls and appropriate avoidance procedures was considered. Various formats were considered and an appropriately structured Handbook was identified as the most viable, usable and portable solution.

This handbook is developed to help engineers, project managers and foreign construction practitioners who are inexperienced in working with Chinese construction projects. In addition, with use of the handbook, the local Chinese construction practitioners will benefit from using the project management techniques, standard forms and checklists provided for various phases of construction projects.

Also, this study has reviewed the current status of the Chinese construction industry. This included the latest constitutional requirements on construction projects, including the Law of Construction, the Construction Supervision Ordinance, the Tender and Bidding Administration Ordinance and the Client Responsibility Ordinance. The typical Chinese construction practice which involved the formation of a Preparation Office is also studied in detailed.

Through the identification of good practice and analysis of construction projects, this study also identifies the most significant problems such as the complex design approval process of a construction project in China. Therefore, this allows the construction practitioners to be aware of and alert to the problems in a Chinese construction project, and to direct more effort towards the problem areas in terms of detailed planning and close monitoring. This should minimise the impact and risk on these peculiar difficulties of the management of construction projects in China.

A Project Management System (PMS) for Construction Projects in China - A Comparative Study Approach Based on Forgiven Invested Industrial Projects in Guangzhou

A Thesis

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1.0 Introduction to the Study

1.1 Problems in Construction Projects

A considerable amount of money is being invested in the construction industry every year in the world. The Anglo-France tunnel, the Jubilee Line Extension in England [1], the Light Rail System in Malaysia [2] and the Ø-Resund crossing between Denmark and Sweden [3] are few of the examples. However, the problems of time and budget overrun seem quite common [4]. In particular, the investment in the construction industry by the Chinese State-Owned Sector has increased from Renminbi (RMB) 69.9 billion in 1979 to RMB1,700 billion in 1995 [5]. Moreover, the projects with size over RMB5 million was reported generally having a budget overrun by at least 20% in 1995 [6]. Many foreign organisations has also come across difficulties in managing Chinese construction projects. Therefore, the development of a project management system suitable for Chinese construction industry is necessary.

1.2 Objective of the Study

Efforts has been devoted to improve the problematic situation in construction industry. For example, the lean construction paradigm has been developed for the construction industry from lean production applied in the manufacturing sector [7]. Although the problems happened in Chinese construction projects are similar to the rest of the world, the different environments such as cultural effect put together a unique situation in China.

The prime objective of this study is to formulate a method to tackle the management problems in the Chinese construction projects. In addition, the following objectives are also included in this study.

i) Understand the property of construction;
ii) Understand the construction project management principle and techniques;
iii) Understand the current status of the Chinese construction industry and practice;
iv) Analyse the project management problems incurred in the Chinese construction projects;
v) Develop a tool to assist the management of construction projects in China.

Therefore, by fulfilling the objectives, the prime objective of this study is also achieved.

1.3 The Principle of Construction Project Management

In short, the principle of project management for construction can be considered as the planning, monitoring and control of all aspects of a project and the motivation of all those involved in it to achieve the project objective on time and to the specified cost, quality and performance. This is further elaborated by Walker [8] as the application of all the project management techniques in directing all the available resources, including human, mechanical plants and material, to the completion of a project to meet the project owner's requirements in terms of utility, function, quality, time and cost from project inception to completion.

Therefore, based on the modern construction project management principle, this study is tried to improve the performance of the Chinese construction projects.

1.4 Research Methodology of the Study

- There are many ways of carrying out studies on construction project management. The most common research methodologies include the followings.

  i) Explanatory Study - to become familiar with some problems or to achieve new insights that can guide further research.

  ii) Hypothesis Testing Study - to focus on the collection of data that permit the confirmation of a given hypothesis, or set of hypothesis, and thereby help to determine the probable validity of the theory from which it is derived.

  iii) Descriptive Study - to define and portray the characteristics of the object of research or determine the frequency of various occurrence and examine their associations with one another.

A descriptive study approach is selected as the research methodology. In the descriptive studies, the characteristics of construction projects are defined and portrayed as variables. These variables are then compared on similar basis. The variables for comparison in this study are derived from the definition of Construction Project Management which included the organisational structure, project planning and control management in terms of time, cost and quality, etc.

In particular, the research undertaken includes a comparison and analysis study of two industrial facility developments in Guangzhou Economic and Trade Development District with respect to the functional stages from project establishment to preliminary design and construction.

By comparing and analysing the similarities and differences between the project management approaches in the two projects, good project management practice is identified to improve the performance of construction projects in China. Finally, suitable project management techniques are also identified to formulate a project management tool to resolve the difficulties in managing Chinese construction project.

1.5 Justification of Research Methodology

Because the formal application of project management in Chinese construction project has only a short history, it would be difficult to gather sufficient data to fully understand the situation in the Chinese construction industry. Therefore, a descriptive comparative methodology is used in this study. In addition, it is a logical approach to portray the management aspects as variables and compare them individually.

In suggest of this approach, Etzioni [9] also stated that comparative studies release people from the boundaries of their habit and show people the wide gamut of patterns possible in human interaction.

Also, though the information that can be reviewed in a comparative study is limited, it allows a deeper and detailed understanding of specific construction projects in China. In addition, practical problems which occur in a construction project can be explored as well. As a result, relatively more practical recommendations can be made for construction projects in China.

1.6 Scope of the Study

In order to achieve the objective as mentioned in the above paragraphs, the scope of the study included the followings.

i) The characteristic of construction.
ii) The principles of construction project management.

iii) The properties of Chinese construction industry and the associated construction project management problems.

iv) The construction projects management techniques applicable in Chinese Construction Project.

Particularly, in the comparative analysis, how construction project management was applied to the two or more construction projects in China was examined, and analysis of the similarities or differences in its application by the different construction project management teams was also carried out.

1.7 Collection of Information

The qualitative method of information collection has been adopted in this study. The methods of information collection employed in this study included site visits, desk top studies, semi-structured interviews and analysis of project documents and files.

i) Site visit to the projects

During the study, the researcher has visited construction sites in China as well as the projects to be studied. This enabled the researcher to observe the construction industry in China and the construction management practice of the targeted projects.

ii) Desk top study

The study of the Chinese construction industry based on books, periodicals, journal papers and Chinese Government Ordinances. This allowed the researcher to have a general understanding of the construction industry in China.

iii) Semi-structured interview

- Semi-structured interviews have been carried out by the researcher for the collection of targeted project information, and the collected information then reported through the case study of the targeted projects.

  In addition, semi-structured interviews have also been conducted with various parties such as university professors, construction supervision teams, project management practitioners and Government officials to collect their view on the status of the Chinese construction industry as well as operation and management practice of target projects.

iv) Analysis of documents

  Much of the general information on the two target projects was collected through the analysis of relevant documents which were either written by or about the project management teams.

1.8 Limitation of the Study

Owing to the limitation in time and resources, only a general study of the properties of construction industry and the construction project management, especially in China, was carried out. In addition, only two projects which represented only one segment of the construction industry in China were studied. Although the results cannot be regarded as necessarily representative of the whole construction industry in China, the results of the study are directly applicable to that segment of the industry, i.e. the industrial facility development.

1.9 Anticipated Results

As it is revealed in the title of this research, the prime objective of this research is to develop a suitable means to assist project managers in managing construction projects in China. Therefore, in addition to the comparative study of construction projects, a project management system is documented for project managers. This documentation takes the form of a handbook that consists of guidelines and instructions to suggest any necessary actions or identify potential problems that may arise throughout the life cycle of a construction project. In the development of the handbook, the construction law, ordinances and regulations in China were also incorporated. This handbook is expected to help the project manager of Chinese construction project throughout the project life cycle.

Chapter 2

Chapter 2

2.0 The Construction Industry

Without some basic understanding and intuition of a subject, managing it well is difficult. Different people may see construction in different perspectives. Architects may see construction as a series of actions to create a piece of art, while the environmentalists may see construction as natural destroying activities. Obviously, the perspective of a construction practitioner is selected for the description in the following paragraphs which review some characteristics of the construction industry.

2.1 History of Construction

Construction has been a part of mankind history for a long time. In the prehistorical days, the construction works were simple. Stevens [10] stated that the Primitive Man built crude tents or hutments out of the materials around him to shelter himself. In other words, most of the construction materials were localised and the construction techniques were simple. Therefore, only simple planning was sufficient for the works.

However, as the construction knowledge advanced, giant projects such as the Pyramids in Egypt and the Great Wall in China were built to serve different needs [11]. It is believed that some form of detailed planning and management was exercised in these projects. During the great era of cathedral buildings in the 13th century, architects were highly paid to play the role of "Manager" in organising, planning and directing various kind of construction works from preparation of drawings and specifications to monitoring of construction works [12]. As new technology and building systems developed in this century, the construction projects became bigger, faster and more complicated. Therefore, the architect was considered insufficiently trained to cope with the situation [13]. As a result, various disciplines of professionals including architect, surveyor, engineer and project manager are usually teamed up to carry out the modern day construction projects.

2.2 The Management Variables of Construction Project

In the previous paragraphs, only a brief introduction was given about the characteristic of construction projects. In the following paragraphs, these characteristics that affect the management of construction projects are portrayed as the "Management Variables" and discussed in detail.

2.3 The Variable of Construction Project Nature

Being a project based entity, a construction project shared the uniqueness and temporary properties of any project [14]. However, most construction projects have a relatively long life cycle time. Therefore, uncertainties such as inclement weather are unavoidable, and often affect the execution of construction works. Moreover, many works-parties are involved during the life cycle of a modern day construction project. The parties involved in construction projects include the owner and the contractor, while specialists, such as the architect or engineer, are frequently consulted for technical advices.

2.3.1 *Unique Nature of a Construction Project*

In general, every project is unique, however, being unique does not mean that the works are unique. Lock [15] stated that projects can never be exactly the same as anything which has gone before. Thus, the uniqueness of a project means that the result it generated is unique. For example, buildings with identical outlooks are built in a housing estate, but all the buildings are unique individually. Their locations are different, the foundation conditions are different and the problems came across during the construction process may also be different. The presence of repetitive works including reinforcement fixing, concreting and plastering do not change the property of uniqueness.

As every project is unique in itself, clearly define the project objectives and details is an important initial process. During the course of a project, the objectives have to be qualified, quantified and modified for management, control and coping with the project constrains. A similar conclusion is also drawn in the PMBOK [14].

> *Because the product of each project is unique, the characteristics that distinguish the product or service must be progressively elaborated. . . . . These distinguishing characteristics will be broadly defined early in the project and will be made more explicit and detailed as the project team develops a better and more complete understanding of the product. Progressive elaboration of product characteristics must be carefully coordinated with proper project scope definition, particularly if the project is performed under contract.*

2.3.2 <u>*Temporary and Transient Nature of a Construction Project*</u>

The "Temporary" property of a construction project can be considered as the time constrains of a project. In other words, every project has a definite beginning and a definite end, or a project is life cycle imposed. However, this only reveals part of the temporary and transient nature of a construction project.

The temporary and transient nature of a construction projects is also revealed in project management team and works in different stages [16]. For example, design team is diminished after the detailed design stage, and construction team is dismissed after construction works completed.

This change in the organisational structure is often required to suit the nature of works at different stages. Therefore, careful initial detailed planning and control of the works is necessary to attain a smooth progress.

2.3.3 *Uncertainty Property*

As the life cycle of construction projects are relatively long, risk and uncertainty are inherent in all construction works irrespective of the size of the project [17]. Typical examples included the inclement weather and fluctuation of construction cost, some of these effects are foreseeable while some are not. Various efforts have been addressed to cater for the uncertainty effects. The techniques included contingency method, cost study method, the Monte Carlo method and PERT are developed to address the uncertainties. Some of these methods address the uncertainties of construction cost while some address the issue of construction duration uncertainties.

In addition, what happened during a project stage often influents the subsequent life and end product. Thus, risk management techniques are important to minimise the impact of uncertainties in construction projects.

2.3.4 *Multiparty Involvement and Specialisation*

The development of the construction industry has been professionalised since the end of 19th century. It is because projects have become more and more complex, therefore requiring a board range of technical knowledge to complete a construction projects. Construction specialists are employed to carry out the planning and monitoring duties for the owners in modern days project. They included the quantity surveyor, engineer, planner and architect [18]. The architect or engineer is responsible to design and administer the project, and the contractor is responsible for the construction works with his technical know-how [19]. It is hoped that the interest of the owner is safeguarded by the professionals.

In addition, the development of construction technology and construction materials during the past 30 years has meant that more specialists are required for specific parts or phases of construction. This has made the project organisational structure bulky, and required good coordination between participants throughout the projects at different phases [20,21].

2.4 The Variable of Construction Project Parties

The present structure of the construction industry adopted in most of the countries did not come by itself in one day. The structure including the client as the owner of the project, the architect or engineer as the design professional and the contractor as the construction professional has gradually evolved. Particularly, the current structure was heavily influenced by practices in the UK during the last two centuries [8]. Moreover, different configurations of the parties have been developed for different project needs.

2.4.1 *The Client*

The client of a construction project is normally the owner of the project. Upon evaluated that the value generated from a construction project will be higher than the cost, a client will usually support the project and, within his capacity, provide the funding. Depending on the type of client, their effects on projects are different. For example, government clients usually have a team of in-house construction professionals and they used to greatly involved in the preparation of detailed design and the supervision of construction works.

However, most private clients do not have a team of in-house construction professionals. They usually appoint an architect or engineer to carry out the design works and manage the construction of the project while the client still monitor the financial status of the project. For the client of an industrial facility, their interest is focused on the function of the processes. Therefore, close coordination with the process design professionals to define the need of the facility is required throughout the project.

2.4.2 *Architect and Engineers*

Usually, the architect and the engineer are the professionals who manage a construction project for the client. They are the professionals who use their technical know-how to design and manage the construction of a project. To be more specific, they bare different responsibilities in the construction industry. For example, an architect is mostly responsible for works related to design and construction of buildings while a civil engineer is involved in different types of projects such as the construction of roads, bridges, harbours and reservoirs, etc. Their particular characteristics are described in detailed in the following paragraphs.

Architect

In the Penguin Dictionary of Building [22], an architect is defined as the person who designs and supervises the construction of buildings. On the technical side, an architect's duties are mainly the preparation of designs, plans and specifications, possibly also including sites inspections. In particular, he is often responsible for the aesthetic design and the functional layout of buildings. On the management side, he is responsible for obtaining tenders for a project and underlaying negotiations needed before construction can be started. The function of an architect may also be extended to the aspects of town planning and social needs of buildings.

As the architect is particularly focused in the trade of building construction, therefore, they usually have good management capability on building projects.

Civil Engineer

Generally speaking, the works of civil engineering included all the works of non-military engineering but excluded the works of mechanical, electrical and electronic engineering. In the Penguin Dictionary of Civil Engineering [23], the scope of civil engineering is further limited to land drainage, water supply, river, canals, harbours, docks, marine construction, water power, sewage disposal, sewerage, bridges, tunnels, railways, roads, traffic engineering, foundations, airports, municipal engineering, soil mechanics, structural design, town planning and transportation engineering.

Since the field is so wide, it is difficult for any civil engineer to specialise in more than two of the subjects. In conclusion, the works of a civil engineer included the planning, design and construction of the mentioned subjects. In addition, a civil engineer is also responsible for letting works contracts, look after the technical accountancy of contracts and supervising the construction works. Therefore management capability of civil engineers varied and depended on their particular experience.

Other Types of Engineer

In particular, different types of engineers are also involved in the construction industry. They included the structural engineers, the services engineers and the process design engineers. Their duties are usually focused in a particular subject of works. For example, a structural engineer is specialised in the design and construction of structures. The services engineers are important in the design and installation of various types of building services systems. The process engineers are particularly important in the design and installation of process system in an industrial facility development project.

In conclusion, the assistance and cooperation of these specific type of engineers are important in the modern days projects which involved a lot of complex and special requirements.

2.4.3 *Quantity Surveyor*

In the Penguin Dictionary of Building [22], it states that a quantity surveyor is the person who looks after the technical accountancy of building contracts. He is responsible for measurement of works shown on drawings and preparation of the bill of quantities for tendering. He is also responsible for measurement of works done by the contractor and advises the client on the correct sum to be paid to the contractor in any time. However, the duties of a quantity surveyor are sometimes performed by the architect or civil engineer or project manager.

In conclusion, the presence of a quantity surveyor is particularly important in large re-measurement type construction projects. This is because the quantity of works is required to be accurately justified.

2.4.4 *Contractor or General Contractor*

The contractor as defined in the Penguin Dictionary of Building [22] and Civil

Engineering [23] is a person who signs a contract to do certain specified work at certain rates of payment, generally with a stated time. The general contractor is a contractor who is responsible for the bulk of the work on a site, including the work of subcontractors. However, various alterative forms of contracts have been introduced in this decade. This has made the role of a contractor different from being just the constructor of a project. For example, a contractor is also the architect or engineer of the project as in a Design and Build contract, while an engineer also played the role of a general contractor in the Engineering Procurement Contract [24].

As the contractor is responsible for various kind of works including coordination and construction. Therefore, a competent contractor is important to ensure construction projects be carried out effectively.

2.4.5 *Project Managers*

Traditionally, the architect or engineer was responsible to lead and manage the team of construction specialists. However, as most projects are getting complicated, the dedicated project managers is evolved to manage and monitor the construction projects. In general, the project managers have a common understanding of all aspects of construction work, and with this project management knowledge, they direct all aspects of the works on a construction project from project inception to project completion.

In conclusion, a project manager is important in the modern days' construction project. It is because he is the coordinator of the various information and the facilitator of all the project works.

2.5 The Variable of Project Type

Depending on the type of construction project, different aspects of the project assume varying importance. For example, in the building projects the functional and aesthetic requirements are both emphasised. An architect has traditionally been appointed to manage a building project with the assistance of structural, E&M, building services and fire services engineer in their specific areas. Some basic characteristics of different types of construction projects are discussed in the following paragraphs:

2.5.1 *Civil Engineering Project*

Although high aesthetical standard is a trend in the recent years, the functional requirement is emphasised in civil engineering projects in general. Civil engineering projects include all types of infrastructure developments. Typical examples included various types of road networks, reservoirs and subways. In most civil engineering projects, the works are divided into a small number of big size works packages in both design and construction phase. For example, the works of a highway bridge are usually split into packages of foundation, superstructure and E&M works.

As the works packages size is large and the chance of overlapping of working environment is relatively small, works programme planning, progress control and coordination within individual works package is emphasised.

2.5.2 *Building Developments*

Similar to the civil engineering projects, the functional requirement of building projects is emphasised. However, particular attention to the aesthetic requirements in building projects is usually required. Advance technology such as telecommunication system, computer automation and security system, etc. have been heavily employed in recent years, and this has made building projects more complicated. Similar to civil engineering projects, the works packages are usually divided according to the category of works. These may included foundation, superstructure, electrical, mechanical, plumbing, drainage and fire service.

As the works packages are often small and the working environments are often overlapped during construction, close coordination and detailed planning of the works are essential to avoid conflicts and to facilitate the progress of works.

2.5.3 *Industrial Facility Developments*

Industrial facility developments can be considered as a specific type of building development with a special focus on the production process. However, they are generally more complicated, as different types of facilities and detailed considerations are required to support different types of production process. Therefore coordination, detailed planning and execution of the types of works are required in both design and construction phase. Furthermore, early arrangement of process equipment procurement is required as the process machinery is usually tailor-made.

Similar to building developments during the construction stage, the industrial facility developments beared the characteristic that works packages are generally small and the working environments of works overlap. Therefore, a high amount of coordination is necessary to prevent conflict arising between the works to be carried out by different parties.

2.6 The Variable of Project Procurement Method

Traditional project procurement method included the admeasurement and cost reimbursement has been used. They all required the client of the project to highly involved in the project in monitoring the project progress and exercise the financial control. However, as the modern construction projects are getting complicated, the turnkey and the design and build procurement methods are developed. This passed many of the coordination works to the contractors. Therefore, the clients can focus on determination of the project performance requirements and let the contractor to carry out the project with his technical experience.

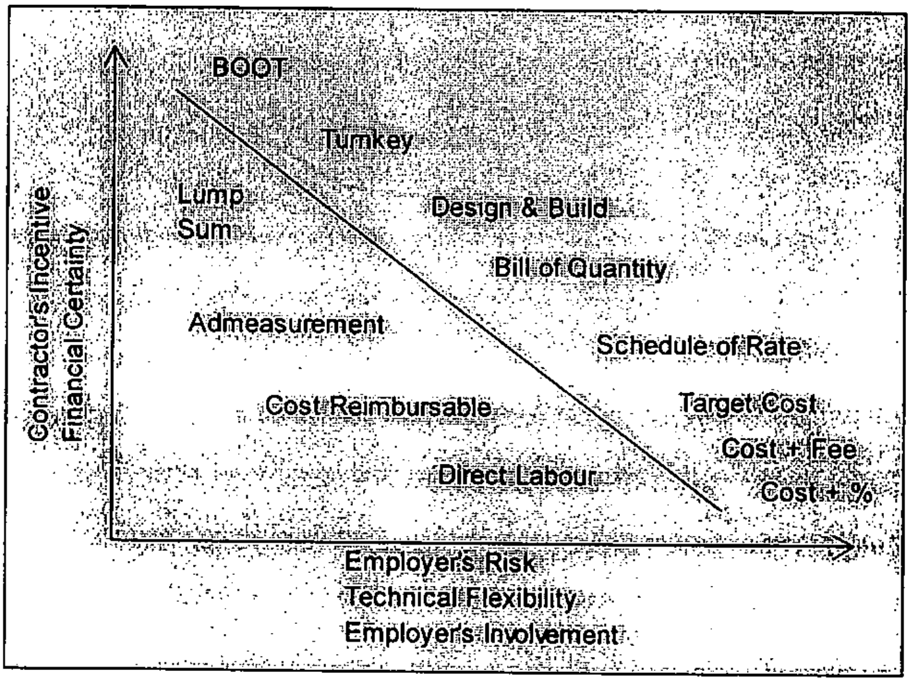

Figure 2.1 - Type of Project Procurement Method

Although various types of contract is developed for the modern days' construction projects, this do not reduced the amount of project management works of the project. The works are only passed from the client, architect or engineer to the contractor. Certainly, this give some advantage to the contractor as they can have more room to control the works. However, an experienced project manager is still important in the contractor's organisation to ensure the construction works are carried out effectively. In conclusion, effective project management techniques are required throughout the life cycle of a construction project.

2.7 Summary of the Construction Industry

In considering the configuration of the construction industry today, it is not surprising that the construction industry is based on the procurement process. Therefore, different kinds of projects were carried out with different combination of professionals. This is aimed of optimising the performance of the outcome of construction projects. As construction projects become more complicated, it is difficult for a single discipline of professional to mange a project throughout the whole project life cycle. Therefore, one is required to have general understanding of cross disciplinary knowledge before he can manage various kinds of construction project from inception to completion. Furthermore, different configuration of the project team can be expected under different project procurement methods such as Turnkey and BOT.

In conclusion, with the basic understanding of the properties of the construction industry, the parties involved and the characteristic of different type of projects, the project management knowledge and techniques required for implementation of a project are discussed in the next chapter.

Chapter 3

Chapter 3

3.0 Management of Construction Projects

With the basic understanding of the characteristic and management variables of construction, the key project management aspects to facilitate construction works are presented in the following paragraphs. This included the concept of the generic project management and the project management techniques for construction projects.

3.1 Generic Project Management

3.1.1 *Concept of Project Management*

Modern project management is being considered as a relatively young discipline, Lock [15], Madsen [25] and Karen [26] describe that project management includes the process of planning, organising, directing and controlling available project resources for a short term objective. To be more precise, some project management professional bodies have tried to refine the definition of project management as below.

i) USA, Project Management Institute [14] :

"Project Management is the application of knowledge, skills, tools, and techniques in order to meet or exceed stakeholder requirements from a project. Meeting or exceeding stakeholder requirements means balancing competing demands among:

Scope, time, cost, quality, and other project objectives.
Stakeholders with differing requirements.

- *Identified requirements and unidentified requirements (expectations)."*

ii) UK, Association of Project Management [27] :

"Project Management is a managerial task on project completion in time, within the frames of established budget and according to technical specifications and requirements. Project manager is responsible for achieving project results."

iii) DIN 69 901 (Germany) [28] :

"Project Management is the unity of managerial tasks, organization, technique and tools for project implementation."

Although the definitions are different in the wording, there is a common understanding of project management.

It can be seen that, to achieve the goal of a project within specific constrains, the project management knowledge is a collection of the existing and developing theories of both psychological and scientific management. This is also supported by Voropajev and Pannenbacker [29]. They concluded that Project Management is a specific professional creative activity, based on modern scientific knowledge and technical achievements, aiming at achieving effective results by successful project implementation as purposeful changing.

3.1.2 *Project Management Process*

Although the project manager does not physically carry out the works, with various techniques and knowledge, he manages and facilitates a project throughout its life cycle. Thus, project management can be generalised as the repetitive application of various management techniques and knowledge in the project management processes as shown in Figure 3.1. These basic processes together form a phase of a project, and collectively the project phases form the whole life cycle of a project. These basic processes are further elaborated below [14].

i) Initiating processes — recognizing that a project or phase should begin and committing to do so.

ii) Planning and/or organising processes — devising and maintaining a workable scheme to accomplish the business need that the project was undertaken to address.

iii) Executing and/or directing processes — coordinating people and other resources to carry out the plan.

iv) Controlling processes — ensuring project objectives are met by monitoring and measuring progress and taking corrective action when necessary.

v) Closing processes — formalizing acceptance of the project or phase and bringing it to an orderly end.

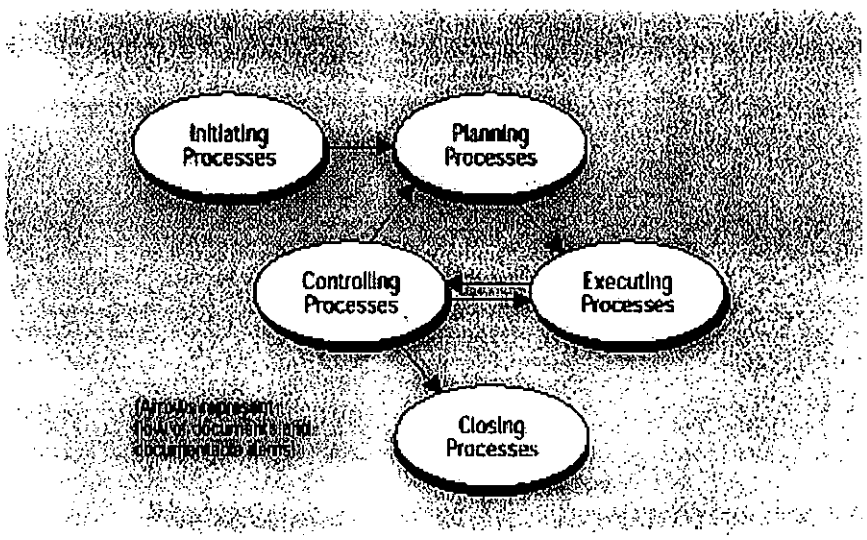

Figure 3.1 - Project Management Process

3.2 Construction Project Management

Although construction project is also a kind of project, it have a relatively longer project life cycle when compared with other types of project such as an exhibition. Therefore, more uncertainties are incurred in construction projects and more efforts are required. In addition, a construction project also have the following properties [16].

i) The project organisation is often temporary and may change in phases
ii) Most projects contain some elements of uncertainty and risk
iii) What happens during one phase of a project often affects the next phase and the end product
iv) Projects are not isolated, they interact with other projects. Their structures and systems are interactive organisationally, technically, economically and socially
v) Projects involve varying parties in different phases

Particularly, in order to avoid any conflicts between the various parties involved in a project, teaming up the participants in a project at all the project phases is important [21]. Furthermore, with the understanding of the properties of construction projects and generic project management knowledge, more specific project management knowledge and techniques can be tailored for construction project at different project phases.

3.2.1 *Construction Project Management Phases*

There can be different division of project phases for different types of projects. Cleland [30] suggested a project should consist of 6 phases while Pelser [31] mentioned a 12 phases life cycle approach. However, most projects are split into four or five phases. Morris [19] suggested, a construction project life cycle should consist of the phases as shown in Figure 3.2, the deliverables completed in each phase and are passed into the next phase for the project implementation.

i) Feasibility — project formulation, feasibility studies, and strategy design and approval. A go/no-go decision is made at the end of this phase.

ii) Planning and Design — base design, cost and schedule, contract terms and conditions, and detailed planning. Major contracts are let at the end of this phase.

iii) Production — manufacturing, delivery, civil works, installation, and testing. The facility is substantially complete at the end of this phase.

iv) Turnover and Start-up — final testing and maintenance. The facility is in full operation at the end of this phase.

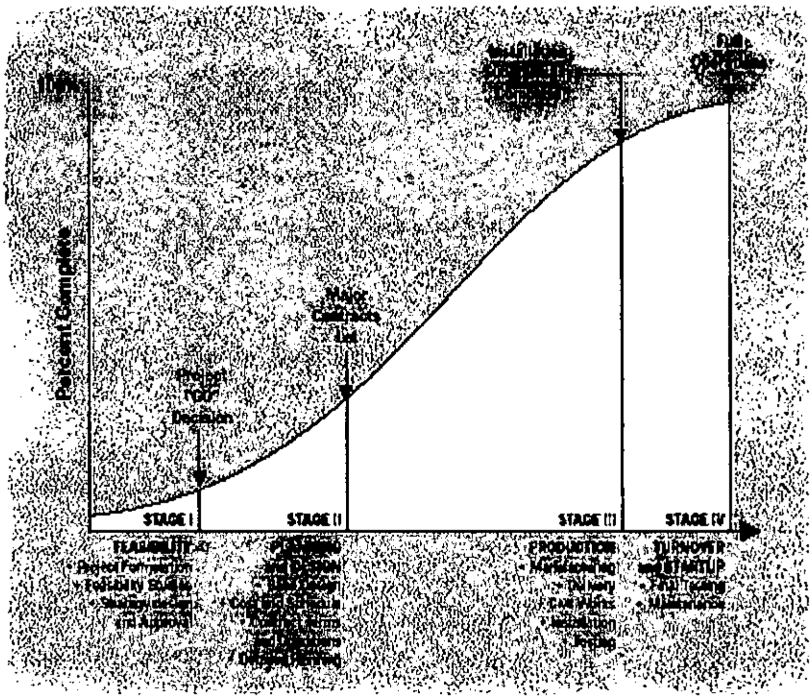

Figure 3.2 - Construction Project Phases

Based on this division of project life cycle for construction project, the properties of a construction project are further discussed.

3.2.2 *Feasibility Study Phase*

The objective of the feasibility study phase is to provide the client with sufficient information to make the decision to proceed with the project. Upon definition of the project objective and need, these are transformed into a project brief and outline design for development. Formation of suitable project team is also an important issue in this phase.

Based on the major deliverables, including the feasibility studies and concept design and cost estimate, a client compares the cost with the value that will be generated. Different alternatives may be reviewed and compared to identify the most cost effective solution. A master project programme is also required to be prepared to identify time required to complete the project, as this will influence the cost and viability.

3.2.3 *Planning and Design Phase*

After the concept is defined in the feasibility study phase, a well-defined description of the project is required. This includes a preliminary design, a budget and a more detailed project programme. Based on the preliminary design drawings supported by the more detailed project programme, the project cost of the project is refined to a greater accuracy. Besides, adjustments and refinement of the construction cost is usually required throughout this phase as the change of project requirements. The design documents such as design calculations and drawings are also prepared in this phase. Therefore, control of the project scope is also required throughout this phase to ensure the project details are incurred in the design. Finally, at the end of this phase, contracts are let for the implementation of the works.

In the planning and design phase, various design documents are required to be prepared. They included the design drawings and the contract documents. During this phase, there are three basic management function required:

i) co-ordinate the design team activities,

ii) prepare and manage the design programme, and

iii) the implementation of an effective cost system.

3.2.4 *Production Phase*

Upon completion of the design and letting of the contracts, the construction of the project follows. Although efforts has been put into the project in the form of planning, design and coordination in the precedence project phases, there are various factors that will affect performance of the works in the production phase. These factors include controllable factors and uncontrollable factors such as inclement weather and fluctuation of material and labour cost. Therefore, in addition to monitor that the works are being performed according to the contract, planning for the risks incurred in the construction is also required.

Moreover, it is important to control the project cost and project progress throughout the production phase of a construction project. Interim project status reports will be necessary to report to the client the project progress, cost status and contingency plans for any possible risks.

3.2.5 *Turnover and Start-up Phase*

In this phase of a project, most of the works are completed except some minor defects to be rectified, and the testing and commissioning works that are required. However, in this phase of a construction project, there are still a lot of paper works to be completed. These include various completion certificates, reports of tests and the documents for settlement of claims, etc. Therefore, in order to accomplish these works, the communication and information management is necessary and important.

In addition, the change control, scheduling of works, planning of project programme and project progress status reports are required throughout the whole project life cycle.

3.3 Construction Project Management Knowledge and Techniques

In general, project management knowledge and techniques can be classified into management area of project scope, time, cost, quality, resource, information, risk and procurement [14,21]. Furthermore, Jain [32] suggested that project management knowledge should further be divided into soft and hard side theories. For example, Partnering and Effective Team Building are typical soft side project management knowledge. Hard side knowledge emphasises on the application of various techniques including Work Breakdown Structure (WBS), Critical Path Method (CPM) and Risk Planning etc. Both soft and hard knowledge of project management should be applied to optimise the outcome of a project.

Therefore, throughout the various phases of construction projects, the combination of various project management theories and techniques forms the complex matrix of modern construction project management knowledge as shown in Figure 3.3. Also, depending on the characteristics of a construction project, emphasis and application of the different techniques and aspects of project management will vary at different project phases. These key project management elements are described below.

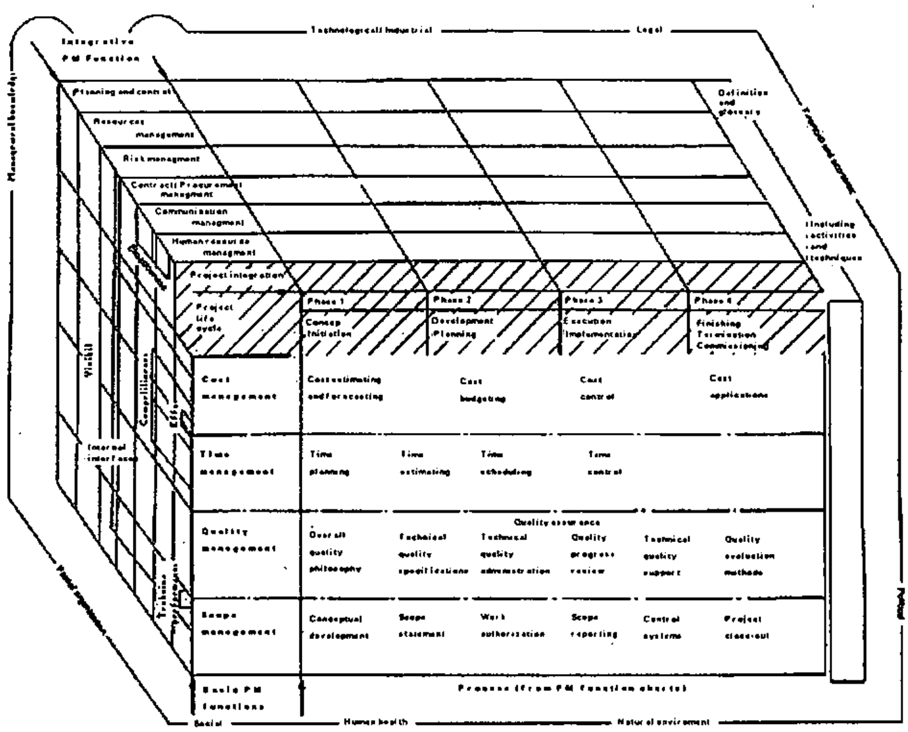

Figure 3.3 - Matrix of Project Management Knowledge

3.3.1 *Project Teaming*

In order to tackle the multiparty property of construction projects, teaming up the project parties is important. Day [33] stated that it is necessary and important to select and appoint the key project team member after the project tasks are defined and the project budget is established in the project feasibility study phase.

The most basic organisational structures include the hierarchy type, the matrix type and the object oriented organic type. As these types of organisational structure are developed to satisfy different organisational environment, they have different strengths and weakness. Therefore, combination of these structures may be necessary throughout the project life cycle.

As the project organisational structure will change throughout the project life cycle of a construction project, it is necessary to ensure a right project team combination is adopted at various phases to facilitate the project progress. It is also suggested that the selection of project team members will require the following considerations [16].

- relevant experience
- technical competence
- appreciation of project objectives
- level of available supporting resources
- creative / innovative ability
- enthusiasm and commitment
- team attitude
- communication skills

Therefore, based in these considerations, the project organisational structure is changed to suit the project needs throughout the phases of a construction project.

3.3.2 *Value Management*

Value management originates from value engineering which is a technique developed by Miles in the General Electric company during the World War II. The technique began as a search for alternative product components with the same function to cope with shortages of some components due to the war. It was later discovered that this process of function analysis produced cheaper overall products without reducing quality [34].

In general, value management address the value process during the concept, definition, implementation and operation phases of a project. It encompass a set of systematic and logical procedures and techniques to enhance project value throughout the life of the facility. Value management embraces the whole value process and includes value planning, value engineering and value reviewing. In addition, the unnecessary functions are also identified in the value management process to reduce the cost of the project. It is also suggested that the value management process shall be carried over throughout the early phases of a project [18].

The basic value management steps followed at different phase in the development of a project are:

a) to determine the functional requirements of the project or any of its constituent parts, (project objective, information/criteria and function analysis). This also helps to reach a mutual understanding on the client's needs, preferences and requirements as well as identify the best options available,

b) to identify alternatives (speculation) and

c) to examine the cost and value of each alternative to enable the 'best value selection' (evaluation and recommendation).

As shown in Figure 3.4, the steps of value management, namely value planning, value engineering and value reviewing can be applied independently or be fully integrated.

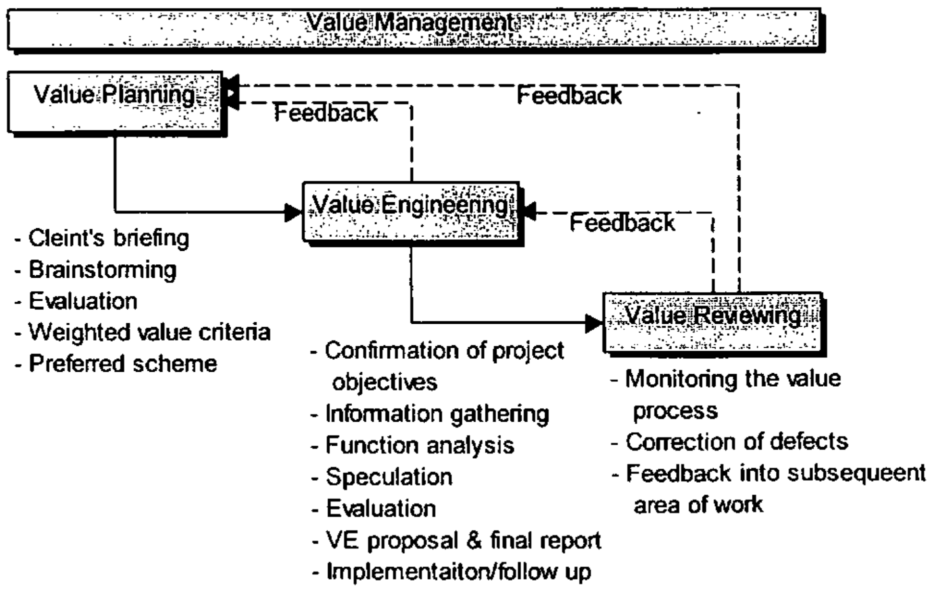

Figure 3.4 - Value Management Process

As typical engineering costs of a remedial action or a plant design are usually in the range of 10-20% of the total project cost, Acharya [35] suggested that value engineering should be addressed at an early stage of a project. It is also suggested that value management will have the highest potential for cost reduction in the early stages of a project. Therefore, value management is necessary to complement the cost estimate at the project planning process.

3.3.3 *Work Breakdown Structure*

In defining the scope of a project, as well as the work to be accomplished to achieve a specified product, Johnson [36], Harrison [37] and Lock [15] agreed that a Work Breakdown Structure (WBS) should be formed for this purpose. In a WBS, a project is broken down into its major work packages or deliverables. These work packages or deliverables are then subdivided into more detailed components, which are then subdivided into activities and, finally, individual tasks. The end result is a project organisational structure made up of different levels, with the overall project at the top of the structure and the individual tasks for each activity at the bottom level as shown in Figure 3.5.

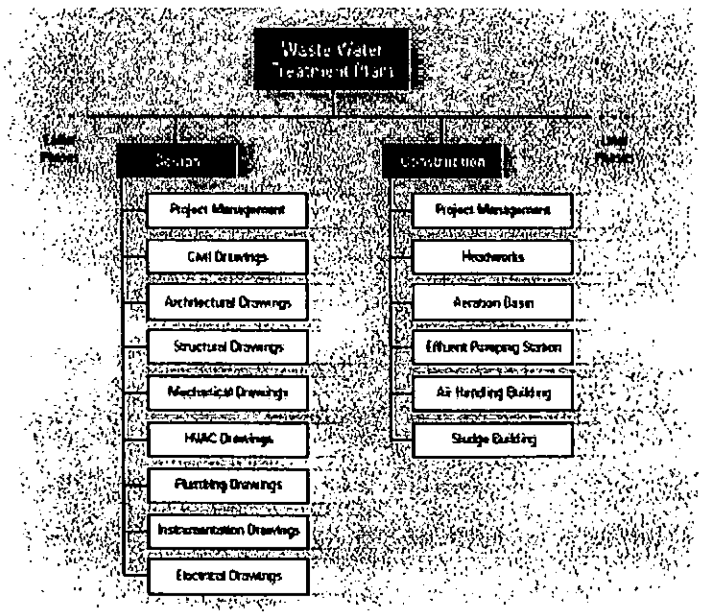

Figure 3.5 - Typical WBS for a construction project

In this "product-oriented" family of hardware, software, services and other work tasks, the deliverables are placed at top level being the output of the tasks or activities of one resource that is delivered to another resource. While the tasks and activities at the bottom are the basic identifiable and quantifiable items of tasks and works that can be measured. At a larger scale, a deliverable can also be an actual output of the project, useful for achieving the throughput for the project. Therefore, by measuring the progress of the identified tasks and activities at the bottom level throughout the project life cycle, the whole project is controlled as well.

Dividing the WBS into deliverables and sub-deliverables, and then having the lowest level as tasks and activities, has a focussing effect on cross-functional team members. As the tasks and activities in the WBS are broken down according to the deliverables, they can be allocated to different functional team members easily and effectively. In addition, with the WBS, a logical, coherent, complete statement of what the project comprises is also provided. It also allows a coding system to be developed which enables cost, schedule, technical and other data to be identified and cross-related across the project. Furthermore, Morris [19]also mentioned that without a WBS it is very difficult to communicate a clear view of the total scope of the project and to organise the various project data in a consistent way. Therefore, a WBS is fundamental to the control of projects scope.

3.3.4 *Task Responsibility Matrix*

The importance of a WBS is also revealed in the formation of a Task Responsibility Matrix (TRM). A TRM is a combination of the WBS activities and the project organisational structure which sometimes termed as a Organisational Breakdown Structure (OBS). From the TRM, the work, tasks and type of responsibilities for each project team member are clarified. As a result, the works of the project at different phases is divided and allowed to be controlled in a more microscopic way.

In addition, based on this TRM, the type of information incurred in a construction project and the required communication channels are also identified. Therefore, the information flow throughout the whole project are also planned and controlled accordingly.

3.3.5 *Works Scheduling and Networks Analysis*

The modern network based works analysis technique included the CPM and PERT are developed from the Gantt Chart. This important project management tool employed for planning and scheduling of works for a project is developed by Henry Gantt at the turn of the century. In the following paragraphs, various network analysis techniques are discussed in detail.

Gantt Chart

The Gantt chart as shown in Figure 3.6 is an important tool employed for the planning of a construction project. In a Gantt chart, bars or time lines are displayed for each activity in a project. This give a clear sequence and durations of the works in a project. Therefore, based on these baseline bars or time lines, the progress of the activities are measured and compared to the planned schedule. By doing so, the project progress is monitored regularly.

Although it is a good scheduling technique for presentation, a Gantt chart does not show the interrelationships that exist between the activities on a project. This limited the Gantt chart to be suitable for a small number of activities. The more sophisticated scheduling techniques, including PERT and CPM, are developed to complement the shortage of Gantt chart in

- scheduling large number of activities.

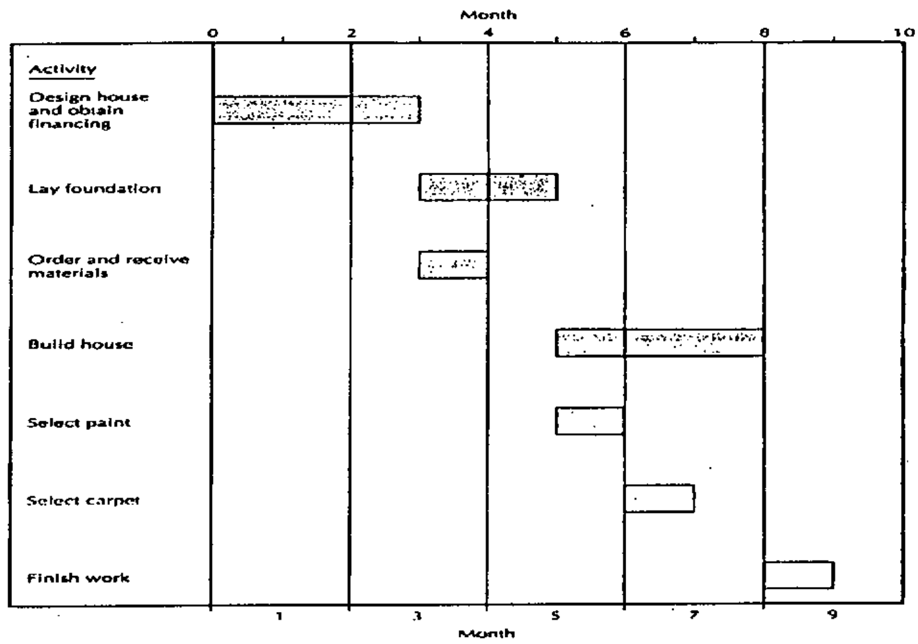

Figure 3.6 - Example of Gantt Chart

CPM and PERT

The critical path method (CPM) and project evaluation review technique (PERT) is the direct successor of the Gantt chart. They are the network scheduling techniques that depict the precedence relationships between activities. They visualise the relationship between the activities in a project which enable a project manager to observe any consequences that will occur when one or some activities are changed. As a result, they are both important tools in the planning and implementation phase of the project life cycle. There is a major difference between the CPM and the PERT technique. The time of activities in the CPM is a single estimated value while PERT employs probabilistic estimated time for the activities. Also, as shown in Figure 3.7 & 3.8, the activity on arrow principle is originally adopted in the PERT while activity on node is employed in the CPM.

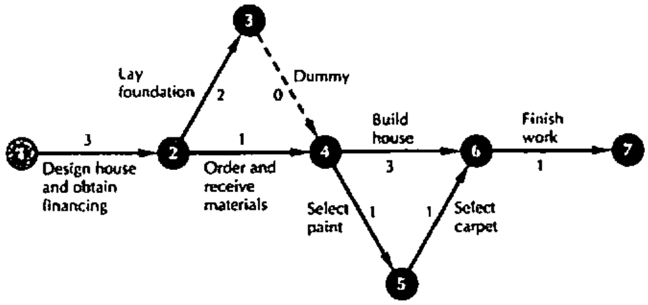

Figure 3.7 - A typical PERT diagram

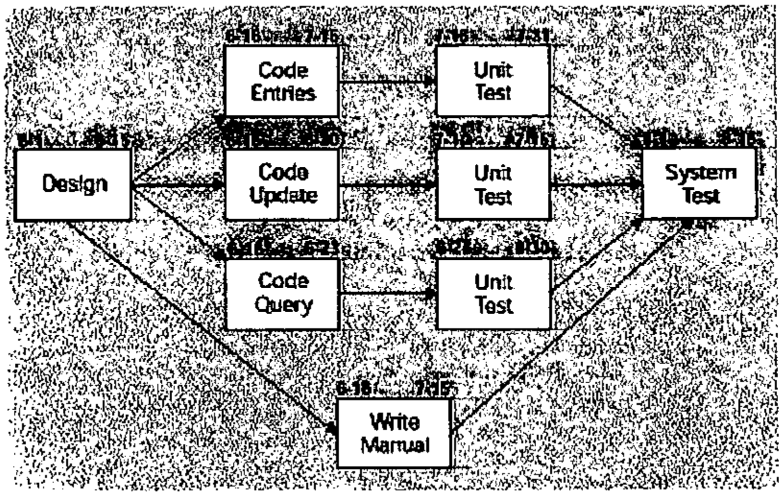

Figure 3.8 - A typical CPM diagram

Multi-level Scheduling

With the basic concept of the WBS and the network analysis techniques, the multi-level scheduling technique is developed. In the multi-level scheduling technique, the level of details revealed in a Gantt chart depends on the need of different project parties. For example, milestone scheduling as shown in Figure 3.9 is important at the owner's level of project control. However, more details are required for a medium and long term schedule, and very detailed activity in a Gantt chart is required for the short term schedule. This gives rise to a nesting system for presenting with the activities to suit different level of needs in different project phases. Therefore, the works of a construction project is planned and controlled throughout the whole project with the repetitive usage of the mentioned techniques.

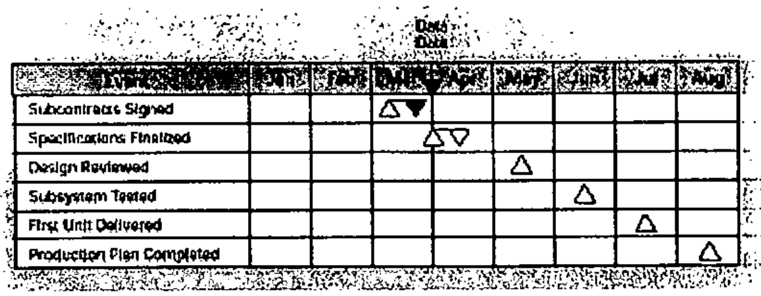

Figure 3.9 - A typical Milestone chart

3.3.6 *Risk Analysis*

Risk analysis is an essential feature of nowadays project management practice [19]. The risk analysis procedure consists of the risk identification and assessment, followed by the elaboration of a strategy to deal with the risk identified. This method helps to minimise the impact of risks incurring on a project by devising possible methods to cater for various risk in different project phases.

In general, risk management will not remove all risk from the project; its principal aim is to ensure that risks are managed most efficiently. The project manager will recognise that certain risks will remain to be carried by the client. This 'residual risk' must be allowed for in the client's estimate of time and cost. It can be said that risk management is not easy, but, as with any complex issue, the task can be approached systematically by breaking it down. Then contingency plans can be derived for these breakdown of project risks.

3.3.7 *Earned Value Analysis*

Earned value analysis, as shown in Figure 3.10, in its various forms is the most commonly used method of performance measurement. It integrates scope, cost, and schedule measures to help the project management team assess project performance. Earned value involves calculating three key values for each activity:

WBS Element	Budget ($)	Earned Value ($)	Actual Cost ($)	Cost Variance ($)	Cost Variance (%)	Schedule Variance ($)	Schedule Variance (%)
1.0 Pre-pilot planning	63,000	58,000	62,500	-4,500	-7.8	-5,000	-8.6
2.0 Draft checklists	64,000	48,000	46,800	1,200	2.5	-16,000	-33.3
3.0 Curriculum design	23,000	20,000	23,500	-3,500	-17.5	-3,000	-15.0
4.0 Mid-term evaluation	68,000	68,000	72,500	-4,500	-6.6	0	0.0
5.0 Implementation support	12,000	10,000	10,000	0	0.0	2,000	20.0
6.0 Manual of Practice	7,000	6,200	6,000	200	3.2	-800	-12.9
7.0 Roll-out plan	20,000	13,500	18,100	-4,600	-34.1	-6,500	-48.1
Totals	**257,000**	**223,700**	**239,400**	**-15,700**	**-7.0**	**-33,300**	**-14.9**

Figure 3.10 - Earned Value Analysis

i) The budget, also called the budgeted cost of work scheduled (BCWS), is that portion of the approved cost estimate planned to be spent on the activity during a given period.

ii) The actual cost, also called the actual cost of work performed (ACWP), is the total of direct and indirect costs incurred in accomplishing work on the activity during a given period.

iii) The earned value, also called the budgeted cost of work performed (BCWP), is a percentage of the total budget equal to the percentage of the work actually completed. Many earned value implementations use only a few percentages (e.g., 30 percent, 70 percent, 90 percent, 100 percent) to simplify data collection. Some earned value implementations use only 0 percent or 100 percent (done or not done) to help ensure objective measurement of performance.

These three values are used in combination to provide measures of whether or not work is being accomplished as planned. The most commonly used measures are:

i) the cost variance (CV = BCWP – ACWP),

ii) the schedule variance (SV = BCWP – BCWS), and

iii) the cost performance index (CPI = BCWP / ACWP).

The cumulative CPI (the sum of all individual BCWPs divided by the sum of all individual ACWPs) is widely used to forecast project cost at completion. In some application areas, the schedule performance index (SPI = BCWP / BCWS) is used to forecast the project completion date.

Performance Measurement, as shown in Figure 3.11, is the generic term for the procedure of integrating cost and schedule control through the use of the three measures BCWS, BCWP and ACWP.

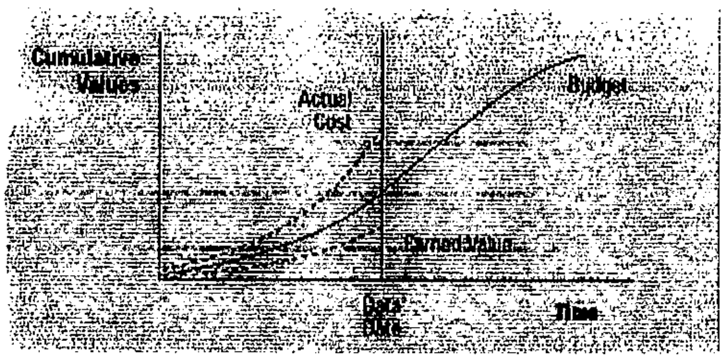

Figure 3.11 - Graphical Performance Measurement

3.4 Summary of Construction Project Management

In conclusion, with the consolidation of the characteristic of different types of construction project, requirements and project procurement method as described in Chapter 2, a complete matrix of construction project management is formed with the combination of the mentioned scientific management techniques. Therefore, with the proper selection and repetitive usage of the project management techniques and theories, the basic requirements of time, cost and quality of a construction project is controlled. Furthermore, though the project management functions required to be performed do not change much in all the construction projects. The focus and emphasis on different techniques and knowledge can be expected in different type of project, such as civil engineering and building development projects.

As the theme of this research is on Chinese construction project management, in the next chapter, a discussion of the current Chinese construction industry, practice, ordinance and management difficulties will be presented. Besides, with the basic understanding of construction project management, the discussion of the suitable construction project management methodology for Chinese construction project will also followed.

Chapter 4

Chapter 4

4.0 The Variables in Chinese Construction Industry

4.1 Background of Chinese Construction Industry

4.1.1 *A Historical Brief*

Detailed literature evidence of construction project management practice in ancient China is difficult to find. However, odd pieces of historical documents show that special government officials were delegated for tasks on palace construction, fortress construction and river improvement, etc [38]. These projects were required to be completed within a specified budget, time and resource. Therefore, it can concluded that construction project management was carried out for the ancient Chinese construction projects.

4.1.2 *Before the Open Door Policy*

In the decades before the Open Door Policy in 1978, the construction practice adopted by the construction industry in China originated from the former Soviet Union. It incorporated a planned economy system and high degree of centralisation. In the practice, most construction projects were financed by the national government as planned. The Government was responsible for allocation of design and construction works to the designers and contractors. Besides, the Government was also responsible for providing necessary construction materials to the contractors. Therefore, the designers and contractors, who were mainly state-owned enterprises, were only the executors of the construction tasks. As funding was fully supported by the central government and the state owned contractors' financial deficit was recoverable from the government, the project teams were therefore not interested in reducing the cost of the project [39].

4.1.3 *After the Open Door Policy*

The implementation of the Open Door Policy has rapidly transformed China from a rigidly controlled, centrally planned economy society to a more vibrant and increasingly market-oriented economy society. The investment in the construction industry by the State-Owned Sector has increased from RMB69.9 billion in 1979 to RMB1,700 billion in 1995 [5]. This represents a nearly twenty-five fold increase in 16 years. Besides, the amount of foreign investment has also drastically increased since the formal announcement of the implementation of the Chinese Socialist Market Economy in 1985. As both the World Bank and Asia Development Bank required that their funded projects to follow the international practice, this initiated some changes in the construction practice in China. In a combination of all these effects, the change in the construction industry has become inevitable.

In order to cope with the changes and bring it in line with the international practice, the Chinese Government has enacted a number of legislative regulations during the early 1990s to enhance the construction industry in China. These included the Government Standard Form of Contract in 1991, the Client Responsibility Ordinance in 1992, the Construction Supervision Ordinance in 1995 and the Tendering and Bidding Administration Ordinance also in 1995. Hence, all the above have brought about the transitional period in the Chinese construction industry. Being a transition for old practice to new practice, it required a period of "learning" and needs time to formulate a more efficient practice for the future. However, as a large number of the projects are still government funded and followed the traditional practice, for such projects the efficiency still varies substantially [40]. In the following paragraphs, a discussion of the development of the construction related Ordinances, practice, and management difficulties are presented.

4.2 Parties Involved in Typical Chinese Construction Project

The practice of establishing a construction projects in China involves the formation of a temporary organisation - Preparatory Office (PO) - which represents the Ministry / Provincial / Municipal Government in administrating the project [41]. As the Government wants to restrict information related to the financial situation and progress of projects, the PO is normally formed by the officers of the Government. These people were responsible for the management and coordination of the project from inception to completion.

4.2.1 *The Preparatory Office*

The PO, acting as the management unit of a project, is responsible for all the necessary functions other than those perform by the design institute and contractor. This included project financial and technical feasibility studies, lay down the project brief, prepare the master plan design, coordinate the design details and manage the construction works, etc. In order to fulfil these tasks, a PO is usually comprised of dozens of people throughout the project life cycle. As the majority of them often lack significant construction management training or experience, the outcome of projects varied. Moreover, after having gained some significant construction management experience, the project crews are usually shifted to the operation or maintenance phases of a project. As a result, the experience gained by these people is not reused and problems kept repeating themselves in successive construction projects [42].

Although the PO system is able to achieve its function in completing construction projects, the efficiency and effectiveness are not high.

4.2.2 *Design Institute*

The design institute in China basically plays the role similar to the architect / engineer (A/E) in the western construction industry. However, a design institute is only responsible for the preparation of preliminary and detailed designs. Its duty terminates as soon as the design works completed. The design institutes system in the construction industry consists of various types of design institutes based on their specialisations, such as petrochemical, transportation and building, etc. This is unlike the practice in the western construction industry where the A/E perform various kinds of designs.

However, the situation is changing slowly in the recent years as some design institutes have started to take up various kinds of design works. Some design institutes are also beginning to send their staff to construction sites to coordinate the design details of construction works during the construction phase of a project.

4.2.3 *Contractor*

The contractor in China is the same as the contractor in the western construction industry. He is responsible for implementing the physical works of a construction project. His duty includes the management of construction site and his own resources including the labour and construction plants. However, unlike the western contractor, the contractor in China is not used to responsible for the procurement of materials which is the duty of the PO for most of the projects. Moreover, the Chinese contractor usually does not carry out detailed planning, such as method statement, before the works were carried out.

In addition, before the implementation of the Provisional Construction Supervision Ordinance in 1988, the contractor was solely responsible for the supervision of construction quality of the projects. In the absence of an independent party to monitor the work, the quality of the works fluctuate.

4.2.4 *Construction Supervision Unit*

The construction supervision unit is a legal requirement introduced since 1988 according to the Provisional Construction Supervision Ordinance. The duty of a construction supervision unit is to supervise the works of a construction project as an independent third party. The aim is that the supervision unit shall monitor various aspects of construction works, including the planning and control of project cost, time and quality. Besides, the supervision responsibility shall span over from project inception to completion. Therefore, this hopefully complement the shortfall of the traditional Chinese construction practice, by bridging the gap between the design institute and the contractor. However, various factors has limited the role of a supervision unit in the construction phase of a project.

4.3 Legislation for Chinese Construction Project

In the early 1990s, the Chinese government initiated some changes in the construction industry to attract more foreign investment. This included the establishment of Special Economic Zones, foreign investment privileges and the legislative regulations that will be further described in the following paragraphs.

4.3.1 *Government Standard Form of Contract*

Traditionally, even for works with large contract sums, very simple forms of contract were used for construction projects in China. These simple forms of contract did no more than cover the bare essentials of the relationships and obligations which exist between the client and the contractor. Therefore, the rights and obligations of both client and contractor were not covered in detail [43].

Owing to the fact that the clients and the contractors were both state-owned enterprises, these simple forms of contract were able to achieve the intended purpose. Other forms of contract have also been used in China. However, they were subjected to review and approval before use at the appropriate government level. Particularly, the international forms of construction contract such as FIDIC was approved on internationally funded projects in which international investors and contractors were involved. Although there was no specific requirement on the forms of contract, the more familiar the contract was to the officials, the easier the process of approval.

In 1991, the State Administration of Industry and Commerce (SAIC) of the Chinese Government issued the government standard form of contract GF-91-0201 for construction works. In most respects, it is more similar to some of the international forms of contract commonly used outside China than those traditionally used within China [44].

This 41-clauses standard form of contract is divided into 10 parts. They include the general conditions that provide the basic rights and obligations of the parties and the special conditions of contract, which follow the sequence of the general conditions, to allow for any special requirements, situations and details. In addition, there is a provision which caters for the appointment by the client of a supervision unit which is not in the traditional Chinese construction practice. However, this provision has a requirement to specify clearly the duties and delegated power of the supervision unit in the special conditions of contract. The SAIC standard form of contract also requires the parties to list those documents that form part of the contract, and the priority of these documents [45].

Although the SAIC standard form of contract is relatively less comprehensive when compared with the FIDIC (1995) or the NCE (1996), it provides more detailed legal liabilities for both the client and the contractor. In addition, the SAIC contract is prepared in compliance with the relevant Chinese legal regulations, such as the Economic Law. Therefore, there should be no government approval problems in comparison with other form of contracts.

4.3.2 *Client Responsibility Ordinance*

The western construction industries are developed primarily within a market economy system, where the clients of construction projects are always facing financial risk. The clients normally reduce the risk by hiring professionals or consultants who "know the job" to provide advice or to manage the projects. In the Chinese construction industry, projects are mostly funded by the Government. The PO is only responsible for implementing a project, without any financial liability. Besides, when the project cost overran the budget, the government would often increase the amount of funding to complete the project. Therefore, an overrun of the project budget was not a major concern.

The Client Responsibility Ordinance announced in 1992 focusses on the Government funded projects. It aims to pass the financial responsibility to the client of a project. Under this new arrangement, the client is liable for the financial responsibility of a project [46]. It is also hoped that by introducing this ordinance, the client will employ a supervision unit to manage a project. However, as a number of projects are still Government, such as major infrastructure projects, the traditional practice is still adopted. Therefore, the effect of this Ordinance is not as significant as expected due to the varied degree of implementation between projects.

4.3.3 *Construction Supervision Ordinance*

The concept of mandatory construction supervision was introduced into China in the 1980's as a requirement of World Bank and Asia Development Bank funded projects. After gaining some successful experience in these projects, the Government acknowledged the advantages of the construction supervision system. Since then, the Chinese government has tried to set up a construction supervision system by implementing the Provisional Construction Supervision Ordinance. The ordinance was enforced in some selected areas including Shanghai, Guangzhou and Shenzhen in 1988 [47].

The purpose of this ordinance was to develop a system that is similar to the consultancy system in western societies. Under the ordinance, the client should employ supervision unit to supervise all aspects of works, such as quality, progress and financial control, in a construction project from project inception to completion. However, with the strong desire to retain traditional practices within which the clients wanted to withhold planning, financial, and project progress information from a third party, the supervision unit was often limited to the quality control of works in construction stage. As the supervising units are not employed to participate in the feasibility study and the preparation of detailed design, a satisfactory performance is not achieved by this Provisional Ordinance [48].

Although the trial of the Provisional Ordinance was not completely successful, it brought about improvements to the construction industry. In 1995, the Ministry of Construction (MOC) therefore enforced the Construction Supervision Ordinance throughout the nation, replacing the Provisional Construction Supervision Ordinance [49].

4.3.4 *Tender and Biding Administration Ordinance*

Construction works in China were carried out by the Government based on a standard cost concept before the 1980's. Contractors were reimbursed the overheads and cost of materials based on the Government's fixed standard price index. The practice of tendering and bidding was re-established in the World Bank and Asia Development Bank funded projects. These projects were required to undergo a public tendering process at an international level. As successful results were observed in these projects, the Chinese government realised the advantage of tendering and started to re-establish the tendering and bidding practice in the construction industry.

The Tender and Bidding Administration Ordinance was announced in 1995. Under the Ordinance, all the construction works are required to undergo a tendering process. The tendering method may be in the form of public tender or short-listed tender. However, the tendering of works shall be reported and registered with the municipal tender administration committee, or provincial tender administration committee otherwise. The Ordinance also sets out the tendering procedures. For example, a joint tender assessment board shall be formed by the client or his representative / PO together with the tender administration committee. Then the board shall determine the tender assessment method such as assessment by tender price only or a combination of the price and tenderer's experience and reputation. Finally, the tender result shall be announced by the board in the registered date and place.

4.3.5 *Build, Operate and Transfer Construction Ordinance*

Build, Operate and Transfer (BOT) projects have been introduced in recent years in China mainly for infrastructure projects such as highway and power plants. Based on the experience of these projects, the BOT Construction Ordinance is enacted in 1997 to regulate the subsequent projects. The Ordinance lays down the requirements and procedures for BOT projects in China.

4.3.6 *Law of Construction*

The PRC Construction Law enforced since March 1998 is a consolidation of most of the previously mentioned Ordinances with some other supplements. The Law has set out most of the major project approvals required for establishing a construction project in China. Although a high degree of Government intervention is still present, the Law codifies the basic requirements and approvals for construction project implementation in China. The Law also reinforces the grading system of the parties in the construction industry, including the design institutes, the contractors and the supervision units. The Law also lays down the legal liabilities which result from violations [50].

4.4 Official Procedure for Construction Projects

According to the procedure of major Government approvals, the development of an industrial project in China can be divided into five major phases. They are the Project Establishment Phase, Land Procurement Phase, Preliminary Design Phase, Construction Drawing Preparation Phase, and the Tendering and Construction Phase.

As shown in Figure 4.1, the progress of these phases are sequential. It is therefore important to secure the required approvals in each phase to prevent any delay to the project.

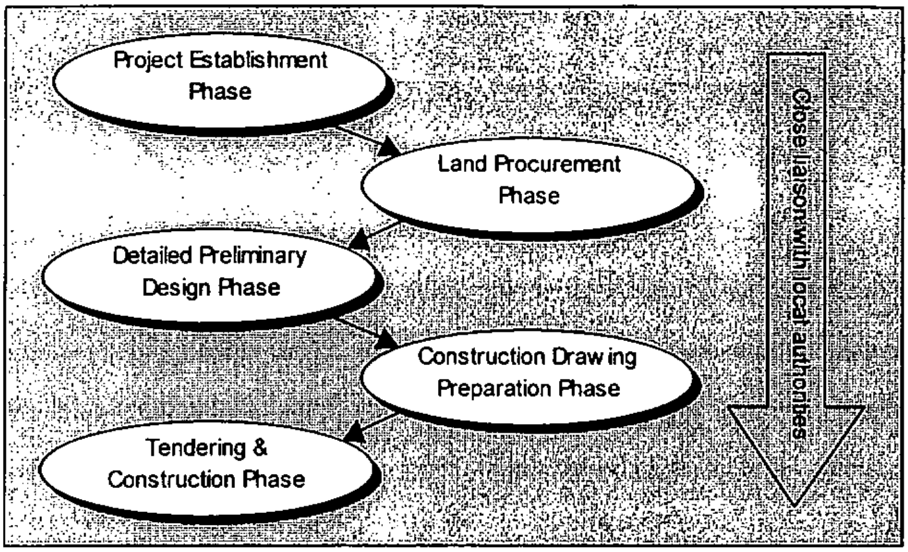

Figure 4.1 Major Government Approval Phases

4.4.1 *Project Establishment Phase*

In the project establishment phase, the economic feasibility is the focus. In this phase, a Project Approval is required from the State Planning Committee or the municipal government planning committee, and a Business Approval is required from the State Administration of Industry and Commerce (SAIC) for the local Chinese project. In addition, an Joint Venture Approval and a Foreign Business License is required from the Ministry of Foreign Trade and Economic or municipal government foreign trade and economic administration department.

4.4.2 *Land Procurement Phase*

In general, the procurement of land in China means procurement of the land usage right, normally for up to 50 years. Although the details required for assessment / approval for land procurement may vary from province to province, a similar process is expected in most areas. In the submission for the land use right, the approved schematic / master plan design is submitted. An environmental impact assessment (EIA) report is submitted for industrial type projects. Finally, the Land Use Right Contract is required to be signed between the Land Administration Bureau and the project owner.

4.4.3 *Preliminary Design Phase*

Upon completion of schematic design and approval of the proposed land, the preparation of the preliminary design follows. In China, the amount of detail required in a preliminary design is almost equivalent to a detailed design except the detailed structural design and drawings are not required in this phase. Separate approvals are normally required from different government authorities. These include the Fire Service Authority (Public Security Bureau) for the fire service design, Environmental Protection Bureau for the environmental protection facility design, Labour Bureau for the operational safety provisions and Hygiene Bureau for the hygiene facilities design, etc.

4.4.4 *Construction Drawing Preparation Phase*

In the Construction Drawing Preparation Phase, the Government procedure is relatively simple. It includes the preparation of structural detailed design and structural construction drawings for the building structures. After the construction drawings are completed, they should be endorsed by a design institute if the design drawing is not prepared by them. The drawings are then submitted to the provincial / city level construction administration authority for construction drawings consent. This process is (normally called the "Construction Application") also applies to the construction of some special items such as pressurised vessels.

4.4.5 *Tendering and Construction Phase*

The tendering procedure for construction works is stipulated in the Tendering and Bidding Administration Ordinance. Methods of tendering such as public or short-listed tender is generally suggested, while nominated contracting is only allowed under some special circumstances. Before carrying out the tendering process, the works are required to be reported and registered with the local tender administration committee. The tender documents are also required to be assessed and endorsed by the committee. Finally, joint assessment of the tenders is required to be carried out by the client or his representative and the tender administration committee. This is to ensure fair and professional selection of the best contractor for a project.

Upon selection of the contractor for the work, the project team is required to issue a Letter of Acceptance to the contractor. Then the contractor is required to prepared a Construction Commencement Report, register the contract with the local construction authority and to apply for the Construction Works Commencement Permit. It is important to note that the Construction Works Commencement Permit is required to be posted outside the site for checking.

The project team is required to engage the Quality Inspection Office which is responsible for periodic checking of the project construction works. This checking includes quality of major items, such as the concrete quality, reinforcement quality, structure workmanship quality and piling completion, etc. Upon inspection and acceptance of each major item, a quality inspection report is issued. These reports are required to be recorded and properly documented. Upon completion of the project, these reports are required to be resubmitted to the Construction Authority to demonstrate the construction works were completed properly. In addition, employment of a construction supervision unit is compulsory for construction projects in China. The function of a construction supervision unit is to ensure the works are carried out in accordance with the contract and the appropriate codes and regulations.

4.5 Difficulties in Managing Construction Projects in China

Despite methods such as quality construction bonus and national construction grading awards being set up by the Chinese Government in the hope that some of the main deficiencies in the construction industry will be eradicated, difficulties in managing construction projects in China still exist. This is mainly because the construction industry has long been developed under a planned economy system. Any effort to change its basic structure requires substantial changes to the established practice, system and the perception of people in the industry. For example, education and training for all personnel from management to the workers level is necessary. Some of the difficulties in managing construction projects in China are discussed in the following paragraphs.

4.5.1 *Difficulties in Contractor Management*

Sometimes, contractors may eagerly lower the price to get a job in order to receive the pre-construction payment, which is a standard practice in China [51], to support other under-fund projects. Although the SAIC form of contract has been introduced since 1991, it is not fully accepted by the industry. In addition, the SAIC form of contract places a high portion of risk on the client. For example, the client is liable for the accuracy of the site investigation information and the contractor is granted the right to claim unforeseeable site obstacles [52]. Therefore, this increases the chances of construction claims by the contractors on unforeseeable obstacles. Thus the claims valuation and evaluation works.

4.5.2 *Government Intervention*

The intervention by Government also imposes difficulties in managing construction projects in China. For example, clients have to submit very detailed business and economic information of projects to the Government for assessment of project feasibility. This lengthy project approval is usually an internal process and rarely required in the western society. Furthermore, under the Tender and Bidding Administration Ordinance, the assessment of tender has to be carried out jointly by the government tender administration department and the client. As a result, the client may not be allowed to award the contract to a competent contractor that has worked for the client for a long time. Also, during the construction phase, it is compulsory to employ the Government Quality Inspection Office to monitor the major construction activities such as final setting of piling. This therefore duplicates the works of the supervision unit.

4.5.3 *Tedious Project Approval Process*

In general, the approval of a project can be divided into 3 stages. They include the project approval, the design approval and the construction approval. Upon receipt of the project approval as mentioned in the previous paragraph, the design details are required to be submitted to different Government authorities such as the Construction Administration Bureau, Fire Service Bureau, Environmental Protection Bureau, Power Supply Bureau, Water Supply Bureau for registration and approval. As the approval process is sequential, this has limited the flexibility of construction projects in China. For example, it is difficult to use methods like Fast-Track construction to shorten the construction period of a project in China by overlapping the design and construction period. Other procedures including the contract document approval, tender document approval, construction commencement and completion report submission, etc. may also hinder the progress of projects as these unavoidable approvals are often lengthy and bureaucratic.

4.5.4 *Perception of Traditional Practice*

Since a large number of projects are still government funded with clients and contractors both being government-owned enterprises, the structure of the construction industry has not changed uniformly in China. The traditional construction practice is still widely adopted. The efficiency and effectiveness of the Chinese construction projects are still not high. The projects with size over RMB5 million are reported having a budget overrun of at least 20% in 1995 [6]. The supervision units are often stopped from carrying out cost and progress control of projects. This has restricted the professional development of the supervision units.

In international practice, the role of supervision unit has traditionally been played by the A/E as the Engineer. This is due to the reason that they have the most detailed day-to-day knowledge of the project. However, the design institutes in China only carry out the design works and are normally not responsible for supervision of the construction works. Although the supervision unit is present to fill this gap between the design and construction team, the performance cannot be expected to meet expectations as the technical and managerial ability of these units is still developing from a very low base. There are only around 60,000 formally trained supervising engineers in China, revealing a shortage of qualified supervising engineers [53]. This also restrained the development of construction industry in China.

4.5.5 *Quality of Contractor and Labour*

In general, most of the Chinese contractors are trade contractors. The technical competence of the contractors at technician level is high as they are normally highly educated and have sufficient technical knowledge in the trade. However, most of the people at worker level are unskilled and a lot of them are not roundthe-year construction workers having construction as their career. As a result, the quality of works is often not guaranteed. Trade contractors also have complex organisations with many people at different levels allowed to give instructions on a project. This hinders the work when instructions being given continuously contradict each other [54].

Construction managers of the contractors are often not given enough authority to make decisions and are not responsible for profit and loss. Therefore, they lack the motivation to carry out the work in the most cost-effective way. In addition, unlike contractors in Hong Kong or other places, contractors in China are not required to coordinate with each other. This has limited their ability to take into account of the needs and expectation of other trades. Hence, this may result in abortive work or poorly co-ordinated sequences of work.

The testing and commissioning process for a project is often not detailed enough, as the contractors have often established good relationships with the government construction departments. Therefore, the approval of construction completion can be obtained easily from the government construction department, without the project being properly completed and all minor defects rectified or even noticed.

4.5.6 *Cultural Effect*

As the construction industry has long been developed under a communist society, the concept of "Build for the Nation" is still assumed, even when a project is foreign funded and invested. Therefore, it has been common for the aim of the local partner in an Equity Joint Venture (EJV) to be the acquisition of modern technology and funding from the JV company for betterment of the nation. This contradicted with the foreign partner's ultimate objective to gain a financial profit from the JV.

In addition, Confucianism also affects the Chinese construction industry legislation. For example, most of the ordinances issued by the national government are only a legal framework. This is to allow the local government and officials, who are assumed to have a high moral and ethical standard, more room to explain and interpret the ordinances. As a result, construction contracts are drafted with the same philosophy and disputes easily arise when the contract conditions are not sufficiently detailed to define the obligation of the concerned parties clearly.

4.5.7 *Other Reported Management Difficulties*

In addition, Tjia [55], Tan [51] and Chau [52] has also reported the following project management difficulties in Chinese construction projects.

Phase	**Difficulties**	**Consequence**
Project Planning Phase	- Bad coordination with government and non-government departments for approval and registrations	- Delay in project approval and construction
	- Not familiar with local conditions and legal requirements	- Underestimated budget and tightened schedule
	- Time consuming tedious project and business assessment process	- Delay in project approval and construction commencement
	- Stringent requirements and constraints	- Delay of business license application and various applications

Table 4.1 - Summary of Management Difficulties in Project Planning Phase

Phase	**Difficulties**	**Consequence**
Project Design Phase	- Slow design approval stage and incompetent design institute	- Delay of subsequent stages
	- The supporting infrastructure and utilities are not fully appreciated	- Lack of traffic support, and utilities supply
Project Tendering Phase	- Typical government conditions of contract too simple and site supervision unit is not included in typical China Conditions of Contract	- Difficult to define liability in case of dispute, require variation to maintain quality, works are not completed accordingly on time
	- Specification is not part of contract, included only are design specification and no workmanship specification	- Workmanship and material quality is difficult to control or refer to a specific standard
	- Too many contractors of unknown quality interested in tender	- Lengthened tender assessment and quality is difficult to guarantee
	- Small time contractor "borrowing" the name of established contractor to enter.	- Quality is difficult to guarantee if incompetent contractor was selected

Table 4.2 - Summary of Project Management Difficulties at Project Design and Tendering Phase

Phase	Difficulties	Consequence
Construction Phase	- Lack of coordination between trade contractors, sequential working procedure	- Conflicts at interfaces
	- A lot of Chinese design specifications quoted are outdated or materials are no longer available	- Increased amount of Variation Order (V.O.), adverse quality of works and delays due to V.O.
	- Failure to coordinate with various parties including government departments and trade contractors	- Delay in project approval and construction commencement approval
	- Complex contractor organizational structure	- Difficult to find the right person to tackle problems, and lengthened problem solving period
	- There is still a large gap between the perception of Chinese contractors and international quality standard	- Sub-standard quality of material and workmanship
	- Contractor is not customer oriented	- Unsatisfied quality and workmanship
	- Unlike in more developed countries, "LD" clause in China is unenforceable. It cannot be used as a weapon to accelerate schedule.	- Resulting in bad relationship with contractor, further delay of construction
	- In simple contracts with trade contractor, material is expected to be supplied by the client	- Increase the work load of the client or project managers to find and coordinate the supply of suitable material
	- Delay due to bureaucratic custom	- Delay in shipping of imported material and process plants
	- Contractors in China commence works after receipt of initial payment	- Delay in project construction commencement

Table 4.3 - Summary of Management Difficulties at Project Construction Phase

Phase	Difficulties	Consequence
Testing and Commissioning Phase	- Often in China, the taking over process is not taken seriously. Government construction authorities often have good relationships with established local contractors.	- Sub-standard quality works are accepted finally
	- During the defect liability period, rectification works may not be carried out as diligently as it should be, because the concept of defect liability is still not serious in China	- Extra cost have to be paid for the faulty works
	- Difficult to find good maintenance crew in China	- The working life of works reduced
	- Developer often has to be very diligent on their own to prevent any breach of regulations especially fire regulation because the product can be used long before any breach is spotted	- Penalty of violation

Table 4.4 - Summary of Project Management Difficulties at Testing and Commissioning Phase

4.6 Summary and Discussions on the Chinese Construction Industry

Although there are many limitations and difficulties in managing construction projects in China, there are many ways to improve the situation. A combination of local and foreign project management expertise is seen as the way to improve the situation, and ensure that projects are managed in a more cost-effective way.

Since the local engineers are familiar with the Chinese construction regulations, submission procedures and local situations, they are therefore able to function effectively in these areas. Foreign construction management professionals are able to contribute their knowledge of modern technology and construction management practices such as project planning, value management, time management and risk management, etc.

However, as the bi-party construction management may increase the project cost. It is eventually essential to establish a training system to train up local construction management professionals.

In addition, as the construction practice and regulations differ slightly between provinces, a better understanding of the national and local regulations is definitely essential. A good relationship with the local authorities is also helpful in seeking advice for approvals, submissions and various government procedures.

It is also important to organise training courses for people in the worker level. Since most of the workers in the Chinese construction industry are undereducated, a training for the workers by trade will enable them to handle new techniques better and have a thorough understanding of the quality requirements. Hence, the quality of the construction projects would also be improved.

As the construction material industry develops in China, the greater use of locally available materials will also help a project to progress smoothly, as the lengthy importation, taxation and testing procedures for imported materials and equipments will be greatly reduced.

To build up the understanding of the current Chinese construction industry, and the practice and management difficulties outlined in this chapter, and the case studies of two foreign invested Joint Venture (JV) construction projects are given in the next chapter. Comparison and analysis of the two projects is carried out to see how the construction management difficulties are resolved by the project management teams.

Chapter 5

Chapter 5

5.0 Analysis of the Variables of Construction Projects and Practice in China

In the previous chapters, the general variables of construction projects in China and internationally are discussed. In the following paragraphs, an in-depth comparative analysis of two commercial projects is carried out to review the reasons behind problems occurred and the good project management practices. In addition, a summary of the problems and aspects of Chinese construction projects as seen by the construction project practitioners in China is also given.

5.1 Problems as seen by Local Practitioners

In general, problems were recognised by both the academic and the industrial practitioners in the Chinese construction industry. However, these problems were difficult to solve due to various reasons. In the following paragraphs, based on the interviews and discussions, these problems as seen by the local Chinese practitioners are discussed in brief.

5.1.1 *The Problems*

Generally speaking, the scholars of the construction industry see that the major problems in the industry include the following:

i) unbalanced development between practice and legislation;
ii) construction supervising engineers are usually in-experienced;
iii) insufficient training provided for the construction supervising engineers;
iv) no standardised project management practice for construction project implementation;
v) quality of contractor is variable.

While the practitioners in the industry agreed that contractor's quality is one of the major problems, they see the problems that limit the development of the construction project management to also include the following:

i) though having limited knowledge on construction, the client frequently interferes in the supervision of construction works;

ii) the client restricts the supervising engineer's role to only the quality control aspect.

5.1.2 *The Possible Solutions*

In order to solve these problems, training courses are organised by universities to improve the quality of the construction practitioners. In addition, different ordinances are issued by the national government to standardise the construction works and procedures. They include the following:

i) the Ordinance of Client Responsibility;

ii) the Tender and Bidding Administration Ordinance;

iii) the Construction Supervision Ordinance;

iv) the Construction Law.

However, as the Chinese construction industry is still in a development stage, the outcome of these methods varies.

5.2 An In-depth Comparison and Analysis of Two Projects

Different methods initiated by the Government and local industry practitioners are discussed in brief in the previous paragraphs. In the following paragraphs, an in-depth comparison and analysis of two foreign invested construction project is carried out. Through the comparison and analysis, the effects of construction project management techniques employed in these Chinese construction projects are reviewed.

5.2.1 *Selection of Projects*

In order for a meaningful comparative study to be carried out, careful selection of the projects is required. In the first instance, the projects environments such as procedural requirements and local construction practice should not be completely different. In addition, this ensures that the comparison is based on the similar and limited number of project variables.

Although the type of management works required for different sizes of project does not vary extensively, the comparisons of similar scale development will increase the comparability of the projects.

Finally, the comparison of similar type of projects would be beneficial to the study as the project management approach may vary a lot between different types of projects. The projects for the comparative study were selected with the above mentioned criteria.

The two projects selected were foreign-local Joint Venture (JV) facilities to produce dairy products. They are both located in the Guangzhou Economic and Trade Development District (GETDD) of Guangzhou in China, and both involved investment of less than US$30 million. Therefore, the project environments, scale and type are similar for both projects.

5.3 Description of the Target Projects

5.3.1 *Mead Johnson China Blending and Canning Facility*

The Project

The Mead Johnson facility is located in the Dong Ji District of the GETDD. It is an investment by the Mead Johnson Nutritional Group in China through the formation of an Equity Joint Venture (EJV) company with the Guangzhou Municipal Yue Xing Enterprise Group and the Guangzhou Economic & Technical Development District Commerce and Service General Corporation. The total investment is US$29.6 million in phases with US$17 million in the first phase and the project was managed by Scott Wilson (HK). A 50 years EJV agreement is formed between the foreign and local partners.

The plant is designed to produce dairy product including Enfamil, Emfapro and O-Lac, etc. With imported milk powder as the major raw material, the plant is designed to have a throughput of 15 thousand tons of the nutritional products annually. The products are primarily to be sold in China. The plant is located on a 6 hectare site with the initial phase covering a floor area of 13,000 m^2. In addition to the process and packaging area, the project includes facilities such as warehouse, laboratories, corporate offices, canteen, staff amenities, recreation and training facilities. The planning and design phase began in November 1992, the construction works commenced in December 1993 and the project was substantially completed in May 1995. The production trail run of the project was commenced in March 1995. However, the commercial production was originally scheduled in March 1995, and the commercial production did not start until September 1995 due to various reasons.

The Project Manager

Scott Wilson (HK) was the project manager for the construction of the Mead Johnson project. Scott Wilson (HK) is part of the worldwide Scott Wilson (SW) consultant group which has over 50 years of history as an independent construction consultant. The company provides a wide range of integrated engineering, project management, planning and environmental services to a wide range of projects for the built and natural environments. Typical examples included transport planning, buildings design and construction, industrial facilities construction project management, rural and urban development, and the environment protection facility design and construction, etc. Professionals in the group included project managers, town planners, urban designers, civil, structural, and geotechnical engineers, environmental scientists, transportation planners and economists, etc. This therefore enables SW to undertake various kind of tasks from initial feasibility studies to full design and management of multi-disciplinary projects.

5.3.2 *AnChia Milk Products*

The Project

The AnChia project is an investment of the Milk Products Holding (SEA) Ltd. and the GETDD East-West Investment Service Ltd. The total registered investment of this project is US$8 million. As in the Mead Johnson Facility, a 50 years EJV agreement is formed between the foreign and local partners.

The plant is designed to produce sliced cheese and instant full cream milk powder sachets. The raw material is primarily sourced from New Zealand, the USA and Germany. The plant is designed to have an annual production capacity of 3,000 tons sliced cheese and 9,000 tons milk powder sachets initially. The products are to be sold primarily in China as well as in Hong Kong. The plant is located on a 16,000 m^2 site with the initial phase covering a floor area of 4,000 m^2 at two levels. The facilities in the project included production plants, storage, office, canteen, utilities, workshop and boiler room. The project planning and Government approval phase started in February 1996 and was completed in March 1998, although the production plant was able to undertake a trial run in December 1997. Commercial production was originally scheduled in December 1997.

The Project Manager

The AnChia was project managed by Lend Lease (China) and SW (HK) being the sub-consultant for early project establishment procedures in China. Lend Lease (China) is a branch of the multi-disciplinary international company Lend Lease Corporation. The Australia Corporation have disciplines of property development, investment service and various management service, etc. Particularly, Lend Lease (LL) have a strong capability in the civil engineering works. The company has over 30 years of experience in the construction industry from project development through to construction, and commissioning. In addition to the complete package of disciplines required to run a construction project, LL is also able to finance the projects and act as the main contractor. Therefore, this allowed LL to have more flexible capability to undertake different kinds of construction projects.

5.4 Comparison and Discussion of the Project Management Practice and Operation

There are various factors affecting the chance of successful completion of a construction project. They included both factors which are controllable and uncontrollable. To address the controllable factors, Madsen [25] stated that a project management process should be adopted. This process should comprise of 1. Planning, 2. Organising, 3. Staffing, 4. Direction, and 5. Controlling. This suggests that a well planned and managed project with a good organisational structure and competent staff will have a higher possibility of success. Therefore, some of these project management principles and methodologies adopted in the two projects are discussed and compared. They include :

i) Project Teaming;
ii) Project Scope Definition;
iii) Project Works Planning and Control;
iv) Project Cost Management;
v) Project Communication, Information Management and Progress Report;
vi) Project Works Coordination and Quality Control, and;
vii) Project Works Procurement Management.

5.5 Project Teaming

Construction is a labour-intensive industry, the management of staff and operations is critical to the success of any construction projects. Morris stated that projects are ultimately managed by people [19]. The organisational structure of a project team directly affects the communication and compliance relationship. Therefore, setting up a proper organisational structure for a construction project is essential to control and carry out the project effectively. In the following paragraphs, a comparison of the organisational structure of the project teams is carried out to reveal this underpinning project management principle in the projects.

5.5.1 *Project Teaming in Mead Johnson (MJ)*

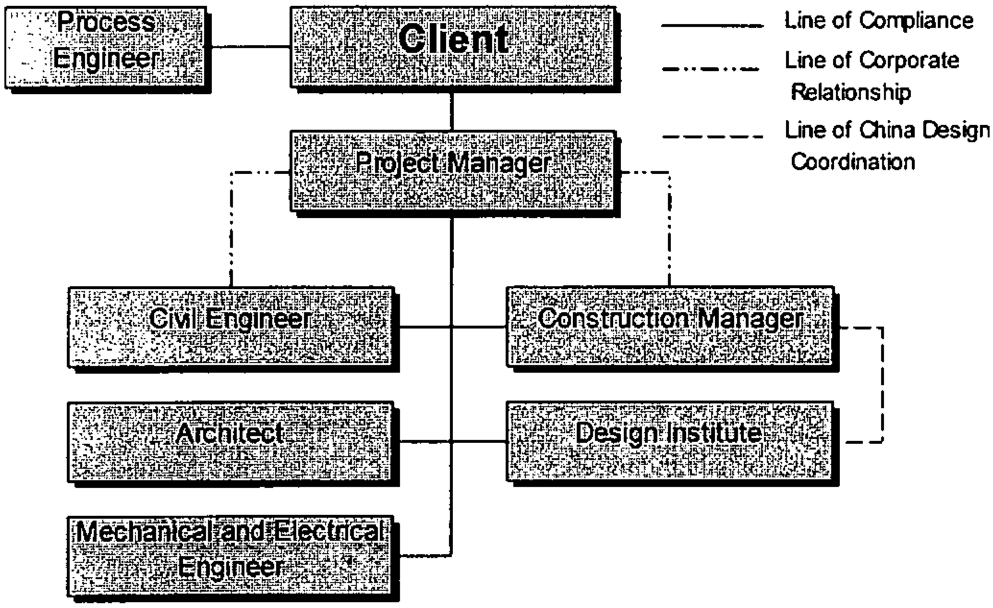

Figure 5.1 - Project Team of MJ at Pre-construction Phase

Figure 5.1 illustrates the project team organisation of the MJ project at the project planning and design phase. The solid lines are lines of compliance and formal communication. The civil engineer (CE) and the construction manager (CM) are in the same corporation as the project manager (PMgr). As they used to work together in a team, this therefore gave an advantage to the project. In the project, a turnkey specialist contractor was appointed by the Client to prepare the processes and plants design based on his specification. As a sub-consultant in the project organisation, the architect was responsible for the architectural design, and the electrical and mechanical (E&M) engineer was responsible for the mechanical, electrical and building services design. They were both Hong Kong based company with international and Chinese project experiences. In the project team, the local design institute (DI) was responsible for the detailed structural design and endorsement of the various design documents. In addition, the CM was responsible for the coordination of design details with the DI and carry out various local Chinese procedures before the construction phase commence.

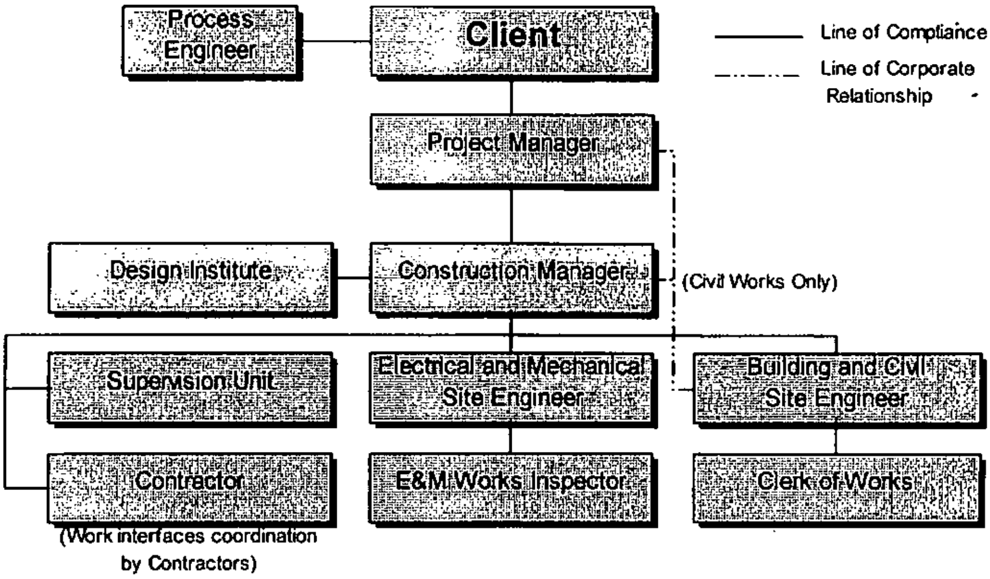

Figure 5.2 - Project Team of MJ of Construction Phase

Since the nature and the requirements of work was changed as the project moved into construction, the project team organisation also changed. As shown in Figure 5.2, a supervision unit (SU) joined the team under the CM due to this being a compulsory government requirement. In the construction phase, the site engineers were recruited for the supervision of specific types of works. In particular, dedicated from the E&M sub-consultant, the E&M site engineer was responsible for the supervision of both the E&M works and the process plant connection servicing works. The process specialist turnkey contractor was responsible for the construction and coordination of the process plants construction.

Furthermore, though the DI, the SU and the contractors were directly contracted with the client, in forming the team, they were under the compliance of the SW project management team.

5.5.2 *Project Teaming in AnChia*

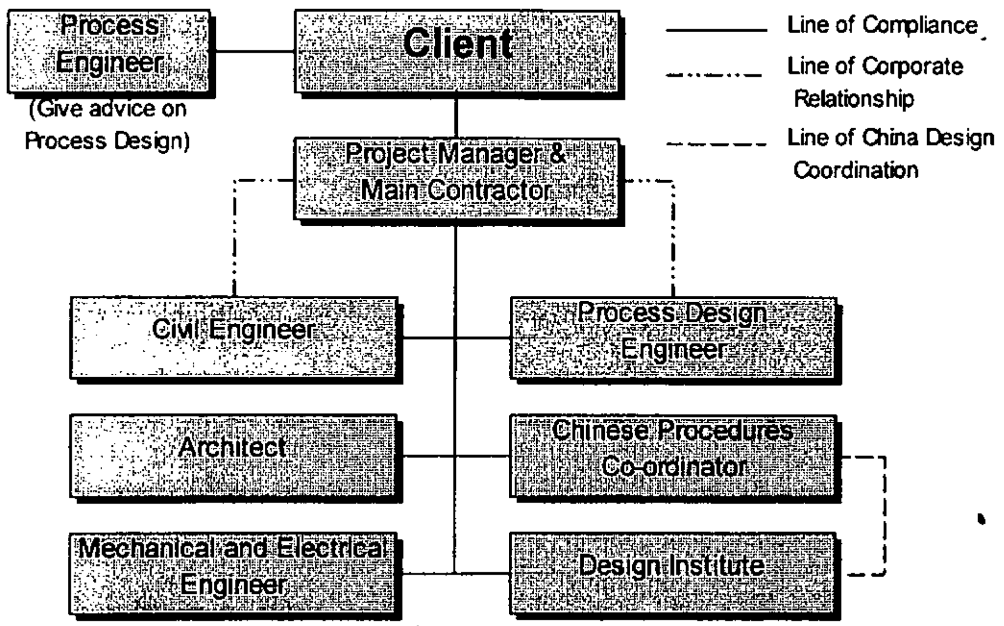

Figure 5.3 - Project Team of AnChia at Pre-construction Phase

The project team configuration of the AnChia project at the planning and design phase is shown in Figure 5.3. The PMgr, the CE and the process design engineer (PDE) are in the same corporation. Although, the client have an internal process design team, the process design engineer from the project management team complement the Client's design from a contractor point of view. This gave the project an advantage as process design is one of the most important part in building an industrial facility. Besides, an alternative process design proposed by the LL project management team was accepted by the Client. Therefore, the process design was finally prepared by the LL team with the Client's in-house specialist to give advice on the process design.

In order to keep up to the international standard, the sub-consultants which included the architect and the E&M engineer were both Hong Kong based company with international and local Chinese experience. Initially, a Chinese procedure coordinator was appointed by the Client to facilitate the local Chinese project procedures and approvals. The Coordinator was also responsible for design coordination with the local design institute.

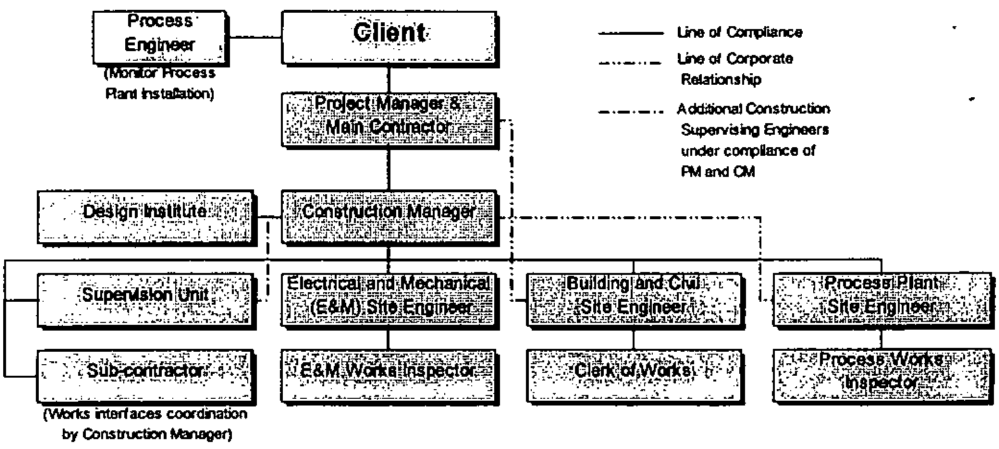

Figure 5.4 - Project Team of AnChia of Construction Phase

In the construction phase, the project management team of the AnChia project comprised mainly of the professionals from LL. This, however, excluded the E&M site engineer which was dedicated from the E&M sub-consultant, and the local Chinese design institute and part of the supervision unit. Therefore, as shown in Figure 5.4, this allowed a better coordination of works within the project management team. Besides, additional construction supervising engineers were employed from the SU to carry out the construction supervision works during the construction phase.

The sub-contractors, the DI and the SU in the AnChia project were directly contracted with the LL team. This enabled a relatively simple relationship be maintained between the LL project management team and the sub-contractors, the SU and the DI.

5.5.3 *Comparison and Discussion of the Project Teaming Approachs*

In the MJ project, it could be revealed from the organisational structure that a typical consultant managed construction project setup was used. Although delay of drawings production by the DI was experienced, the project configuration worked well in the planning and design phase as most of project team members were internationally experienced. However, more problems were experienced at the construction phase. This is because the main contractor was not experienced in full responsibility of work coordination between different work interface. Therefore, though the SW team was not contractually responsible for the work coordination between contractors, a large portion of the civil engineering work coordination was carried out by the SW team. Besides, interference of the selection of main contractor by the local JV partner also undermined the operation of the project management organisation. In addition, the independent supervision by project manager or engineer works well in the western society because the contractors are usually competent enough. However, the Chinese contractors regard the independent project mangers or engineers as having a purely advisory function and their advices are allowed to be neglected.

In the AnChia project, the project manager adopted a setup of main contractor as he was also the main contractor of the project. Similar the MJ project, the project organisation worked well in the planning and design phase. By sub-contracted all the works which he was not expert in, the LL team focused on the process design, the associated facilities and the buildings in forming the whole project. For example, at the design phase, SW complemented the LL team in lacking of knowledge on Chinese project procedures and approvals. This allowed the works be completed in an efficient way, and the deficiency of the LL team complemented. Furthermore, during the construction phase, LL employed additional supervising engineers from the SU and provided the supervising engineers with the proper training. This allow the construction works be supervised by experienced local engineers who understand the practice of local contractors. Moreover, as the sub-contractors were directly contracted with the LL team, this enabled the LL team to control the sub-contractors directly through a flexible payment system. Despite the construction works execution parties were termed as contractors and sub-contractors in the two projects, they were the approved contractors in the GETDD.

In conclusion, the project teaming approach in both the projects are effective. In particular, the works of inexperienced area were sub-contracted to the specialist in the respective area.

5.6 Project Scope Definition

Project scope definition is vital in the beginning of all kind of projects. In the following paragraphs, the project scope definition methods adopted in the two projects are compared and analysed.

5.6.1 *Project Scope Definition in Mead Johnson*

In defining the project scope of the MJ project, the client was required to fill in a set of questionnaires and forms. In the forms, the client was requested to select the rooms to configure the buildings. This included the number, size and types of rooms. Besides, a brief requirements of the electrical, mechanical, ventilation and architectural finish was also determined when the forms and questionnaires were filled in. Since the production and process plant design was prepared by MJ's specialist turnkey contractor. Therefore, coordination with the turnkey contractor for the layout, dimension, mechanical and electrical requirements of the plants was carried out prior to the commencement of the project. Furthermore, the details of the production waste generation was also determined for the design of the waste treatment system.

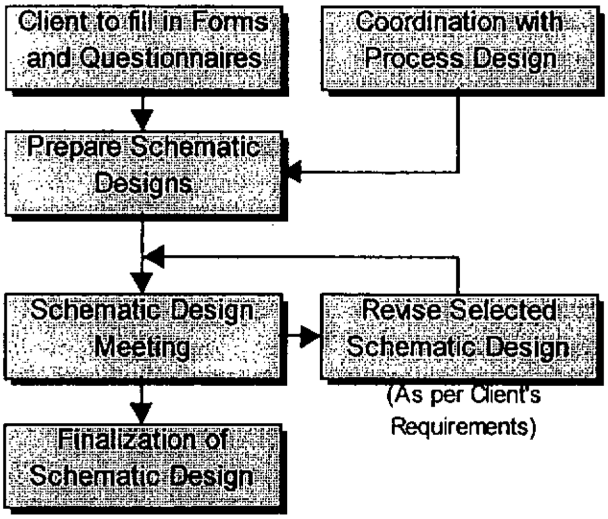

Figure 5.5 - MJ Project Scope Definition Procedure

As shown in Figure 5.5, after collection of all the basic information of the project, schematic designs which included the buildings and rooms layout were prepared by project manager for comparison and selection. Then, based on the schematic design selected in schematic design meetings, the design details for ventilation, electrical and architectural finishes were also determined for the project. Finally, these details were transformed to project documents including drawings and specifications for construction.

5.6.2 *Project Scope Definition in AnChia*

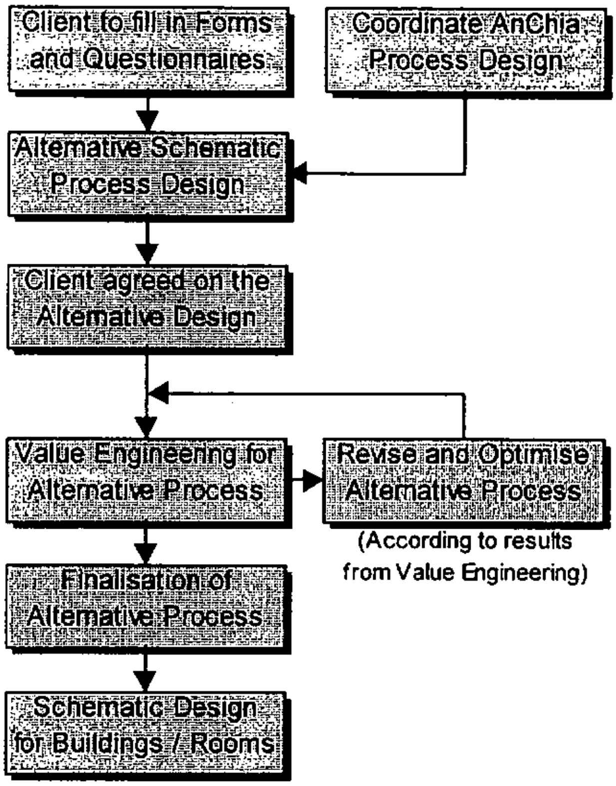

Figure 5.6 - AnChia Project Scope Definition Procedure

A similar procedure was also adopted in the AnChia project to determine the project requirements and specifications. As shown in Figure 5.6, the AnChia client was required to fill in questionnaires and forms for determination of the project requirements. However, an "insides out" approach was adopted in the AnChia project. Upon the client accepted the proposal to prepared an alternative process design, the LL team prepared an alternative process for the project based on the process and process plant functional requirements gathered in the forms and questionnaires. Finally, upon the acceptance of the alternative process design, a value engineering session was carried out to optimise the alternative process design.

After the process design was completed and optimised, the schematic design for the building and the rooms were then prepared based on the optimised plant layout. In addition, the schematic design for all the required supporting facilities were also prepared based on the optimised process design. At last, the design details and requirements were transformed to specifications and drawings.

5.6.3 *Comparison and Discussion of the Project Scope Definition Approaches*

In defining the project scope of the construction projects, the typical approach by asking the client to fill in set of questionnaire was adopted on both projects. Then, based on the information, requirements and functional details from the client, the schematic designs for the projects were prepared. However, in the AnChia project, an alternative proposal for the process design was also prepared by the LL team. Then, based on this alternative design, a value analysis session was carried out to optimise the cost effectiveness of the process and reduce the cost of project.

Although both the method started with the same initial step for development of the project scope, and they were able to achieve the intended purpose in defining the project scope, the procedure adopted in the AnChia project was more successful in producing a lower cost solution. This was primarily because a value management / analysis session was adopted. This optimised the process plant design, and most of the unnecessary or secondary elements were removed or reduced in size. This resulted in the leanest project configuration whilst still fulfilling the required functions for production. In addition, the required land area for the project was also reduced.

However, the effectiveness of this approach is limited if the client wanted to have most of the control. This was happened in the MJ project as the client completely defined project initially. Therefore, value management was not incurred in the project and there was no interaction between the building and the process design for optimisation of the project scope and project cost.

In addition, though the project definition approach adopted in AnChia is relatively more successful, the project scope definition process required specific process knowledge which is not available to most project managers. Therefore, in order to take full advantage of value analysis in specialised construction projects, alliances of different categories of expertise are required.

5.7 Project Works Planning and Control

Upon defined the scope and task of a project, it is necessary to plan and schedule various kinds of works to complete the project task. The project planning as well as the works progress controlling techniques adopted in the projects were discussed and compared in the following paragraphs.

5.7.1 *Works Planning in Mead Johnson*

In planning and scheduling the project works for the MJ project, a master programme was prepared for the project in the early stages of the project. The major works items were set out in the master project programme initially. These items included various studies, reports, approvals, design works, document preparation and constructions works. The respective duration which acted as the baseline for each activity was estimated by the project manager based on his own experience. In the subsequent phases, the project programme was expanded to reveal and include the more detailed works. For example, the foundation works was expanded to include the pile driving, pat foundation construction and driving of vertical soil drains. Throughout the project life cycle, the activities were controlled according to these baselines set out in the beginning and different stages of the project. The activity duration and sequence were also revised to reflect the actual progress of the project.

5.7.2 *Works Planning in AnChia*

In the AnChia project, a similar process for the project programme planning was adopted. The major project activities were first set out in the master project programme in the early stage of the project. Then the project manager identified more detailed works activities and scheduled these activities in the subsequent project phases. Furthermore, the resource based detailed project works programme, which also called the project rolling programme, was prepared by LL for all trade packages and updated in a monthly and quarterly interval. Since these rolling programmes were planned and scheduled according to the available resource of LL and the sub-contractors. Therefore, this allowed the details of works and activities be reflected and planned in a more scientific and effective way. This also made the project programme in AnChia planned to cater for both long and short term needs of resources. Thus, provided a more accurate works activities duration estimation.

5.7.3 *Comparison and Discussion of Works Planning and Control Methods*

The procedure for setting up the project programme in both projects were similar. Both of the project included the formation of the project master programme which acted as the cornerstone for project progress control. Then, based on the project master programme, the more detailed works or activities were identified and scheduled in the more detailed project programme. Finally, based on these detailed project works programmes, the construction work progress was measured and controlled.

However, a better project programme planning and control mechanism was built into the AnChia project. There are several reasons contributed to this result. In the first instance, the project manager (LL) in the AnChia is a contractor based entity. Therefore, he is in a better position to accurately estimate the activities duration and schedule the activities in a more workable sense.

Both long term and short term works were planned and catered for the projects, moreover, more control points were placed in the AnChia project. Also the rolling programmes that shall be prepared by the contractors was badly or not prepared in the MJ project. While in the AnChia project the rolling programmes for all trade packages were planned and scheduled by LL at various project phases. Therefore, the focussing effect of the rolling programmes on the project works was incurred in the AnChia project. In the highest level, the master project programme gives a global view on the milestones and key dates to be met throughout the project life cycle. While in the quarterly scale, a medium time scale, the project rolling programmes give a brief review on the resource available and needed to fulfill the on-going tasks. In the shortest time scale which have a monthly scale, the rolling programme was planned to meet the immediate works details and the short term resource needs. Thus, this provided a more accurate works activity duration estimation, activity scheduling and a better project control mechanism.

Although the project programme planning and control mechanism adopted in the AnChia project is a better approach, this required a project manager to have vast experience in different construction activities. Besides, the project manager is required to have very detailed information on all the available resource for a project, which is difficult to achieve in the MJ project by a consultant based project manager. In other words, extensive effort is required for a consultant based project manager to gather the necessary information to plan a rolling programme as in the AnChia project.

5.8 Project Cost Management

In addition to the project scope definition and the project planning, the cost management strategy adopted in a project also directly affects the way that a project is operated. This project management factor is to be discussed in the following paragraphs.

5.8.1 *Cost Management in Mead Johnson*

The management of project cost can be broken down into project cost estimation and cost control. In estimation of the project cost, the project was broken down into various cost centres based on the buildings and the building elements such as foundation, superstructure and E&M plants, etc. Then the cost estimation of these building elements were set out in HK currency and Renminbi (RMB). The HK currency estimation consisted mainly of the imported material and RMB for the locally available material. Besides, 15% contingency was allocated for the sub-total of the two currencies. Finally, the total project cost estimation was summed up in HK currency based on the market RMB exchange rate.

In controlling the cost of construction, the contractors were only paid by the client after the SW team assessed the portion of payment and issued a payment certificate to the client. Normally, a 30% of pre-construction payment was issued to the contractor upon signing of contract, due to this being a local construction practice. Upon the contractor's submission of request for payment, the subsequent interim payment was certified after the CM assessed the contractor's works progress was according to the contract details requirements. For example, a payment of 10% of contract sum after the works were 40% completed.

5.8.2 *Cost Management in AnChia*

Although the project cost estimation of the AnChia project was not known in details, a breakdown method with the support of value management could reasonablely be expected. That is the project cost was split into the cost estimation of HK currency and RMB based on the cost estimation of the smallest breakdown items. Then a contingency, say 15%, was added to the total project cost estimate.

In controlling the construction cost and payment of the project, the LL team adopted a different and more flexible method. The payments were made to the contractors in monthly, bi-weekly, or even weekly basis depended on the works progress and financial need of the sub-contractors. Therefore, this smoothen the cash flow of the project by having a relatively small amount of interim payment throughout the project. Besides, this encouraged the sub-contractors to complete the works as soon as possible to get their payment on time.

5.8.3 *Comparison and Discussion of Cost Management Techniques*

In estimating the project costs, similar mechanisms were adopted in both projects. However, different project cost controlling mechanisms were adopted in the projects. In the MJ project, the SW team played an independent project manager role. Therefore this limited the SW project management team to adopt a relative passive and indirect cost management system. In this project configuration, he could only certify the payments upon receiving the contractors' request and wait for the client to issue the certified payment.

On the other hand, the LL team was acted as both the project manager and the main contractor of the AnChia project. Therefore, he adopted a flexible and pro-active payment system for the project to encourage the sub-contractors to carry out the works more effectively. This allowed LL to foresee the payment based on the rolling programmes, and smoothened the cash flow throughout the project life cycle.

In conclusion, the cost control mechanism adopted in AnChia required the project manager to have great freedom in the selection payment methods which is not possible in most of the projects.

5.9 Project Communication, Information Management and Progress Report

Throughout the life cycle of a construction project, there are various kind of information required to be communicated. This included the design details, the works progress details and the budgetary details. In the following paragraphs, the information management methodologies adopted in the projects are studied.

5.9.1 *Information Management in Mead Johnson*

In addition to the responsibility for setting up the team with suitable team members and plan the works for the project, the SW project management team was also responsible for other project management activities. They included :

i) setting up and maintain a proper communication channel, and the team was also acted as the point of contact for the client.

ii) organise meetings to communicate various kind of information, such as the design information and construction details, etc.

iii) project progress and budgetary control throughout the project.

The formal communication channel was incurred in the organisational structure of the project team. The project manager was acted as the central coordinator for all types of information from design details to contract details and cost estimation, etc. This involved setting up of a proper information filing system and communication procedure. The filing system adopted in the MJ project was primarily a numbering system. This involved indexing the information according to the respective category such as Contractual (01), Financial (02), Technical (03), Meeting (04) and Liaison (05), etc. They are then further divided into respective sub-indexes such as Foundation (03/01), Architectural (03/04) and Structural (03/05) in the technical major division. Besides, this filling system was revised throughout the project to included various kind of subjects which were not included initially.

Although there was not a written procedure for dispatching information, the information required by various parties were sent through a facsimile message then backed by a formal letter. In addition, log books were used to record the information released and received.

Normally, monthly coordination meetings was organised to communicate the design information at the planning design phase, and the construction details at the construction production phase. Besides, irregular site coordination meeting was also organised at the construction phase to reveal and solve unexpected problems. The monthly coordination meetings were chaired by the project manager. The project manager was also responsible for the preparation of the meeting minutes to record the issues discussion and decision made.

In addition to the monthly coordination meeting to communicate various kind of information, the project progress report was also prepared in a monthly basis. At the end of each month, the project progress and cost status of the project was updated. The project progress report including a cost status report was sent to the MJ client within the first week of the following month.

5.9.2 *Information Management in AnChia*

Similar to the MJ project, the LL project management team was responsible for various kinds project management responsibilities. This included:

i) acting as the client's point of contact, and setting up and maintain a proper communication channel,

ii) arrange and chair the coordination meetings, and

iii) prepare and report to the client of the project progress and carry out budgetary control.

The communication channel in the AnChia project was incurred in the organisational structure as in the MJ project. The LL project management was acting as the information coordinator of the project and the point of contact for the client. Weekly coordination meeting was held throughout the project to communicate the design information in the planning and design phase, while bi-weekly construction coordination meeting was held throughout the construction phase for various construction details. These meetings were chaired by the project manager, and the minutes were written to record the issues discussed and concluded. Similar to the MJ project, the team was also responsible for the project progress and budgetary control for the project throughout the project life cycle.

In order to fluently manage the information of the project, a proper information retrieval and storage system is necessary. A well ordered and properly arranged system was expected in the AnChia project adopted by the LL team. Besides, revision of this information storage and retrieval system was expected throughout the project.

In the AnChia project, the progress report which included the works progress summary and budgetary summary was prepared by the LL team and reported to the client of AnChia project in a monthly basis.

5.9.3 *Comparison and Discussion of Information Management Techniques*

The information management system adopted in both the projects are similar. The information for the projects were indexed and stored in a proper filing system set up in the initial stage of the projects. This, therefore, helped to maintain the information be stored and retrieved effectively. In addition, minutes were written for all the coordination meetings to record the decisions made and the issues discussed.

However, more frequent meetings were organised in the AnChia project. This ensured the updated information was communicated amount the participants in the project. Therefore, more project control points were inserted in the AnChia project throughout its project life cycle.

In addition, both projects adopted a monthly project progress reporting system, this ensured the project progress and budgetary status are reported to the project client periodically.

5.10 Project Works Coordination

In most construction projects, the construction works are carried out by more than one contract parties. Therefore, works coordination for the detailed requirements or specifications is important. Then it is necessary to monitor the works to ensure that they are executed according to these requirements or specifications. In addition, the coordination of various government procedure is also important to smoothen the progress of a construction project in China. Thus, these factors affecting the projects works progress and quality are discussed in the following paragraphs.

5.10.1 *Works Co-ordination in Mead Johnson*

Government Procedures Coordination

Throughout the project, the SW team was responsible for the liaisons with various government departments and bureaux. The approvals liaisons included the Land Usage Approval, the Project Approval, the Preliminary Design Approval in the design phase and the Construction Approvals in the construction phase. Besides, the team was also responsible for arrangement of the testing and commissioning be witness by the local authorities before the production approval was issued in the project turnover and start-up phase.

In coordination of these procedures, the CM searched for the necessary approvals and the respective procedures initially. This involved the close coordination with the municipal government and the construction administration committee of the GETDD. Some of the approvals such as the Construction Drawing Application Approval was arranged by the local design institute GPDI. Besides, pre-submission meetings were arranged between the authorities for the detailed requirements before the formal submission were made to the relevant authorities. In case of more than one government authorities was involved for the approval, the CM was also responsible for the coordination between the different government authorities.

Construction Works Coordination

Briefly, in the planning and design phase, the SW team was responsible for the preparation of the preliminary design of civil engineering works and the coordination of the various details of the other design works. As most of the project team members are experienced international consultants, therefore, the design works were easily coordinated and prepared according to the Client's requirements.

During the construction phase, the SW team was responsible for the overall civil works supervision. Although the main contractor was contractually responsible for the detailed works coordination between various interfaces, he was incompetent in carrying out this duty. Therefore, the SW team was also responsible for works coordination between various works interfaces. In the case that there was not enough manpower for supervision of works, extra foreign team members were brought into the project to supervise and coordinate the construction works. They ensured that the works were carried out following the specifications and the contract drawings.

The SW team was also responsible for coordination of off-site production such as the hydraulic lift production and dock leveller. While the E&M sub-consultant was responsible for the E&M plants and fire services system production. Even though the E&M works construction was supervised by the E&M site engineer, the E&M site engineer was not responsible for the E&M work coordination. Also, the E&M contractor was not experienced in coordination of the E&M works be carried out properly. Therefore, the E&M works were delayed and reworks were required in some locations.

In particular, the process construction was carried by the client's specialist turnkey contractor. As the turnkey contractor was internationally experienced, the coordination and construction of process plant was carried out effectively according to the specifications and contract drawings.

5.10.2 *Works Co-ordination in AnChia*

Government Procedures Coordination

In the AnChia project, the government approvals and procedures were arranged by the Chinese Procedures Co-ordinator. Although the LL project management team was not directly involved in the government approval procedures, the team observed the procedures and the required information for the submissions. Then the LL team took over the repetitive applications such as Construction Application Approval in the project construction phase. Besides, the LL team also made used of the contractors as the middle-man for some of the approvals. This is because the contractors usually have a good relationship between the local authorities, such as the Powder Supply Bureau. In case of more than one government authorities were involved in an approval, similar to the MJ project, the LL team was responsible for coordination between the relevant government authorities.

Project Works Coordination

The LL team was responsible for coordination of all the works throughout the project. This included the design coordination in the planning and design phase, the off-site and on-site works coordination in the construction phase.

In the construction phase, except the E&M works, the LL team was responsible for all the works coordination and supervision according to the specification and contract drawings. As the LL team is not experienced in E&M works supervision and coordination, the E&M works were supervised and coordinated by the dedicated E&M works site engineer from the E&M sub-consultant. Similar to the MJ project, as the E&M sub-contractor was inexperienced in carrying out all his duties, particular in works coordination, the E&M works were delayed and some reworks were required.

In the construction phase, additional supervising engineers were employed from the SU to works for the project. These extra supervising engineers were given a training on the practice of construction supervision in an international standard. Besides, they were explained in detailed of the client's requirements and the specifications. Therefore, this enabled the experienced local supervising engineers to play a supervision role that is recognised in the international practice. As these supervising engineers were only experienced in the civil, structural and architectural works, they were not able to complement the E&M site engineer.

5.10.3 *Comparison and Discussion of Project Works Coordination Techniques*

In the MJ project, except the Construction Drawing Approval was arranged by the DI, all the necessary Government approval procedure was handled by the SW team. This allowed the team to have a full understanding of the various Government approval procedure and enable them to understand the necessary information required for the approvals. However, this imposed high amount of workload on the team to carry out various approval procedure from project inception to completion. Therefore, this required the SW team to plan different kind of works in details to avoid resource conflicts.

In comparison, the LL team adopted a different approach. The LL team tried to make use of the available resource like a Chinese Procedure Coordinator to coordinate the complicated procedures and the sub-contractors to act as a middle-man to facilitate various approval procedures.

In addition, the construction works coordination approach adopted by LL was also different. The LL team employed extra supervising engineers from the SU and gave them the proper training on construction supervision. Therefore, with full understanding of the client's requirements, these extra supervising engineers supervised the works in an efficient way and ensured the client's requirements were satisfied.

However, as both project management teams were inexperienced in the E&M works coordination, the E&M works were poorly performed.

In conclusion, LL presumed that the contractors were inexperience in works coordination and therefore planned the works in detail and closely coordinated the works as necessary. Providing training and make use of local supervising engineers also helped to improve the effectiveness of the project management team.

5.11 Project Works Procurement Management

As construction projects usually involved more than one contractor, therefore, selection of suitable contractors for the works is important. In the following paragraphs, the project works procurement method adopted in the projects were discussed.

5.11.1 *Works Procurement in Mead Johnson*

In the construction phase, the SW team was responsible for the preparation of tender documents, invite the contractors to enter the tender, evaluated and recommended the tenders for the client. However, the client required their own conditions of contract be put in the contract documents. Therefore, this imposed some difficulties in the contract document preparation as the construction contract documents are required to comply with the Chinese Economic Law. The SW team therefore assessed the client's conditions of contract was complied with the

Law and prepared the tender documents which included the proposed payment schedule.

In selection of the contractors to submit tenders, a short-list of the approved contractors was prepared. Therefore, based on the experience of the contractors, they were issued the Letter of Invitation for Tender. Finally, the returned tenders were assessed based on the contractor's past experience, capitals, contractors organisation and the works execution planning. Upon evaluation of the various aspects of the tenderers, the recommendation of tenderer was made to the client in a tender selection report. At last, upon agreement on the payment details and the various condition, the contractor was entered into a contract with the client.

5.11.2 *Works Procurement in AnChia*

In the AnChia project, a Lump Sum Contract was signed between the LL team and the project client. Therefore, this left the details of the contracts between the LL team and the sub-contractors to be sorted out by the LL team. In selection and evaluation of the sub-contractors, a similar method was adopted as in the MJ project. This included short-listing and assessment of different qualities of the tenderers. Then selected the most appropriate contractor for the works. However, this was an exercise determined by the LL team only. Therefore, this allowed the team to have more flexibility in selection of sub-contractors for the construction works. Besides, more flexible payment method could also be hammered out between the LL team and the sub-contractors.

5.11.3 *Comparison and Discussion of Works Procurement Management Techniques*

Although different works procurement procedures were found in the project, they shared the same contractor selection and evaluation method. Since the LL team was also acted as the main contractor of the project, therefore he was able to have more flexibility in selection of the contractors and the payment details. This is difficult to be achieved by most project management team. Besides, limitation was also imposed on the SW project management as the client want to implement their own conditions of contract.

In conclusion, the project management teams adopted the most usual way of contractor selection and evaluation.

5.12 Project Management Techniques Not Applied

In managing the projects, the SW and LL team has implemented various project management techniques in facilitating the works of the projects to be carried out effectively and efficiently. However, evidence of some project management techniques were not formally found in the projects. For example, evidence of the application of Risk Management and Change Management was not found in the projects. These may due to various reasons and they are further elaborated in the following paragraphs.

In the MJ project, the project requirements was completely defined by client in the beginning. The SW project management team was only responsible to hammer out the project scope and the project details in following the client's requirements. Therefore, evidence of "Change Management" was not found in the MJ project. While in the AnChia project, the leanest project configuration was achieved after the value management process. As a result, any change to the project scope or configuration may resulted in a serious adverse effect. Therefore, change to the project scope was not anticipated and "Change Management" was not applied in the project.

The concept of Risk Management is understood by most project managers. However, this concept involves a lot of planning works such as determination of the most likely risks and prepare for the contingency plans. Besides, Risk Management does not provide guarantee results which has discouraged the project managers from applying it. Instead, most project managers plan their works in details to set out the works sequences. This also helps to avoid the unexpected problems from happened. Since the later approach was adopted in the projects, evidence of formal Risk Management was not found in the projects.

5.13 Conclusion

Although the ability to complete a project on time does not imply that a project was managed successfully, a shorter delay was experienced in the AnChia project. There are various factors that contributed to this result. The first being that AnChia was carried out by a project manager which has a general contractor background. Besides, LL has been working with New Zealand Milk Product, who is the parent company of Milk Products Holding (SEA) Ltd, for a similar project in Malaysia. This therefore enabled them to have a clear understanding of the client's requirement and the potential technical difficulties.

In addition, having a process engineering branch also give LL an advantage in managing the construction of an industrial facility. It is because an experienced process engineering team is helpful for both design and construction of an industrial facility.

In particular, acting as the project manager and the main contractor, this gave much flexibility to LL in managing the project. In addition, the project team had a more "hands-on" role in planning and coordination of the construction works. Typical example included the flexible payment system and preparation of contracts details. On the contrary, acting as an independent project manager has limited some of the functions of the SW team in a Chinese construction project. This included variation of project scope by the project client.

In comparing the various project management aspects of the two projects, it can be concluded that rolling programme for all the work packages is an essential and important project management mechanism for Chinese construction project. Besides, more control points should be inserted to monitor the works are carried out according to the rolling programmes. Besides, this also allowed the resources of the project be planned and controlled properly with the project rolling programme.

In coordination of the various types of works, it is important to ensure a experienced Chinese procedure coordinator is present. This helped to easy the complicated Chinese project approval procedures. Besides, the sub-contractors could also be used as the middle-man to facilitate some procedures. This will also help the project to progress smoothly.

In most Chinese construction projects, the supervising engineers were employed only to satisfied the government requirement. However, the experienced supervising engineers can be turned to a to a useful resource by providing them with suitable training, such as the practice of construction supervision. This therefore will also help to improve the performance of a project.

In conclusion, various merits of project management elements are seen in these two foreign invested construction projects. Therefore, in the next chapter, these merits of project management mechanism is extracted and formalised in the formulation of a suitable methodology for successful application of project management knowledge in Chinese construction projects.

Chapter 6

Chapter 6

6.0 Development of Project Management Tool

6.1 Methods of Ranking and Analysis of the Variables

In the previous chapters, different problems in construction projects were reviewed. In addition, the hierarchy of variables causing these problems can be investigated and analysed with the following methods.

i) Ranking of all the variables according to the most influential at top (Appendix C.1).

ii) Ranking the variables according to the influential but remove the uncontrollable variables (Appendix C.2).

iii) Listing by time / occurrence in construction sequence (Appendix C.3).

iv) Listing by time / occurrence in construction sequence while identifying the controllable variables (Appendix C.4).

After discussion and review of the practical methods of controlling these variables, method 4 was adopted. The methods and techniques for dealing with the controllable variables were presented in the following sections.

6.2 Analysis and Selection of Project Management Techniques

There are various factors affecting the implementation of a construction project in China. In order to minimise the adverse impacts, analysis of these variables and selection of the suitable construction project management techniques was undertaken. In the following sections, this analysis is presented by dividing the variables into different categories.

The "Management Variables" as discussed in the previous chapters are classified into the following and further analysed.

	Management Variables	Character
i)	Government Determined	Manageable but Unavoidable
ii)	Project Manager Controllable	Manageable and Controllable
iii)	Uncontrollable	Mostly Un-manageable and Unavoidable but effects can be minimised

Table 6.1

6.2.1 *The Government Determined Variables*

The "Government Determined" variables consisted of the Government approval procedures as discussed briefly in Section 4.4. Construction projects must follow throughout the whole project life cycle. In Table 6.2, the approvals are summarised according to the Chinese construction project approval phases.

	Approval Phases	Approvals Required
i)	Project Establishment Phase	- Project Approval
ii)	Land Procurement Phase	- Schematic Design Approval - Land Usage Approval
iii)	Preliminary Design Phase	- Preliminary Design Approval
iv)	Construction Drawing Phase	- Construction Drawing Consent - Project Construction Permit
v)	Tendering and Construction Phase	- Tendering Approval - Works Commencement Approval

Table 6.2

Although the "Government Determined" variables are unavoidable, it is important and necessary to manage these variables effectively. This can be fulfilled by the identification of the detailed approvals and scheduling them with the works in the rolling project programmes at different project phases.

6.2.2 *The Project Manager Controllable Variables*

The "Project Manager Controllable" variables included various project constraints and available resources which are similar in all construction projects. In visualising these variables, Figure 6.1 gives an general scale of the effect of these variables in a Chinese construction project. However, the effects of these variables are varied over time. Therefore, it is necessary to identify the adverse effects of these variables over time and reduce their impact.

In particular, the "Procedure Complexity" would be high throughout the project life cycle. However, the "Project Team Complexity" is usually high at the construction phase when different contractors are working together. In addition, the "Project Complexity" can be reduced with techniques such as Value Management or the impact can be reduced by detailed project planning.

In general, typical project management techniques can be applied to monitor and supervise the construction works so that they could be carried out effectively. However, as revealed in Chapter 5, many more control points are required throughout a Chinese construction project life cycle. This is due to the fact that most of the Chinese contractors are inexperienced in many areas. This also allows the project manager to have a detailed knowledge of the works progress over the project life cycle.

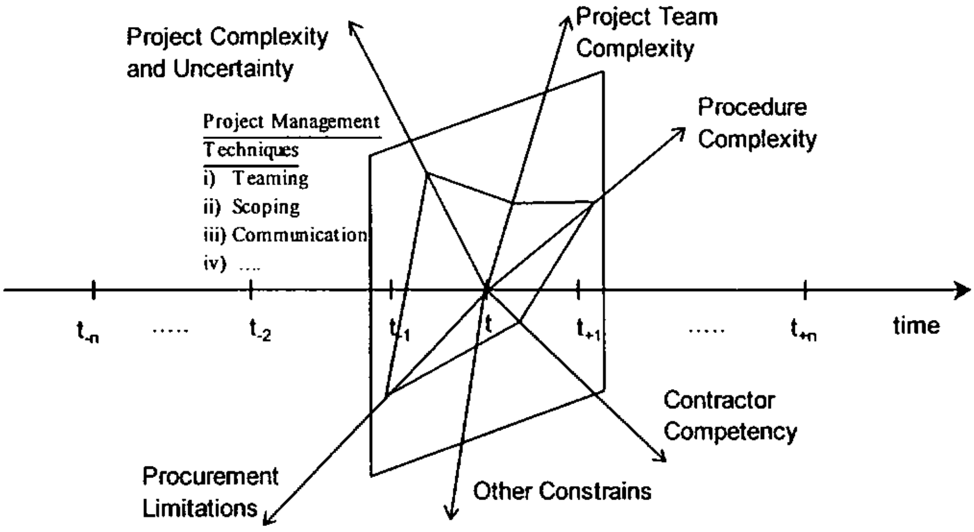

Figure 6.1 - Project Management Variables and Constraints

Some of these constraints from Table 4.1 to 4.4 are summarised below in Table 6.3. Therefore, based on these categorisations, the project management techniques required can be determined and applied throughout the project phases.

Project Management Techniques	Project Management Difficulties
Project Teaming	- Design Institute inefficient - Contractor does not follow specification of works in contract - Complex contractor organisation - Simple contract with contractors
Value Management	- Project scope variation
Detailed Project Works Planning	- Bad coordination with government and non-government departments - Time consuming project and business assessment process - Lack of coordination between trade contractors - Delay due to bureaucratic custom

Table 6.3 - Summary of Project Manager Controllable Constraints

Project Management Techniques	**Project Management Difficulties**
Works Execution Planning	- Conflict of works between trade contractors
Cost Management	- Contractors request to receive 30% pre-construction payment - Contractors are short of funds
Works execution planning	- Conflict of works between trade contractors
Information Management	- Not fully appreciated the supporting infrastructure and utilities

Table 6.3 - Summary of Project Manager Controllable Constraints

In conclusion, based on these categorisations, the required project management techniques can be identified and applied to project works throughout the whole construction project.

6.2.3 *The Uncontrollable Variables*

Typical examples of this type of variable in a Chinese construction project include the following :.

i) the fluctuation of the contractors' performance;

ii) the delay due to bureaucratic government procedures;

iii) the delay due to inefficient material supply;

iv) the inclement weather, etc.

Although these Variables are beyond the control of a project manager, the adverse impacts can be catered and reduced with the application of Risk Management.

6.3 Format of the Project Management Tool

Wallace and Halverson [56] suggested that the project management process can be defined as a set of principles, methods and techniques for the effective planning and control of project with the goal of being on time, under budget and to specification. Therefore, based on the results of the analysis in the previous paragraphs, a project management tool can be formulated for Chinese construction projects.

There are many ways to apply the project management knowledge in commercial projects. It can be in the form of a handbook or a piece of advanced software. For example, the PMBOK was distributed both physically and electronically through the modern technology of Internet. However, a study carried out by Lei and Webber [57] revealed that the application of the advanced technology of computer in the Chinese construction industry was not as common as in the western society.

The language barrier is one of the main reasons for this result. Besides, software packages are often not developed in a common platform such as Microsoft Windows to allow interfacing in Chinese with other softwares. Therefore, this limits the opportunity to apply the discussed project management techniques via a computer software package.

In conclusion, a project management handbook is proposed as the best option to provide guidance and apply the good project management techniques identified. The idea of a handbook is also supported by McNulty [58] who indicates that a handbook is a useful tool for guiding construction practitioners, particularly the project manager, on construction projects of modest to medium scale.

6.4 Components of the Project Management Tool

In formulation of the project management handbook, the necessary components are analysed and discussed here. In addition, a structure or format is required to follow through the whole project management handbook so that the users can make use of the handbook easily.

6.4.1 *Chinese Construction Project Procedure*

As indicated in Chapter 5 and the analysis in previous paragraphs, the "Government Determined" variables, must be identified and fulfilled effectively. Therefore, the project management tool must include the detailed project approval procedures and the information required to allow the project to proceed.

6.4.2 *Significant Project Management Techniques*

As discussed in section 6.1.2, the following construction project management techniques are important and necessary throughout the whole construction project.

i) Project teaming - the efficiency of a team is much higher than the sum of the individual team members. Good teaming and organisational interaction ensures the works are carried out effectively;

ii) Value management - this helps to increase the value of a project's configuration;

iii) Detailed project planning - this helps to identify the works required throughout the whole project and ensure the works are foreseen and planned. The necessary coordination works are also identified, to enable the works to be carried out smoothly. In preparation of the detailed works programmes, the required resource are identified and controlled. Also the works are scheduled, controlled and compared to the baseline of the project programme. This helps to spot any delay to the works and allow the project manager to carry out suitable remedial action as soon as possible;

iv) Cost management - this is needed to help the project client to arrange the required funding for the project and to ensure the cost remains within the allocated funds. The Earned Value Analysis is a useful tool to monitor the project works progress together with the project cost;

v) Information management - this ensures that the latest and necessary information is available to all the project team members of the appropriate time;

vi) Works execution planning - this ensures that the works are considered in detailed before they are carried out. Therefore, this reduces the possibility of re-work.

In conclusion, with the application of these project management techniques, the available resources can be better utilised.

6.4.3 *Method of Checking the Procedure and Applying the Management Techniques*

Checklists are one of the most simple tools available to ensure various approval procedures are met throughout the project life cycle. Therefore, checklists can be provided for the management of "Government Determined" variables. In addition, flow charts and forms can be provided for the project managers or engineers to follow in applying the project management techniques.

In conclusion, the checklist and project management flow charts and forms shall form a major part of the project management handbook for Chinese construction projects. Project managers or engineers will be guided to fulfill the required procedures and apply the project management techniques on a Chinese construction project.

6.4.4 *Example of a "Mock Up" Project*

Although a "Chinese Style" market economy system was adopted since the 1980s, the construction industry in China was developed in a planned economy system. As the construction practice is different, providing a "Mock Up" project as the example in the project management handbook will help to facilitate the management process. In addition, samples of approval documents will be included to allow the project managers on understanding of the format and the important parts of the approval documents. Providing the sample checklist and forms will also help to give guidance on filling in the forms or checklist for the project in hand.

6.4.5 *Structure of the Handbook*

In order to enable the users to make use of the handbook easily, a format or structure should be imposed in the handbook. Division of the handbook according to the project phases will focus the attention of the user on particularly relevant aspects of works in that phase. As discussed in Section 6.2.1 and 6.4.1, understanding and ensuring that the "Government Determined" variables are satisfied is important. Therefore, the Government procedures should form the first part of each division of the handbook. Various project management elements can then follow to indicate those particularly relevant to concentration or attention that phase. Finally, the examples and samples will be placed at the end of the handbook for reference. Checklists and forms will be provided throughout each division of the handbook to remind the user of the important issues.

In conclusion, the handbook will be prepared following a structure as below.

i) Procedure, checklists and forms

ii) Project Management elements, checklist and forms

iii) Example or "Mock Up" project records

iv) Sample documents for reference

v) Blank forms for use

6.5 Formation of the Project Management Tool

In conclusion, based on the analysis and discussion on the previous paragraphs, a management tool in the form of project management handbook is proposed to be beneficial in management of China construction projects. In addition, the collection and analysis of the data for construction projects in the case studies also yielded the general conclusion that a management handbook can be applied to other similar or comparable situations. Therefore, based on this generalisation, a project management handbook is developed and a working copy is provided in the Appendix A for reference.

6.6 Review and Comment of the Handbook

In order to increase the practicability of the handbook, it was reviewed and commented by senior staffs of the Industrial Partner. The handbook was considered informative and usable.

6.7 Future Development of the Handbook

Although the project management handbook was considered informative and usable, enhancement to the handbook is possible. Therefore, further development of the handbook is anticipated in the future.

Chapter 7

Chapter 7

7.0 Conclusion of The Study

7.1 Summary of the Study

In completion of this study, a logical approach was adopted, following the methodology described in Section 1.4. The research that has been carried out included.

i) Review general project management practice and knowledge.
ii) Review general project management tools and techniques.
iii) Review the construction practice of Chinese construction project.
iv) Review the problems or management difficulties associated with construction projects in China.
v) Analyse by ranking and listing the project management problems and difficulties in Chinese construction projects.
vi) Identify the controllable project management problems and difficulties.
vii) Develop and produce an usable tool to reduce the impact of the project management problems and difficulties in Chinese construction projects.

In conclusion, by gathering information such as the current Chinese construction practice and generic project management techniques, this research has developed a useful tool for the implementation of project management techniques in Chinese construction projects.

7.2 Conclusion to the Study

Through the course of this study, it is revealed that the construction industry in China is in a stage of development such that non-satisfactory performance of the industry can generally be expected to occur in the short to medium term. Although it will take time to see great improvement for the whole of the construction industry, under a combination of effects including regulations from the Government and self-initiation from the industry, the improvement process is expedited. In line with this theme, this research has tried to give support to the management of construction projects in China.

In particular, through this research, a generic process for improvement of construction project management in China has been developed. This involved categorisation of the management variables into "Government Determined," "Project Manager Controllable," and "Project Manager Uncontrollable." Furthermore, through detailed analysis and case studies of these variables, this study has proved that improvement to the management of construction projects in China is achievable.

In addition, through this systematic process with analysis and weighting of the importance and possibility for improvement at specific sector of the construction industry in China, a prototype for project management is also developed. This prototype is expected to help and improve the management of construction projects in China.

To conclude this study, it has extended the knowledge of project management, especially, for management of industrial facilities construction in China. In addition, it is believed that the management performance of different sectors of the construction industry in China can be improved with the repetition of a similar research and development methodology.

7.3 Contribution to Knowledge

Great effort has been devoted by many people in formalisation of the application of project management. Typical examples include the PMBOK by PMI, and the Code of Practice for Project Management for Construction and Development by CIOB. They have laid down the cornerstone of the general project management knowledge. Their contribution to project management knowledge is valuable. In particularly, this research contributed the project management knowledge in the area of industrial facility construction in China. This research also contributed in the following areas.

i) It justified that through the process of collation, identification and analysis of the "Government Determined" and "Project Manager Controllable" management variables, a solution is achievable for the construction project management difficulties in China.

ii) A useful database for future studies on the subject of Chinese construction project management is formed by extracting information from published research and integrating this with details collected from site visit and interviews, etc.

iii) This research has extended the project management knowledge for construction projects in China, particularly in the area of industrial projects development. This facilitates further study to be carried out in other area of Chinese construction activities.

7.4 Recommendation for Further Studies

Based on the results of this study, further research on Chinese construction project management is proposed in the following areas :

i) As this research was focused in the area of industrial facility development in China, the research methodology of this research can be applied in other areas, e.g. infrastructure development, to complete the construction project management knowledge for China projects.

ii) Although the basic project management techniques required for projects of different scales are the same, the results of this research were limited to the small to medium size Chinese industrial developments. Therefore, a further study on the project management considerations required for larger scale projects would enhance the knowledge available on this subject.

iii) Only a project management handbook has been recommended as a result of this study, due to the limited implementation of advanced computer technology in China. However, as the use of computer technology increases, the project management knowledge can be incorporated into a knowledge based system to assist project managers in handling Chinese construction projects. As the handbook is still in its preliminary stage, a further development of the handbook during the computerisation process will further help to enhance the management of Chinese construction projects.

In conclusion, this study not only produced a usable tool for the management of construction projects in China, it also generated a process of tackling project management difficulties in China. Based on this process, enhancement to the project management knowledge for construction projects in China is anticipated.

Appendix A

Reference

[1] Oliver, A. and Winney, M., JLE force Northen Line closure. *New Civil Engineering*, ICE, 1995, 19 Oct 1995 issue, 3.

[2] Greeman, A., A Different Light. *New Civil Engineering*, ICE, 1995, 4 May 1995 issue, 18-19; ICE, 1995, 10/17 Aug 1995 issue, 10.

[3] Bolton, A., Orchestrating Ø-Resund. *New Civil Engineering*, ICE, 1995, 24/31 Aug 1995 issue, 26-27.

[4] Overrun claims loom on Malpas Road scheme. *New Civil Engineering*, ICE, 1995, 18 May 1995 issue, 10.

[5] State Statistic Bureau, *Statistic Year Book of China*. State Statistic Bureau Press, PRC, 1996, 67, 157.

[6] Chen, G., *The 1995 National Economic and Social Development Report of China* (Chinese). China Planning Bureau Press, PRC, 1995, 45.

[7] Brian, O. B., Lean Production, Lean Construction - New Paradigm Goes With The Flow. *Journal of Management in Engineering*, 1996, March/April 1996 issue, 3-4.

[8] Walker, A., *Project Management in Construction*. Blackwell Science, 1996, 5, 19, 73.

[9] Etzion, A., *A Comparative Analysis of Complex Organisation*. The Free Press, 1971, xiv.

[10] Stevens, R.A., *Building in History*. 1965, 1.

[11] Gareis, R. and Hetland, P. W., *Global Project Management Handbook*. 1996, 30-35.

[12] Bowyer, J., *History of Building*. 1983, 161.

[13] Waterhouse, R., Spot the Real Project Manager. *Asia Engineer*, HKIE,1996, Sep 1996 issue, 23.

[14] PMI, *Project Management Body of Knowledge*. PMI, 1996, 4, 6 & 9.

[15] Lock, D., *Project Management*. Gower, 1990, 3, 43.

[16] BSI, *BS6046 - Use of Network Techniques in Project Management*. BSI, 1984, 7, 12.

[17] Hayes, R. W. et al, *Risk Management in Engineering Construction*. 1986, 7.

[18] ICE, *ICE Design and Practice Guide - Creating Value in Engineering*. ICE, 1996, 4-5.

[19] Morris, P. W. G., *The Management of Projects*. Thomas Telford, 1994, 2, 32, 107, 245-264, 303.

[20] Albanese, R., Team-building Process : Key to Better Project Result. *Journal of Management in Engineering*, 1994, November/December 1994 issue, 43.

[21] Ritz, G. J., *Total Construction Project Management*. 1994, 10-11.

[22] Scott, J. S., *The Penguin Dictionary of Building*. Penguin Books, 1979.

[23] Scott, J. S., *The Penguin Dictionary of Civil Engineering*. Penguin Books, 1980.

[24] Boldt, O. C., Marketing Engineering Services. *Journal of Management in Engineering*, 1996, Jan/Feb 1996 issue, 3-5.

[25] Madsen, L. K., *Management defined, characteristics, and human behaviour in "Effective Project Management Techniques"*. ASCE, 1973, 7.

[26] Ayas, K., Human resource policies for professional project management. *Proceedings of IPMA 96 World Congress on Project Management*, 1996, 95-105.

[27] APM, *INTERNET UK (1995) Body of Knowledge*. Association of Project Management, 1995.

[28] GPM und RRW, *Projektmanagement - Fachmann*. GPM und RRW, 1991.

[29] Voropajev, V. and Pannenbacker, K., What is project management Today? What are the ways of its global development?. *Proceedings of "IPMA 96" World Congress on Project Management*, 1996, 663-672.

[30] Cleland, D. I., *Project Management - Strategic Design and Implementation*. Mc Graw-Hill, 1994, 42.

[31] Assad, M. G. and Pelser, G. P. J., Project Management : A Goal-directed Approach. *Project Management Quarterly*, 1983, June 1983 issue, 49.

[32] Jain, A., Balancing Hard and Soft Quality of a Project Manager. *Proceeding of IPMA 96 World Congress on Project Management*, 1996, 3-11.

[33] Day, D. W. J., *Project Management and Control*. The Macmillian Press Ltd., UK, 1994, 41.

[34] Miles, L., *Techniques for Value Analysis and Engineering*. Eleanor Miles Walker, 1989, 27.

[35] Acharya, P., Pfrommer, C. and Zirbel, C., Think Value Engineering. *Journal of Management in Engineering*, 1995, Nov/Dec, 1995 issue, 13-17.

[36] Johnston, A., *A Hacker's Guide to Project Management*. Butterworth Heinemann, 1995, 60.

[37] Harrison, F. L., *Advanced Project Management*. Gower, UK, 1983, 20.

[38] Xiao, T. et al., *China Today : The Building Industry* (Chinese). China Social Science Press, PRC, 1988, 88.

[39] Li, S., The CPAM System : A New PM System in the Chinese Construction Industry. *PMNetwork*, 1995, Apr 1995 issue, 7-12.

[40] Bing, J. A., Project management in China. *The China Business Review*, 1984, Vol 11, March-April 1984 issue, 22-23.

[41] Walker, A., *Land, Property and Construction in the People's Republic of China*. Hong Kong University Press, HK, 1992, 73.

[42] Tian, S., Construction Supervision System Under Development and Perfection of China. *Proceedings of Project Management International Conference 1992*, 1992, D2, 12-19.

[43] Liu, X., The Status and Management of Dispute of Construction Contracts (Chinese). *Proceedings of Project Management International*

Conference 1992, 1992, D2, 58-63.

[44] State Administration of Industry and Commerce, *Standard Form of Construction Contract GF-91-0201* (Chinese). State Administration of Industry and Commerce, PRC, 1991.

[45] Liu, S. et al, *Construction Supervision Handbook* (Chinese). Economic and Management Press, PRC, 1996, 614.

[46] Ministry of Construction, *Client Responsibility Ordinance* (Chinese). Ministry of Construction, PRC, 1992.

[47] Ministry of Construction, *Provisional Construction Supervision Ordinance* (Chinese). Ministry of Construction, PRC, 1988.

[48] Luo, M., Difficulties encountered in construction supervision. *Construction Supervision* (Chinese), Ministry of Construction, PRC, 1996, Vol 5, Sep 1996 issue, 27-28.

[49] Ministry of Construction, *Construction Supervision Ordinance* (Chinese). Ministry of Construction, PRC, 1995.

[50] People's Republic of China, *Construction Law of the People's Republic of China*. PRC, 1998.

[51] Tan, K. P., SPMM's Experience in Construction Projects. *Proceedings of the Conference of Avoiding & Solving Disputes in China Construction Projects*, IBC, HK, 1995.

[52] Chau, K. M. , Examining Claims in Construction Projects and Their Effectiveness in Solving Dispute. *Proceedings of the Conference of Avoiding & Solving Disputes in China Construction Projects*, IBC, HK, 1995.

[53] Ministry of Construction, *The "9th five" Planning of Construction Supervision System* (Chinese). Ministry of Construction, PRC, 1995.

[54] Yiao, B., *The Construction and Management of Construction Industry*. China Architecture and Building Press, PRC, 1995, 10.

[55] Tjia, B. and Tseung, K., Review of Main Contracting for Hong Kong - China Joint Venture Projects (Chinese). *Proceedings of Project*

Management International Conference 1992, 1992, D2, 33-38.

[56] Wallace, R. and Halverson, W., Project Management : A Critical Success Factor or A Management Fad. *Industrial Engineering*, 1992, Vol:24, Iss:4, April 1992, 48-50.

[57] Lei, T. and Weber, S., Incorporating Computerization into Chinese Construction Management. *Journal of Professional Issues in Engineering Education and Practice*, 1997, April 1997 issue, 71-77.

[58] McNulty, A. P., *Management of Small Construction Projects*. McGraw-Hill Book Company, 1982, iv.

Appendix B

Interview with Ir. Allen M. K. Kung of the Wharf Beijing Limited,
For the Beijing Capital Times Square Development Project
dated 22nd October 1996

Objective

The objective of this interview is to use the Beijing Capital Times Square Development Project as a review, in order to have a better understanding about the Project Management system used in the PRC major construction project.

Interview

1. Background

Q.1.1 What is your position and role in the project?

A.1.1 I am the Deputy General Manager & Chief Engineer of the Beijing Capital Times Square Development Co. Ltd. which is formed to manage the construction of the Beijing Capital Times Square and the Dalian Time Square in Beijing and Dalian. The Beijing project covered an area of 200M sq. ft. and this is the first Time Square project by Wharf in China. I was involved in the project since 1995 while the project was planned since 1990 and the excavation of the project started in December 1992 and the project is expected to complete in mid 1997. Therefore, I was involved in the project after the excavation started, while I also involved in the tendering of various other stages such as superstructure and E&M contract.

2. The Project Management Practice

Q.2.1 How do you manage the Project in China? Is it different from that you manage a project in Hong Kong.?

A.2.1 In general, it is able to apply the project management practice in Hong Kong in China, however, this heavily depended on the attitude of the Client to the implementation of a effective management system and whether the person in charge is willing to implement the practice. Although the legal requirement for a project is different from that in Hong Kong, one will know all the basic requirements after having participated in 3 to 4 project in China. For example, the legal requirements and submissions for a 5 stories building would be similar to that of a bridge project.

It is important to fix a contractor agreed construction programme once after the construction work was awarded. This is because the contractors in China, in general, do not have a effective time management system to guide them throughout the whole construction process, and TimeLine was used in this project for time management to determine and control the progress of the construction works. Besides, the site engineer must understand the importance of the flows and mile stones in the programme so that to drive the contract to carry out the work according to the critical path .

Q.2.2 How do you select a contractor for the project, and what kind of contract are you using?

A.2.2 As the statuary tendering system require the construction works be tendered in the Fix Material Cost Contract, therefore, the contractor can only win the bidding by lowering the labor price in the tender document. However, a cost estimate by using B.Q. contract was prepared by the project team to determine a reasonable price for the contract. Finally, a contractor was recommended to the client by the contractors experience, the capacity of work in hand and reputation etc.

Q.2.3 How do you manage the Government relationship and human resource of the project?

A.2.3 Owning to a different culture and government system in China, it is important to have a good relationship with the respective government bodies. For example, it is important to inform the MOC the establishment of a new project and seek for their advice, permission and opinion in the very early beginning of the project. Besides, stating clearly the project teams baseline and professional conduct that adopted to safe guard the project team is also important. While little gifts to the officials to show respect during some special festivals may be required at this age.

In addition, the emphasis of team work with the contractor is important as the standard of contractor in China in general is not comparable to international contractors. Besides, the supervision concept of the government supervision team is not professional enough, therefore, more experienced and professional supervision staff was employed from HK in addition to the government supervision team to exercise professional judgement and supervision during construction.

Q.2.4. How do you manage the information flow of the project?

A.2.4. The exchange of information between the client and the project team is using facsimile at the moment, however, the project team is considering the possibility of using computer Intranet and Internet as the information management media both within the project team and between the client, as the application of a Internet e-mail account is getting easier these days.

Q.2.5. Do you carry out safety management in the construction site?

A.2.5. In general, the concept of safety in the labour is not high and there is a great distance from the international standard. For example, the contractors set a quota for the injury and they are aimed at having accidence not more than the quota, while the international standard is aimed at not having any of the injury or accident.

Besides, the Government do not have any ordinance or regulation for safety, as a result the contractors will not be penalized or not be able to obtain jobs from the market. In conclusion, it is difficult to carry out safety management in the China construction industry.

Q.2.6. Do you carry out environmental management in the construction site?

A.2.6. In general, there are no environmental monitoring requirement for the construction industry. Therefore, it is difficult to request the contractor to carry out environmental protection and they also do not know how to carry out environmental protection concept in construction.

Q.2.7. Which kind of contract do you use in the project?

A.2.7. There are no sophisticated contractors in China as in Hong Kong, therefore, the project is divided into contracts in smaller contract sum and smaller scope of work and sub-let to different kind of contractors. For example, the earthwork and reinforced concrete structure are issued in the form of B.Q. contract to two different contractors, while the E& M equipment and installation and Decoration of the building are issued to two different contractor in Lump Sum contract.

Besides, the FIDIC condition of contract is employed and implement to define the liability of both contractor and Client.

Q.2.8. Finally, what problems do you see in the construction industry in China?

A.2.8. In general, one of the main problem is that there is not sufficient practically experienced teachers in the colleagues to teach the students of the construction field. Therefore, they taught only the theory which may not be practical. In addition, the quality of labour is generally a problem in China. The idea of quality of the labour is weak. The labour usually bear a concept that it is good enough to have the works done. Therefore, the works quality is usually bad. In addition, the time and coordination management of the Chinese contractor is usually bad. This may due to the problem of the development of the Chinese construction industry.

Meeting with Prof. Du Xun of the Nanjing South East University,
dated 9 November 1996

Objective

In order to understand the current practice of the Chinese construction industry, interviews and meetings are conducted with different practitioners in the industry. This meeting was carried out with the Professor to understand the current status of the Chinese construction industry and the problems incurred in the industry from the academic point of view.

Interview

1. Background

Q1.1 What is your professional background ?

A1.1 I am the Deputy Head of Department of the Civil and Structural of the Nanjing University. I was involved in providing advices to various government construction projects in Nanjing for many years.

2. The Chinese Construction Project Management Practice

Q2.1 What is the usual practice in carrying out a construction project in China?

A2.1 In China, the clients of construction projects are usually Government Departments. Usually, the Government Department responsible for the project will carry out a very detail feasibility study before appoint a Preparatory Office (PO) or Construction Engineering Unit (CEU). After the project need is justified, a PO or CEU is appointed to carry out the project. Then this PO or CEU will arrange the Master Plan Design, Detailed Design and Construction Drawings be prepared. A design institute is usually appointed to prepare the detailed design and the construction drawings.

In recent years, as it is required in the Construction Supervision Ordinance, the PO or CEU will also appoint a Construction Supervision Unit (CSU) to monitor the construction works. Therefore, the PO or CEU virtually is the client of the project at different project phases.

Q2.2 Do you think the concept of Partnering is applicable in Chinese construction industry?

A2.2 In general, it is impossible to apply the Partnering concept in the Chinese construction industry. It is because most of the clients are Government Departments, and there is no need to use Partnering to complement any of their shortages. Besides, this would make the project organisation more complicated as different Government Departments are usually involved in specific parts of a construction project.

However, as the number of Joint Venture type projects increase, the concept of Partnering will be accepted. In addition, as the privatisation of Government Departments, the Partnering concept will be need to increase the efficiency of the State Owned Enterprise. In conclusion, as the development of the construction industry in China is different from the western society, the need of types project management techniques are different.

Q2.3 What other problems do you see in the Chinese construction industry?

A2.3 In general, the lack of legislation for the construction industry imposed some problems. In addition, as most of the law for construction industry are still in development, some of the problems are possible to resolve readily while some required a longer time.

For instance, the enforcement of the Construction Supervision Ordinance since 1988 has improved the structure of the construction industry. However, as the construction supervision system is still in development, a lot of supervising engineers are inexperienced. Besides, most of the supervising engineers are come from contractors with very little formal training. Therefore, further training is required for the supervising engineers. In particular, most the supervising engineers do not have a common understanding of works coordination.

In addition, as the construction industry is in a transitional period, the CSU are usually overruled by the client. Besides, some of the project do not implement the CSU system.

Furthermore, lack of experience people to provide training on construction supervision also limited the development of competent supervising engineers.

Q2.4 What kind of problems is imposted in the construction industry due to the contractors?

A2.4 Usually, the contractors are not planned well in advance. In the situation that the CSU is inexperience to spot out the problems, the projects are usually delayed. In addition, though the Government issued the Standard Form of Contract for construction projects, there is still a distance between the theory and practice.

Q2.5 What other limitation is imposed in the Chinese construction industry due to the different concept of the practitioners?

A2.5 As the CSU is employed by the client, the client usually expected the CSU to biassed on their side in supervising the works. Therefore, the client usually complain and interfere the supervision works. On the other side, the CSU usually complaint that they are not given an enough power and authority to supervise the construction works independently.

Meeting with Mr Chen Jia Jun of the Preparatory Office of the new Nanjing Airport Expressway, dated 9 November 1996

Objective

In order to understand the current practice of the Chinese construction industry, interviews and meetings are conducted with different practitioners in the industry. This meeting was carried out with the Preparatory Office personnel, which is virtually the client of the new Nanjing Airport Expressway. The Expressway is the major transport access for the new Nanjing Airport located in the Jiangning district of the Jiangsu Province.

Interview

1. Background

Q1.1 What is your position in this project?

A1.1 I am the Head of the Preparatory Office for this new Nanjing Airport Expressway project. I am responsible for directing all the project activities of this project. In the pre-construction phase, I was responsible for appointing the design institute to prepare the detailed design and the construction drawings. In the construction phase, I was responsible for the tendering process and selection of contractors. In addition, I was also responsible for the procurement of construction material.

Q.1.2 What is the scope of this project?

A.1.2 The Nanjing New Airport Expressway is a toll highway which started to construct on June 1995 and is expected to complete on June 1997. The total contract sum of this project is RMB4,000,000 which is divided in to 3 contracts. This project comprises the construction of highway bridges and embanked roads at a total length of 2400m. It also includes the construction of control buildings and interchanges to connect the existing road network. In addition, the works of the project includes soil excavation of 4.5km^3, the construction of shallow foundation of highway bridges and the filled embankments. Besides, the scope of work is increased after the Jiangning Economic and Technological Development Zone (JETDZ) requested the preparatory office to add an exit to the JETDZ highway. This design change is approved by the Provincial Government and the construction cost is bared by the JETDZ.

The Project Management Practice

Q.2.1 What is the organizational structure of this project?

A.2.1 This project is a construction project that uses the traditional government project practice. The Nanjing New Airport Expressway Preparatory Office (NNAEPO) is formed by the officials of the Department of Communication of Jiangsu Provincial Government to construct this project. There are 4 Senior Engineers (SE) under the Chief Engineer (CE) in the organization. The SEs are responsible for the planning and control aspects, the engineering technical aspects, the material and testing aspects, and the office administration and coordination aspect of the project.

This kind of set up has an advantage of minimized problems in procuring the required land through governmental instruction. This arrangement is necessary for the tight schedule of this project in accelerating the works through the governmental instruction.

In this project, the Jiangsu Communication Planning Design Institute (JCPDI) is responsible for the preparation of detailed design and working drawings, and the NNAEDO is responsible for the overall construction supervision. In particular, the construction supervision of the building works are carried out by the Jiangsu Scott Wilson Kirpatrick Consulting Engineers.

Q.2.2 What kind of procurement method is used in the project?

A.2.2 As this project is constructed based on the traditional practice, the Unit Cost contract is used for this project. The contractors are appointed through a short-listed tender process. A construction tender assessment committee is formed to select the contractors for this project.

Q.2.3 What kind of problems did you come across in this project?

A.2.3 The tight schedule of this project already made it a great difficulty to complete the project on time. In addition, one of the three contractor is incompetent, therefore, the NNAEPO have to do most of the planning and coordination works for the contractor. As a result this imposed more work load on the NNAEPO. It was lucky that last summer is not a too rainy season, otherwise, that would have been a serious problem as the excavation work was expected at its peak during that time.

In addition, there was a target to complete all the excavation works within 90 days in the works programme, however, all the contractors requested a speed up fee so that they can achieve this target. Therefore, the Preparatory Office have to use governmental instruction to instruct the contractors to complete this task on time.

Meeting with the Construction Supervision Unit (CSU) of the new Jiangsu Province Communication Department (JPCD) Building,
dated 11 November 1996

Objective

It is hoped to understand the current practice of the construction industry in China through interviews and meetings with different kinds of people in the industry. This meeting was carried out with the Construction Supervision Unit (CSU), which is known as Jianli in Chinese, of the new JPCD building which is the office building to house all the control centers of the Communication Department of the Jiangsu Province.

Interview

1. Background

Q.1.1 What is the function of the JPCD building?

A.1.1 The JPCD building is built to house all the control centers and divisions of the Communication Department of the Jiangsu Province. These included the air, sea and land traffic control center and various divisions of the Communication Department. The project sum is 200 million RMB and the gross floor area of the building is 3100m^2 which comprise of 2 levels of basement and 28 floors above ground level. The total structural height of the building is 105m and there will be an antenna tower on the roof which makes the building to a height of 134m. The building was planned 3 years ago and the project was delayed due to funding and design problems. The building was redesigned and the construction works commenced in mid-1995 when some of the design works including the finishing and E&M works of the building was still in design process. The structure of the JPCD building was completed in the Nov 1996.

2. The Project Management Practice

Q2.1 What is the organizational structure of the JPCD building project?

A2.1 In the traditional government-funded project like JPCD building, a preparatory office is established for the project. This preparatory office is consisted of personnel from the provincial government and municipal government to act as the client team of the project. Their work briefly included the followings.

i) arrangement of project funding

ii) appointment of design institute, material supplier, contractor and the CSU

iii) financial and works progress control, etc.

Q2.2 What is the duty of the CSU in the JPCD building?

A2.2 In general, the CSU in a construction project is to control the quality, cost and progress of the project during the construction phase as state in the Ordinance of Construction Supervision. Besides, the ordinance also states that the CSU should be responsible for the contract management and coordination of different parties for the construction. However, the client team considered that the information of works and cost progress of the project is confidential and does not want a third party like CSU to know. Therefore, the CSU is only allowed to monitor the quality of material and the workmanship of the building while the client team is in control of the cost and works progress.

Q2.2 What kinds of problems do the CSU face when carrying out the duties?

A2.2 As the client team still refrain the power to certify the interim payment and the details of the project programme is not released to the CSU, the CSU does not know the planned works programme of the project and have no idea whether the works falled behind schedule. Besides, as the CSU has no power to certify or not to certify interim payment. Therefore, the CSU was not able to carry out suitable action like certify interim payment only for portions of works that had been done to push the contractor to accelerate the works to meet the planned target.

In addition, the material supplier such as concrete and reinforcement was appointed by the client. The reports of sub-quality material was often ignored by the client. This may also due the fact that the suppliers are Government departments.

There was not a General Specification to form the construction contract. When CSU requests the contractor to rework the bad workmanship parts, the Contractor by pass the CSU and asks the client team to accept substandard works. The CSU could only keep the records of all the substandard works and sent to the client team for record. Besides, as there were not sufficient working drawings, especially the E&M and finishing working drawings, and general specification was missing, the CSU was in a difficult situation to certify the completion of works. Besides, the CSU could only supervise the works based on their own experience. The CSU was also not authorized to stop the works when they found the works was below quality.

The incompetence of the Contractor was also a problem of the JPCD building project. The Contractor of the JPCD building is the Nanjing City 2nd Construction Team which has several construction projects at the same time during the construction of the JPCD building. Therefore, the Contractor was not able to supply enough skilled labors for the project. Instead, the Contractor employed peasants from the rural area to work for the project. Therefore, the quality of works was bad and uncontrollable. The contractor do not prepare detailed planning for the works also made the CSU difficult to follow up the works carried out. Also, the finishing works were poorly carried out. It was often in conflicted with the E&M works as bad coordination was carried out between sub-contractors.

Although a unit price contract was signed between the contractor and the client, the contractor was non-verbally allowed by the client to work not fully according to the conditions in the contract.

The interview with Mr Li Jia Xin of the Communication Planning & Designing Institute Jiangsu Provincial, dated 12 November 1996

Objective

It is hoping to gather information of the current practice of the construction industry in the PRC through interviews with different kind of people. This interview was carried out with Mr Li Jia Xin of the Communication Planning & Designing Institute of the Jiangsu Provincial. Through the interview, it is aimed to see the current practice and situation of construction industry in the PRC from the designers point of view.

Interview

1. Background

Q.1.1 What is your position and role?

A.1.1 Mr Li Jia Xin is the Senior Engineer and Vice President of the Communication Planning & Designing Institute Jiangsu Provincial and the director of the Jiangsu SWK Engineering Consultants Co. Ltd. Mr Li has been involved in the design and construction works of highway infrastructures for many years.

2. The Project Management Practice

Q2.1 How do you describe the construction industry in China?

A2.1 As the government adopted a planned economy system in China, therefore all the construction projects were planned and constructed according to the master plan issued by the national government to the provincial government, municipal government and town government through governmental instruction. This master plan is normally in a 5-year base. The client project team normally included government officials from the provincial government, the city government and local government.

The duty of the client team ranged from the appointment of design team and construction teams to land obtainment, fund acquirement and procurement of material. This huge client team therefore was responsible for all the aspects of the project including the quality, cost and progress management of the whole construction project. Furthermore, there used to be a post called Quality

Control Official who is responsible specially for the quality control of the whole construction project. .

Q2.2 What is the current construction system used in the PRC?

A2.2 After the introduction of open tendering system in the construction industry in 1984, some changes are initiated in the construction industry. This included an ordinance that projects with a sum over RMB500,000 shall recruit a contractor through the tendering which may be in the form of public tender, short-listed tendering or negotiation tender. This is unlike the situation that used to be the project team appoints a contractor through the governmental instruction. As this arrangement do not guarantee the most cost effective contractor is selected or the contractor is selected for it has a good relationship with the key project team member.

Under the new ordinance, the contractors must be assessed by a Tendering Assessment Committee which is formed by the provincial or municipal government to ensure that the best contractor for the project is selected. The client can appoint his representative in joining the Committee which consisted of the government selected specialists. Therefore, the selection of the contractor is based on both the advices form the specialist and the willingness of the client. Besides, this ensures that the selected contractor is best to the client and the society form a macro-economy point of view.

Moreover, in forming the Tender Assessment Committee, not less than 3 professionals shall be invited to assess the tender in case of close tendering. The foreign contractors can also be invited to tender through the Ministry of Foreign Trading International Tendering Committee in foreign invested projects.

Q2.3 What is the ordinary organizational structure of a client team?

A2.3 In general, the client team of a government-funded project consists of a project manager and there are different persons responsible for different kind of works like project planning, technical/engineering aspects, material procurement, cost control and labor & technician arrangement under this project manager. As there are various kind of functions required in a construction project, the client team is usually consisted of dozens of people.

In particular, a design institute is a appointed to prepare the detailed design and all the drawings included the tender and working drawings. However, in the construction phase, the design institute is only responsible for the revision of the working drawings to suit the site conditions or to make any design revision.

Q2.4 Finally, what other ordinances are also employed in the Chinese construction industry?

A2.4 The government also introduced the construction supervision system in 1988, the client team is required to appoint a site supervision unit to monitor the cost, progress and quality of the project in the construction stage. However, not most of the client teams understand the importance of this construction supervision system and a large number of client teams still refrain the power to control the cost and progress of the project. Thus, weakened the function of the construction supervision system.

Meeting with Ir Peter Soundy - Project Manager of the Mead Johson China Canning and Blending Facility (Scott Wilson); Chinese Procedure Coordinator of the AnChia Milk Product (Guangzhou)
Location : Scott Wilson Office at Metroplaza Tower 1
Time : 4 November 1997

The Mead Johnson Project

Q1. What is the organisational arrangement of the Mead Johnson project?

A1. When Scott Wilson were appointed, the Project had already been designed by Mead Johnson and John Brown (one of the largest EPC contractors in the USA). The general layout, dimensions, floor heights, etc were generally set based on a detailed process layout by Mead Johnson and their nominated process contractor. The size of the plant was therefore set with no scope for optimisation or major cost reductions.

In addition, the site had already been purchased.

Q2. What problems did you come across at the pre-construction phase of the project, and what improvements would you suggested for the project?

A2. During both the preliminary design and detailed design phase delays occurred in getting drawings and documents produced by the Design Institute (D.I.) This is relatively normal on all PRC projects, but some considerations to improve their response could have been :

(i) Because of the client's own definite requirement for open warehouse areas a drencher curtain was required by China fire regulations. This was a rather unusual factor and took some time to get the D.I. to incorporate and then to get the fire bureau's approval. It would have perhaps been better to convince the Client to compartmentalise the warehouse and negate the need for the drencher

(ii) With the client in the USA and the PM in Hong Kong, communication with the D.I. was not always regular. The designer's co-ordinator would visit the D.I. every 1-2 weeks but in critical phases a closer monitoring by locally based staff or staff based in the office of the D.I. would have been beneficial

(iii) The interaction between the architect and the D.I. was not as good as it should have been. Particularly during the detailed design phase the architect waited for the D.I. to produce drawings and then briefly commented on them. This "checking" was not very effective and a lot of errors were left to be resolved on site. This caused construction delays, abortive works and some additional costs (although generally not large). To correct this the PM's Design Co-ordinator either needed to have a better understanding of the architectural aspects of the job or the architect needed to take a more pro-active role in supervising the DI's work.

Q3. What problem did you come across in the project, particularly during the construction phase?

A3. The award of the main contract was delayed such that there was a gap of 1-2 months between completion of the ground beams and award of the contract. This was largely due to :

- delays in preparation of the drawings by the DI.
- delays in preparation of the contract documents and specifications by SW (this task was underestimated and with very limited standard documents available it required a lot of work - solution is obvious - have standard contract documents and specifications available)
- longer than anticipated tender and negotiation period

In addition, following the tender of the works and the interviews, etc, SW recommended the works be awarded to a small local company which has successfully completed a preliminary ground beams and pile caps contract.

However, due to political interference from the joint venture partner the contract was awarded to a large provincial contractor which performed poorly throughout the project. In particular they took nearly two months to mobilise on site, and performed so poorly in the final fit-out and finishing part of the project that they were ordered off the site and the final clean-up and defects work was undertaken by directly employed labour under the control of the PM.

The moral here is easy - do not accept interference in the contractor/supplier selection process and preferably use contractor teams/suppliers known to the PM.

Q4. What particular category of the works incurred most of the problems in the project construction phase?

A4. The performance of the E&M contractor is poor. Despite selection of a reputable HK E & M Contractor, they performed badly (both in time and quality). The main reason was the difficulties experienced in managing their local subcontractor, which was largely forced upon them by the local authorities. The obtaining of the necessary permits for the foreign contractor was a major problem and therefore the local subcontractor had a lot more control of the situation than was desirable.

It is necessary to fully aware of the approval requirements for all consultants/ contractors/suppliers and try to select those that are approved, or at least monitor carefully the gaining of the necessary approvals by others. Where possible, locally experienced contractors should be selected.

Q5. What kind of problems did you come across at the quality control aspects?

A.5 In general it is difficult in achieving the final quality standards required due to various reasons:

i) None of the team on site - PM, consultants, contractors fully understood the levels of finishes and final cleanliness required on the project due to the GMP regulations applying to the manufacturing process. This significantly delayed the final handover due to a lot of remedial works required.

ii) This was partially also due to lack of specifications or scope definitions by the client's PM in this area. No comments had been made on the design or specifications previously, but as completion neared, new requirements for detailing and finishing were identified daily.

Q6. What is the difficulties came across in testing and commissioning of the project?

A6. Due to delays in the E&M works as mentioned previously, the commissioning of the systems experienced considerable delays and difficulties. This could be attributed to :

- lack of well trained technical staff.
- inadequate supervision/inspection of the works (subsequently beefed-up by the PM during the commissioning by adding two new and very competent staff)
- lack of desire to complete on the part of the contractor
- large number of variations to the design made by the client
- errors in the design requiring rectification/changes at a late stage

In addition, the interference of the Handover Process by the Operations Staff also imposed difficulties in the testing and commissioning of the project.

The Mead Johnson project was generally managed by their engineering team from the USA. Whilst some general information exchanges occurred with the local operations team as they became established, they did not have "ownership" of the project and therefore took every opportunity to put obstacles in the way of the handover. They consistently wanted more than was originally specified and this resulted in a large number of variations at a very late stage. The general non-cooperative nature of the operations team also delayed local approvals and hindered completion of the remedial works.

Q7. What other management difficulties did you come across at different project phases?

A7. Other management difficulties included the followings:

(i) Supervision Unit

Selection was largely influenced by the J.V. partner. They turned out to be useless and did not contribute to the project as well as they could. This may be partially due to the PM "giving up on them" and taking on more responsibility themselves.

(ii) Co-ordination of the Contractors :

Contractually the main contractor was to co-ordinate with the other contractors. In practice this did not occur and the co-ordination was by the Construction Manager.

The AnChia Project

Q1. Which phases of the AnChia project did you involved in?

A1. Although I was only involved in the initial set-up phase of the AnChia project, I keep contact with Ir Robert Johnson of Lend Lease (LL) regularly to see the progress of the project was carried out as planned.

Q2. What is the details of your involvement in the AnChia project?

A2. LL was not involved in the initial project set-up phase of the AnChia project. SW helped the client in selecting the land, agreeing the land agreement details and progressing the joint venture negotiations, preparing a concept design and an initial programme and cost estimate. SW's local knowledge was invaluable at this stage.

Q3. When is LL start involved in the project and how is the organisational arrangement of the project changed?

A3. During the design development phase LL approached the client with an offer to provide a turnkey project at a "fixed lump sum price". This interested the client and they therefore requested that SW accept a revised teaming for the design development phase with LL as the PM. A fee was agreed for this phase following which LL were to confirm the overall final project price and make the turnkey offer. As LL had not undertaken a project in China, SW's involvement was crucial to provide the local knowledge of design, construction, approvals and utility connections procedures.

Q4. What is the detail of the role of LL after it involved in the project, and what approach did LL use to get the project done?

A4. Following the design development phase, LL became the contractor guaranteeing cost, time and quality for the client. They were successful in getting the job primarily because they engineered the job down below their initially quoted price.

In particular, their approach was :

- offer to undertake the project on a turnkey basis for a price of $XX millions based on the client's original design.
- re-engineer the client's design by analysing the process requirements and reduce the size of the plant significantly to ensure that they would achieve a good profit out of the $XX million
- confirm their price of $XX million for the much reduced plant which however still produced the same output of product.

This approach is fine, provided the Client gets what he wants. The turnkey approach works best when the Client does not have any expertise or willingness to get involved in the detailed planning of the project. They only know what output they require. The Client is, however, open to exploitation by the contractor and not only do they take a significant profit element out of the job. They can also change the price when the Client requests changes to the very limited specifications.

Had SW project managed the construction of the LL design, the final project cost may well have been less. The advantages of the turnkey approach were :

- well defined and guaranteed project cost at an early stage.
- experienced process designers were able to optimise the design and advise the Client on process aspects of the project.
- having the contractor managing the suppliers and subcontractors should provide a higher degree of control and more "hands on" contractors' approach to management and co-ordination.

Disadvantages were :

- after price is agreed, Client is no longer in control of what he gets.
- lack of local PRC knowledge relied on SW initially and caused problems later on during the contractor registrations, and final occupation approvals.

Meeting with Mr. Robert Johnson - Project Manager of the AnChia Milk Products (Guangzhou) Limited (Lend Lease)
Location : Lend Lease Office at China Hong Kong City
Time : 10:20 am to 12:00 pm on 2nd December 1997

Q1. Being the project manager of the AnChia project, what do you think is the goal of a projet manager?

A1. The goal of a project manager is to do the best for his customer, i.e. NZMP in this project. Besides, the project manager have to deliver the project on time, within budget, with the expected quality and enable safety measures is sufficient for the construction.

Q2. What kind of approach did you employ in carrying out this project?

A2. We adopted a turnkey/design and build approach in this project, and we also played the role of the general contractor of the project. Being the project manager and the general contractor of the project, this gave several advantages to the project and the client.

<u>Traditional method - risk on client</u>

Client — communication and contractual relationship

Architect | E&M | Civil | Fire Service | Process | Contractor | Vendor/Supplier

(Fee base)

<u>PM Contractor - risk on PM contractor</u>

Client — communication and contractual relationship

PM (Lump Sum)

Architect | E&M | Civil | Fire Service | Process | Contractor | Vendor/Supplier

(Lump sum)

From a comparison of the two setups, it can be revealed that the client has to bare a higher portion of risk in the traditional method as the consultants are contracted with the client in a fee base, and the client doesn't have an idea of the total cost of the project. Besides, the consultants usually work according to their own expertise. The details of the project may sometimes be contradicting or deviated from the client's expectation, hence the progress of the project is affected. Although this conflict can be resolved by the leading consultant who normally is the architect, the client is still required to monitor the progress of works frequently.

In the PM contractor approach, the project cost is a fixed lump sum to the client. Therefore, the client is able to have a relatively clear idea of the total project cost. Besides, most of the coordination and progress monitoring works are done by the PM contractor who is relatively more competent in carrying out the duties. This not only reduced the workload of the client but ensured the quality of works as well.

Q3. What other advantage do you see in this approach?

A3. It also has an advantage that a centralised communication channel is established. Therefore, information, requirements and objectives are centrally coordinated. This also allows the PM contractor to have a close coordination with the client in defining the process details, room size, supporting facilities required and various requirements. As the PM contractor normally have a board spectrum of experience, he can instruct the sub-consultants with the determined requirements more effectively.

Q4. What are the important things to make a project success?

A4. Formation of a team that consist of the right persons is one of the very important things in making a project successful. The team should have a board spectrum of expertises, therefore, the requirements are determined concisely, targets are met precisely and the problems are solved effectively. For example, the project team of the AnChia Milk Pdt consisted of a process engineer, E&M engineer, building service engineer and civil engineer. Besides, it is important that the project manager is having a general understanding of various categories of works and the implications, therefore, judgements can be made cost effectively.

In addition, it is important to define the project clearly in the inception stage. Sometimes, a client may not have a very clear and precise idea of the project. It is therefore vital to help the client in defining clearly and precisely the project details. In this project, a precise scope of works is defined with the client through a questioning session. This process is properly documented and agreed with the client. Therefore, the requirements and details of the project is clearly defined and the works are carried out according to these requirements and details.

Q5. Is there any standard procedure in implementing an industrial project? What is the procedure in carrying out an industrial project?

A5. An "inside-out" approach is adopted for the industrial projects. In this object-oriented approach, the processing details of a facility are clearly defined with the client first. This included the operation details, required process equipments, process flow, process details, racking details and the required supporting facilities, etc. Then the types, effective size of rooms and layout of the buildings are determined for the process operation, storage and supporting facilities, etc. Finally, a design brief is configured with the determined requirements and details.

Afterwards, the design works are sub-contracted to the design consultants based on lump sum charges. The total project sum is also determined and agreed with the client at this stage. At the same time, works programme and execution strategy are set out to keep tracking of the progress of the design works. Therefore, works are executed according to these plans with the necessary project management techniques i.e. planning, scheduling and controlling. For example, a weekly design meeting is carried out to monitor the progress of the design works. In case of any delay to the progress, the works programme is required to re-schedule and reorganise to suit the progress of works. Besides, the project team is required to motivate the sub-consultants to finish the tasks on time.

During this stage, the project team is also required to plan for the long lead items. For examples, design of special transformers may need to be carried out before the building structures as the fabrication and shipping of these special transformers may require a five months period and the design will take up another month. Therefore, the design of transformer rooms are required to suit the special transformers afterwards.

Q6. How is the project be managed in the construction stage?

A6. A pre-purchase equipment and early works schedule is prepared for the long lead items identified in the overall works programme. In addition to the overall works programme, more detailed works programmes are prepared in tri-monthly and bi-weekly basis to reveal the working sequence and required coordination. Besides, the design information and construction details are also be prepared according to the detailed works programme.

The project was split into packages of works according to the respective categories. The works were split into seven works packages. The works packages included site filling, piling, civil engineering works, epoxy floor coating, steel building, E&M and the sandwich panel installation. According to the detailed works programme, the coordination works are carried out between different contractors. In addition, the schedule, control, revise and motivate process was kept repeating throughout the construction stage.

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                    motivate
Schedule/organise ----------> Implement
        ^                         |
        |                         |
        |      revise             v
        |________________________ Control/review --------> Complete
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Although the Construction Supervision Unit was employed in the project as a requirement of the government ordinance, Lend Lease is responsible for the details of the construction supervision and coordination. Therefore, extra effort was paid to secure the progress of the project. Besides, Lean Lease was also responsible for the design management in the design stage to facilitate the design works be carried out on time.

Q7. How do you manage the constriction cost of the project?

A7. In managing the cost of the project, it is same as a usual business. However, a flexible payment method was adopted in this project. In addition to the pre-construction payment as stipulated in the government ordinance, the contractors were paid in a bi-weekly basis depending on the size and duration of the contract. Besides, it is important to be fair to the contractors or sub-consultants, i.e. pay when it is necessary to pay.

Meeting with Mr. Cao Jun & Mr Johnny H.T. Hung (Lend Lease) - Construction Manager of the AnChia Milk Products (Guangzhou) Limited
Location : AnChia Milk Products (Guangzhou) Site Office
Time : 10:00 am to 3:30 pm on 10th December 1997

Q1. What is the role of Lend Lease in this project?

A1. In the AnChia Milk Products project, Lend Lease is the design and build / turnkey contractor. This allow Lend Lease to provide a cost effective solution to the client - New Zealand Milk Pdt. However, the Chinese government and the local contractors considered Lend Lease as a consultant of the project. This is due to the reason that limitations and restrictions were imposed on foreign contractors. Besides, complicated business approval procedures are required for a foreign contractor to be established in China, and the approval is not allowed in project base. Although this confined the role of Lend Lease in China, Lend Lease followed its own practice in carry out the project as a main contractor.

Q2. How do Lend Lease carry out the project in China?

A2. As Lend Lease do not have its own labour or construction team in China, thus, the works were subcontracted to the local contractors. Lend Lease was responsible for planning and coordinating the works, monitor and facilitate the progress. Lend Lease also requested the civil subcontractor to provide some day work labours to support the Lend Lease site team. These labours follow the instructions of the Lend Lease site staff in carrying out some minor works. This helped to ensure some safety measure and house keeping of the site was carried out.

Q3. How many contractors worked for the project?

A3. There were 7 subcontractors carried out the works for the project. They are the poly-epoxy floor coating contractor, steel structure contractor, thermal insulation sandwich panel contractor, site filling contractor, piling contractor, E&M contractor and civil contractor. The public utilities works such as power supply, water supply and sewerage were required to be constructed by the government nominated subcontractors. Besides, under the China construction ordinance, a licenced construction supervision unit was employed to supervise the works.

Although, some of the works were physically carried out by local contractors, these works were closely monitored and supervised by foreign specialist contractors. For example, the poly-epoxy floor coating, the steel structure and thermal insulation sandwich panels were carried out by local contractor under the close supervision of foreign specialists contractors, and the process plants were installed by the client himself. The E&M works were subcontracted to the E&M contractor Polycrown. Since Polycrown does not have the working licence in China, the installation works were therefore further subcontracted to local E&M contractors. In the arrangement, Polycrown was responsible mainly for the supply of E&M equipments and material from overseas or locally. Polycrown was also responsible for the supervision of the installation works. However, the supervision of E&M works were not carried out satisfactorily as Polycrown was not able to facilitate the subcontractor to carry out the works effectively.

Unlike the resident engineers in the western country, the supervising engineers in China are having different perceptions. They supervise the works for the benefit of the society. Their concern is focussed on ensuring the government procedures followed and specifications met while completion of works on time or quality works is of less importance. This therefore contradicted with the expectation and interest of the client. As a result, Lend Lease requested the supervision unit (Wang Tat) to second 5 extra supervising engineers to work for the benefit of the client in the project. However, this arrangement was not working very successful initially, as these extra supervising engineers still followed their own practice in supervising the works. The situation was improved upon a number of briefing sessions and changing of several supervising engineers.

Q4. What other problems did you come across in the project?

A4. Most of the time, the contractors were not coordinated with each others. This is due to the reason that the contractors in China do not have the common understanding of coordination. They tried to leave out any unforeseeable responsibility for coordination so as to minimise their own works, overhead and operating cost. Besides, the practice in division of works also affected the progress. The traditional practice of construction is followed a trade after trade principle. However, a tight schedule was imposed in this project which required many coordination works be carried out. For example, in laying a underground E&M conduit, the E&M contractor is responsible for laying the conduit while the civil contractor is responsible for excavation and refill of the trench after the conduit was layed.

In the public utilities works, the sub-contractors are nominated from the government departments. They usually regard themselves as working for the government without time constrains. It is therefore important to start the public utility works in an early stage. For example, application for construction of high voltage cable was carried out in the early stage of construction, so that cable construction from connection point to the site by the Electric Power Bureau nominated contractor was completed on time.

Q5. Did you come across any other coordination or procedural problems?

A5. The civil subcontractor often consider himself as the leading contractor, therefore, he often expect other subcontractors to coordinate with him. In order to enable the civil subcontractor to coordinate with other subcontractors, meetings were often conducted with the civil subcontractor for the sequence of the works and Lend Lease have to coordinate the works in detailed. Besides, pre-construction meeting was carried out to clarify the coordination works required for each subcontractor before the commencement of construction works. Though this increased the workload of Lend Lease in defining clearly the coordination required and the sequence of works for each subcontractor, this helped to smoothen the progress of works and improved the efficiency of the construction. Besides, drawing assessment meeting, which is a typical China practice, was carried out to ensure the construction details were matched and the works were not conflicted with each other.

Before the commencement of every type of construction works, it is necessary to apply for a construction works commencement certificate from the local construction bureau. This is a government procedure which often required to pass through several government departments. Therefore, it often took up a lot of time for the commencement certificates be issued. Lend Lease had found two alternatives to solve the problem. In the first method, Lead Lease was required to understand throughly the approval procedure in the first hand. Then Lend Lease submitted all the necessary documents to the related government department. Upon approvals and comments were gained from these government departments, Lend Lease then revised the details and took the approval documents form departments to departments for further approvals. This saved the time to wait for comments or approvals be passed between the government departments. In the second method, Lend Lease used the subcontractors as a middle man to facilitate the approval process. As the subcontractors were usually having a good relationship with the government departments, this helped to speed up the approval process. Besides, these subcontractors were usually had a detailed understanding of the approval procedures, therefore, they were able to handle the situation in a more effective way.

In addition to the construction commencement certification application, quality inspection was also required to be carried out by the local construction bureau. In the Guangzhou Economic and Trade Development District (GETDD), this is carried out by the Quality Monitoring Station (QMS) of GETDD. On all the major works procedure, such as before and after casting of concrete structure, it is necessary to be checked and witnessed by the officer from the QMS. In case of the works is accepted after the inspection, the QMS will then issue a quality inspection certificate to the project. The project teams is also required to re-submit these certificates to the QMS to certify the project is properly completed before it can occupied and operated. Therefore, it is important to coordinate the QMS for the works inspection to prevent any delay of works.

Q6. As the large local contractors are not willing to coordinate the works, is it possible to cut the size of the works and sublet the works to smaller size contractors?

A6. Although the smaller size subcontractor is relatively easier to manipulate, the coordination problems would still exists when too many small size contractor work together. Besides, for works of size larger than RMB500,000 would required to go through a tendering process with the government tendering assessment committee, the downsizing of works packages may increase the amount of tender assessment works as a consequence.

Q7. What other control mechanism did you employ in the AnChia project?

A7. Although most of the time the contractors are not able to meet the scheduled target dates of the project, it is still necessary to determine the milestones with the contractors so that all the contractors can work toward the target dates. In addition, detailed works programmes are prepared in a tir-monthly and bi-weekly basis. This kept track of the progress of the works and planned for the works sequence and details of coordination required. In the bi-weekly programme, various minor works details and procedure were planned. For example, the dimension and installation details of the process plants. Besides, application for construction material approval, such as fire service material and boiler, were planned in the detailed works programme. In case of delay to the progress, it is possible to instruct the contractors to carry out the works in a 24-hours basis. This is possible as the labour cost in China is relatively low and the contractors are willing to increase the labour force to keep up with the works progress.

Although the subcontractors were not able to complete the works identified in the action list during the bi-weekly works progress meeting in most of the time, it is a necessary mechanism to keep track of the subcontractors performance and monitor the progress of the works. This also reminded the Lend Lease site team of the uncompleted works and the subcontractors of the remaining works to be carried out.

In the E&M and plumping and drainage works, Lend Lease tried to use as much as possible the locally supplied material or foreign brands that have plants in China. This is due to the fact that minor material or equipment for these works were not foreseeable at the early stage of the project. If the equipments were imported, it was often difficult to find a required compatible parts in China. For example, the pipe fittings for stainless steel from local suppliers and oversea were usually not matching. Therefore, it is more appropriate to use locally supplied E&M and plumping and drainage material to minimise incompatibility problems in construction stage and maintenance problems in future operation.

In order to ensure the architectural works were not damaged, the final finishes such as painting was not carried out until other works were completed. In addition, the E&M contractor was required to confirm the works were completed and no alteration was required before the final finishes was applied.

In order to keep the client be informed of the works progress, a monthly report was prepared to review the detailed works progress.

Q8. How do you control the cost of the project?

A8. As there are various charges imposted in the construction projects in China, it is necessary to identify the major charges in the planning stages so as to enable a more accurate cost estimation. For example, charges such as cement package charge, block work deposit and quality monitoring fee of 15% total project sum was included. The construction tax was also determined and the construction supervision charges were negotiated with the supervision unit in the planning stage. In addition, charges like the extra supervising engineers were also allowed in the cost estimate. Although it is also possible to allocate a contingency to cater for these charges, this reduced the accuracy of the cost estimation.

A flexible payment method is adopted in this project. In addition to the 20% pre-construction payment, which is a standard practice in China, some of the contractors were paid in a bi-weekly bases while some were paid in a monthly basis. This was depended on the size of the contract with the subcontractor, and this helped the contractor in having sufficient fund for the project.

Sometimes when the scheduled contract period was too tight for a subcontractor, the construction period was relaxed to reveal the real situation. For example, the civil works subcontract was set at 100 days construction period which was relaxed to 150 days finally. This is due to the fact that liquidated damage in China is difficult to be enforced in a construction project. Hence, allowing more time for coordination is required.

Although the labour cost is low in China, the material cost for imported construction material is high. Therefore, it is important to use more local construction material to save the construction cost.

Appendix C

Stage	Related to	Problems	Results
Pre-design (Planning)	Client, PMers	Misunderstood and not clearly defined objectives	Outcome not satisfied, frequent revision of requirements
Construction	Contractor	Lack of coordination between trade contractors, sequential working procedure	Contlicts at interfaces
Pre-design (Planning)	Client, PMers	Bad coordination with GOV and non-GOV departments for approval and registrations	Delay in project approval and construction
Pre-design (Planning)	Client, PMers	Not familiar with local conditions and legal requirements	Underestimated budget and tightened schedule
Construction	Contractor	A lot of Chinese design specifications quoted are outdated or materials are no longer available	Increase amount of V.O., adverse quality of works and delays due to V.O.
Construction	Contractor, Client, PMers	Failure to coordinate with various parties included government departments and trade contractors	Delay in project approval and construction commencement approval
Construction	Contractor	Do not prepare method statement and poor planning for details of works	Inefficient works
Post Construction	Contractor	Often in PRC, the taking over process is not serious enough. Government construction authorities often have good relationship with established local contractors.	Sub-standard quality works are accpeted finally
Project Conception (Design)	Design Institute	Slow design approval stage and incompetence design institute	Delay of subsequent stages
Construction	Contractor	Late delivery of local materials	Delay in construction progress
Construction	Contractor	Labours are normally non-skilled and non-trained	Bad workmanship
Pre-design (Planning)	GOV	Time consuming tedious project and business assessment process	Delay in project approval and construction commencement
Construction	Contractor	Complex contractor organizational structure	Difficult to find the right person to tackle problems, and lengthened problem solving period
Construction	Contractor	Lack of safety procedure and understanding adopted by contractor; Formal safety training is not appreicated	Delay in progress due to accidents
Pre-design (Planning)	GOV	Stringent requirements and constraints	Delay of business license application and various applications
Construction	Contractor	There is still a large gap between PRC's perception of quality and international standard	Sub-standard quality of material and workmanship
Construction	Contractor	Contractor is not customer oriented	Unsatisfied qulaity and workmanship
Post Construction	Contractor	During the defect liability period, rectification works may not be carried out as diligent as it should be, because the concept of defect liability is still not serious in PRC	Extra cost have to be paid for the faulty works

Stage	Related to	Problems	Results
Project Conception (Design)	Client, PMers	Not fully appreciated the supporting infrastructure and utilities	Lack of traffic support, and utilities supply
Construction	Bank	Un-anticipated banking hold-ups in payment of money into PRC, triangular debit problems	Delay in project payment and therefore progress is delayed
Post Construction		Difficult to find good maintenance crew in PRC	The working life of works reduced
Project Implementation (Pre-Construction)	GOV	Typical government conditions of contract too simple and site supervision unit is not included in typical PRC C of C	Difficult to define liability in case of dispute, require variation to maintain quality, works are not completed accordingly on time
Construction	Legal System	Unlike in more developed countries, "LD" clause in PRC is unenforceable. It cannot be used as a weapon to accelerate schedule.	Resulting in bad relationship with contractor, further delay of construction
Construction	Contractor	In simple contract with trade contractor, material is expected to be supplied by the client	Client or Pmers to find and coordinate the supply suitable material
Construction	GOV	Delay due to bureaucratic custom	Delay in shipping of imported material and process plants
Post Construction		Developer often has to be very diligent on their own to prevent any breach of regulations especially fire regulation because the product can be used long before any breach is spotted	Penalty of violation
Project Implementation (Pre-Construction)	GOV	Specification is not part of contract, included only design specification and no workmanship specification and others	Workmanship and material quality is difficult to control or refer to a specific standard
Project Implementation (Pre-Construction)	Contractor	Too many contractors of unknown qualities interested in tender	Lengthened tender assessment and quality is difficult to guarantee
Construction	Client	Contractors in PRC commence works after receives initial payment	Delay in project construction commencement
Project Implementation (Pre-Construction)	Contractor	Small time contractor "borrowing" the name of established contractor to enter.	Quality is difficult to guarantee if incompetent contractor was selected
Pre-design (Planning)	Client	Failure to recognize risks and variations, keep changing of material and project requirement due to changing economic requirement	Delay due to frequent revisions
Pre-design (Planning)	Client, GOV	Not clearly defined Engagement Fee, Assessment Fee and hidden cost by government	Underestimated budget
Project Implementation (Pre-Construction)	Contractor	Contractors often are willing to lower price in order to secure the project at the expense of quality	- poor quality - final cost much higher due to acceleration fees and delay - delay extensively due to insufficient resource
Project Implementation (Pre-Construction)	Contractor	Contractor's financial standing is often difficult to verify	Contractor bankrupt after received the initial payment

Stage	Related to	Problems	Results
Construction	Client, PMers	Poor construction management due to lack of understanding of local culture and practice	Unable to control the progress according to the schedule
Construction	Client, PMers	Insists on using foreign specification and materials	Resulting in high amount of V.O. to suit the requirements
Construction	Contractor	Contractors often take on too many projects and use progress payment of one project to fund other projects	Resulitng in delay of project and insufficient fund to order material and plants
Construction	Client, Contractor	Insufficient funds to pay for material and sub-contractors	Delay in project progress
Construction	Contractor	Poor and difficult to carry out construction supervision	Delay in progress, poor workmanship
Construction	Market	Insufficient skilled labour and site supervision personnel	Construction quality is difficult to guarantee

Stage	Related to	Problems	Results
Pre-design (Planning)	Client, PMers	Misunderstood and not clearly defined objectives	Outcome not satisfied, frequent revision of requirements
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Pre-design (Planning)	Client, PMers	Bad coordination with GOV and non-GOV departments for approval and registrations	Delay in project approval and construction
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Construction	Contractor, Client, PMers	Failure to coordinate with various parties included government departments and trade contractors	Delay in project approval and construction commencement approval
Construction	Contractor	Do not prepare method statement and poor planning for details of works	Inefficient works
Construction	Contractor	There is still a large gap between PRC's perception of quality and international standard	Sub-standard quality of material and workmanship
Post Construction	Contractor	During the defect liability period, rectification works may not be carried out as diligent as it should be, because the concept of defect liability is still not serious in PRC	Extra cost have to be paid for the faulty works
Project Conception (Design)	Client, PMers	Not fully appreciated the supporting infrastructure and utilities	Lack of traffic support, and utilities supply
Construction	Contractor	In simple contract with trade contractor, material is expected to be supplied by the client	Client or Pmers to find and coordinate the supply suitable material
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Construction	Client, PMers	Insists on using foreign specification and materials	Resulting in high amount of V.O. to suit the requirements
Construction	Client, Contractor	Insufficient funds to pay for material and sub-contractors	Delay in project progress

Appendix D

Quick Reference Chart for Chinese Industrial Project

(The purpose of this table is for easy cross-referencing between various Chapters in the Handbook)

	Approval Procedures and *Accompanying Reports*	Approval Authority	Appropriate KEY Project Management Tools Given
Phase 1 (Project Establishment Phase)	Chapter 2.1 **- Project Approvals** Chapter 2.2 ***- Project Feasibility Report*** ***- Joint Venture Report***	- Local / State Planning Committee - State Administration of Industry and Commerce - Ministry Of Foreign Economic and Trade	Chapter 2.3 - Project Teaming - Value Planning - Master Works Programme Planning
Phase 2 (Land Procurement Phase)	Chapter 3.2 **- Schematic Design Approval** ***- Schematic Design Report*** **- Land Usage Approval** ***- EIA Report***	- Land Administration Bureau - Planning Bureau - Construction Administration Bureau - Environmental Protection Bureau - Fire Service Bureau	Chapter 3.3 - Detailed Works Programme Planning - Works Coordination - Value Engineering / Analysis
Phase 3 (Preliminary Design Phase)	Chapter 4.1 **- Preliminary Design Approval** ***- Preliminary Design Report*** Chapter 4.2 **- Design Institute Appointment** **- Construction Development Approval**	- CAB - PB - EPB - FSB - Labour Bureau - Power Supply Bureau - Water Supply Bureau - Municipal Bureau - Hygiene Bureau	Chapter 4.3 - Detailed Works Programme Planning - Information Planning - Change Control
Phase 4 (Construction Drawing Preparation Phase)	Chapter 5.2 ***- Construction Drawings*** **- Construction Application** **- Construction Permit** **- Appoint Supervision Unit**	- CAB - EPB - FSB - LB - MB	Chapter 5.3 - Detailed Works Programme Planning - Risk Planning - Document Control
Phase 5 (Tendering and Construction Phase)	Chapter 6.1 ***- Tender Documents*** ***- Tendering Approval*** **- Tender Assessment Method** Chapter 6.2 **- Construction Commencement Approval** ***- Construction Commencement Report*** **- Quality Monitoring Office Appointment** Chapter 6.3 **- Project Completion and Performance Verification** ***- Project Completion Report***	- Tender Administration Committee - Construction Administration Office - Economic Administration Commission - Industry Administration Commission - CAB - EPB - FSB - LB - HB	Chapter 6.4 - Detailed Works Programme Planning - Works Execution Planning - Earned Value Analysis - Performance Trend Analysis - Cost Status Control - Variation Control

(Note : Checklist for various phases is given in Annex C)

Preface

Inside This Document

This "Handbook" is the "Product" of a research jointly organised by the SW(HK) and the HKPU under a TCS scheme. The goal of this handbook is to make management of construction project in China straightforward. Therefore, in the first hand, the "Users" of this handbook are guided to find the necessary information required for various Chinese construction project approvals. Then, this handbook covers the "Basic" project management knowledge required for construction projects to be implemented in China. In doing so, this handbook is divided into 4 major parts. In addition, the "Users" of this "Handbook" is expected to have "Basic" understanding of general engineering management knowledge.

Part 1 Procedures and Key Project Management Techniques

It includes Chapter 1 to 5, gives the detailed descriptions of the procedures, information required and the "Basic" project management techniques.

Part 2 "Examples" of Standard Forms for a "Mock up" Chinese Project

The Annex A of the handbook, provides the sample standard forms of a "Mock up" Chinese construction project. Through the examples, the users are guided of the necessary information required for the development of a Chinese construction project.

Part 3 "Samples" of Government Project approval Documents

The Annex B of the handbook, sample Government project approval documents are given. These sample documents are provided to give the "Users" an idea of the format of the Government approval documents.

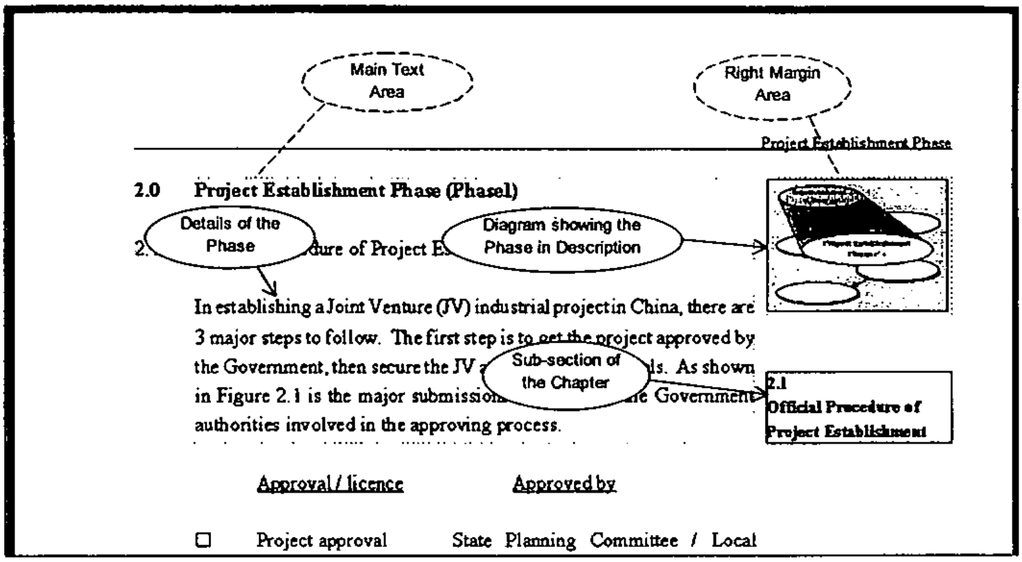
Part 4 Standard Forms and Checklists

The Annex C of the handbook, blank forms are given for the implementation of construction projects in China.

User Hints

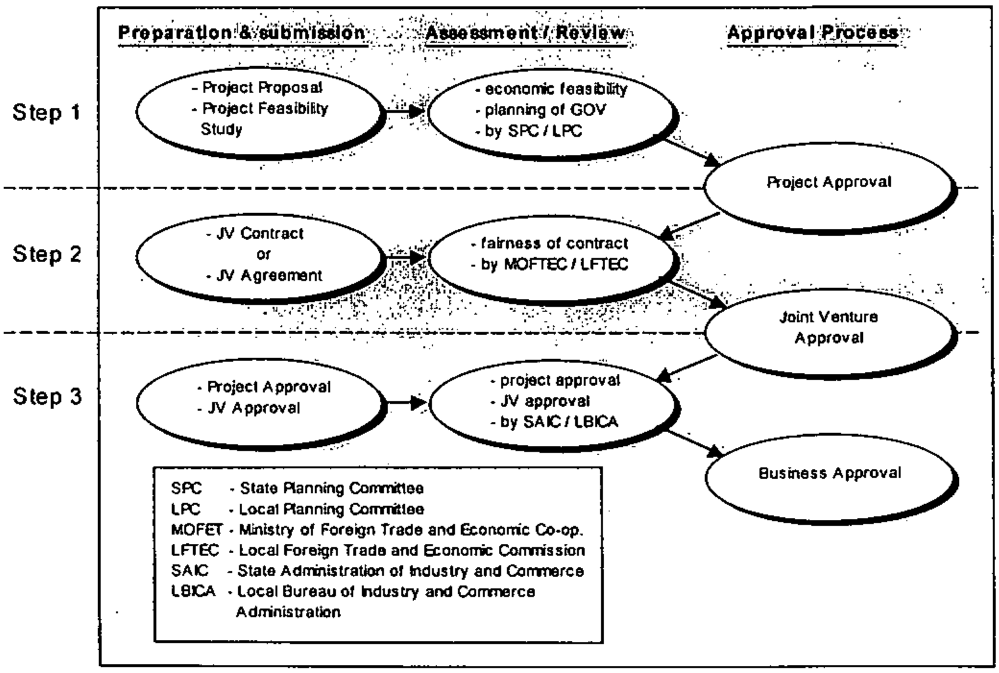
A "Quick Reference Chart" for the approval procedure and information provided in the handbook is shown in the front page of the handbook.

A standard layout is used throughout Chapter 2 to Chapter 5.



In the "Main Text" area :

- Bubble diagrams are used to show the procedure of "Approval"



- "Bar Charts" are used to show the time relationship between works

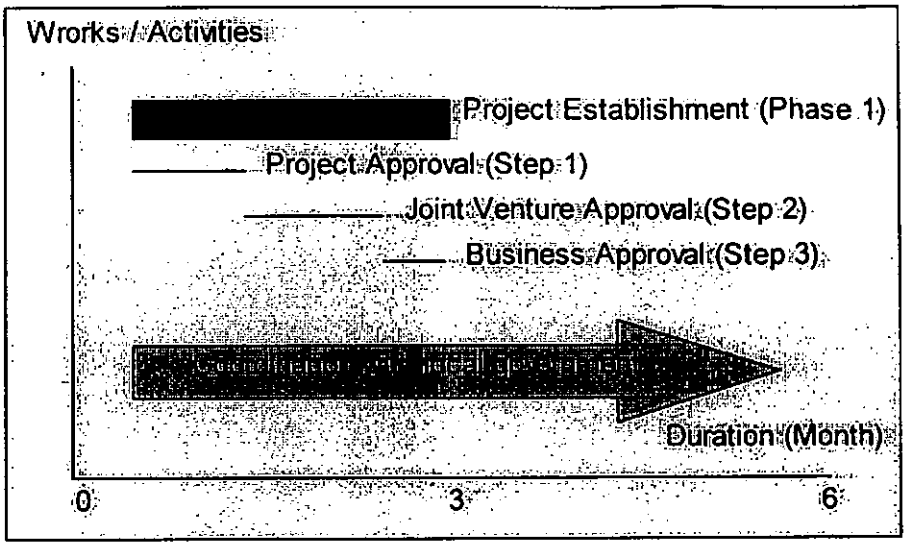
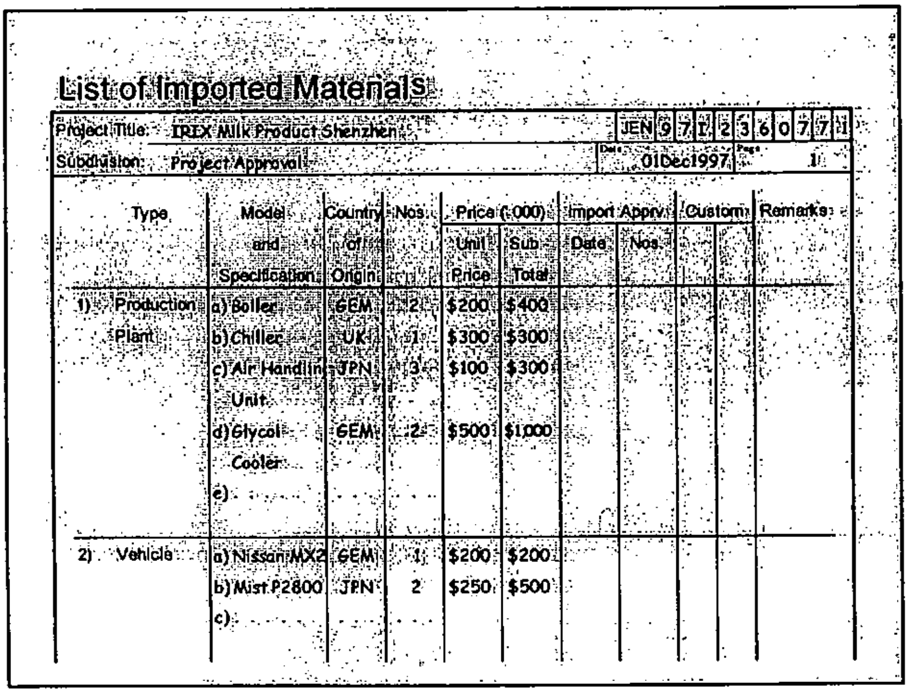


Figure 2.2 Project Establishment (Phase 1) Approvals

- "Forms" are used to demonstrate the necessary information to be prepared, and application of the "Key" project management techniques



List of Imported Materials

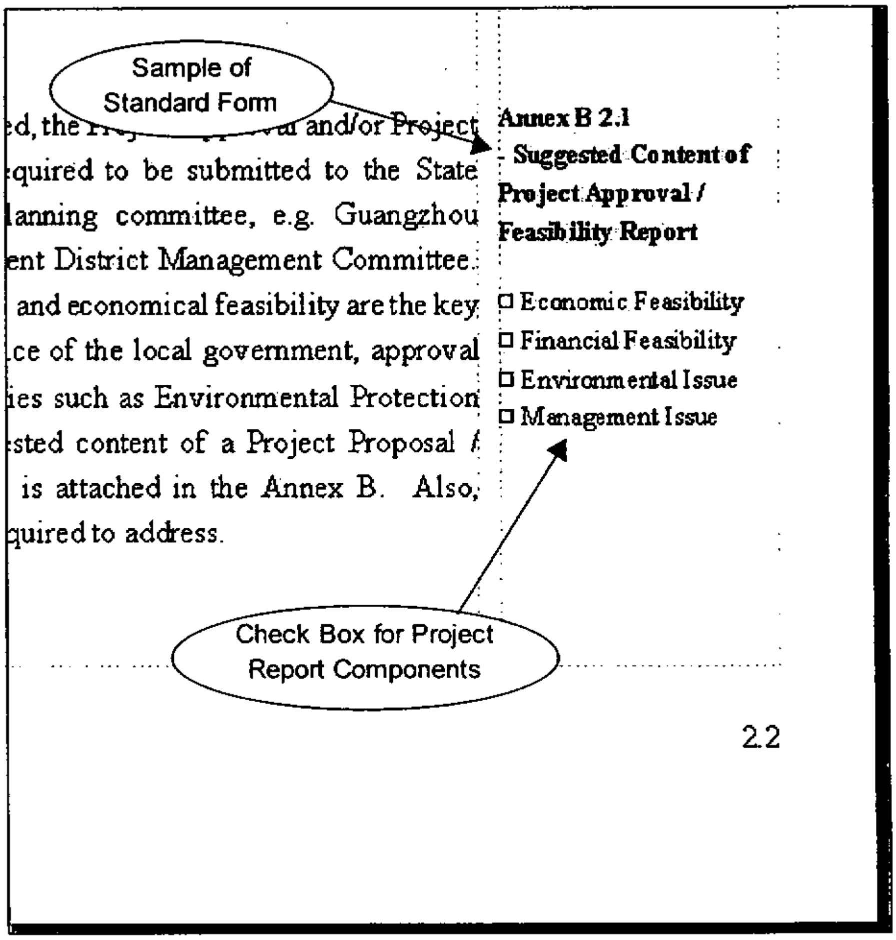
Project Title: IREX Milk Product Shenzhen — JEN 9 7 I 2 3 6 0 7 7 1

Subdivision: Project Approval — Date 01Dec1997 — Page 1

Type	Model and Specification	Country of Origin	Nos	Price (,000) Unit Price	Price (,000) Sub Total	Import Apprv Date	Import Apprv Nos	Custom	Custom	Remarks
1) Production Plant	a) Boiler	GEM	2	$200	$400					
	b) Chiller	UK	1	$300	$300					
	c) Air Handlin Unit	JPN	3	$100	$300					
	d) Glycol Cooler	GEM	2	$500	$1,000					
	e)									
2) Vehicle	a) Nissan MX2	GEM	1	$200	$200					
	b) Mist P2800	JPN	2	$250	$500					
	c)									

All the quick references are provided in the right margin area. For example, check box and quick notes are provided to remind the considerations and forms / checklist to be filled in. The reference of Sample Government Approval Documents are also provided in the right margin.

- Check box are provided to remind necessary considerations
- Annex A indicates the Sample documents for references
- Annex B indicates a Sample Government Approval document for reference
- Annex C included Blank Forms with respect to Samples in Annex A, i.e. Blank Form in Annex C 2.1 = Sample Form in Annex A 2.1
- The "Key" project management techniques required are also indicated in the right margin in **BOLD** face.



Content

Preface

Part I

1. Introduction

About This Chapter

Read this chapter to find out

- General information about this "Handbook"
- Division of the chapters
- Chinese project approval phases

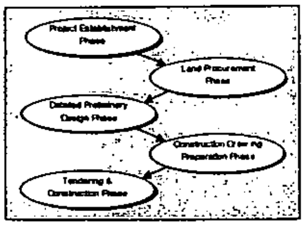
1.0 Introduction

1.1
Purpose of this Handbook

1.1 Purpose of this Handbook

The purpose of this handbook is to give a general guidance to engineers or project managers (the Users) in carrying out industrial projects in China. Although most of the information provided is based on construction projects in Guangzhou Economic and Trade Development District (GETDD), the general procedure described in this handbook should be applicable for most industrial projects in other parts of China. It is expected that for projects not in an economic and trade development district, more complex and variable government approvals procedures will apply. Whereas in an economic and trade development district a "Construction Administration and Management Committee" is usually presence to regulate and assist with the coordination between Government departments.

1.2
China Project Phases



1.2 Overview of the Handbook

This handbook is divided into four major parts. Chapter 2 to Chapter 6 as listed below is divided according to the major Chinese project approval phases. The chapters contain detailed description of the phases of a construction project in China. Each chapter contain details of the major Government procedures and documents required, and guidelines for the applicable project management techniques.

Chapter 2	Project Establishment Phase (Phase 1)
Chapter 3	Land Procurement Phase (Phase2)
Chapter 4	Preliminary Design Phase (Phase 3)
Chapter 5	Construction Drawing Preparation Phase (Phase 4)
Chapter 6	Tendering and Construction Phase (Phase 5)

Besides, bubble diagrams are used to show the works and their relationships.

In Annex A1-A6 of the handbook, the "Example" of standard forms for a "Mock up" Chinese project is provided to give the users a brief idea on the usage of the forms and checklists. The necessary information to carry out the works and prepare the submissions throughout the life-cycle of an industrial construction project is also provided in these sections.

In Annex B1-B6 of the handbook, "Sample" documents of the major approvals, submissions, etc. are provided as a reference.

In Annex C1-C6 of the handbook, blank forms and checklists for implementation of a Chinese construction project is provided.

1.3 China Project Phases

In accordance with the procedures for major Government approvals, the development of an industrial project in China can be divided into five major phases. They are the Project Establishment Phase, Land Procurement Phase, Preliminary Design Phase, Construction Drawing Preparation Phase, and the Tendering and Construction Phase.

As shown in Figure 1.1, the progress of these phases are sequential. It is therefore important to secure the approvals in each phase to prevent any delay to the project.

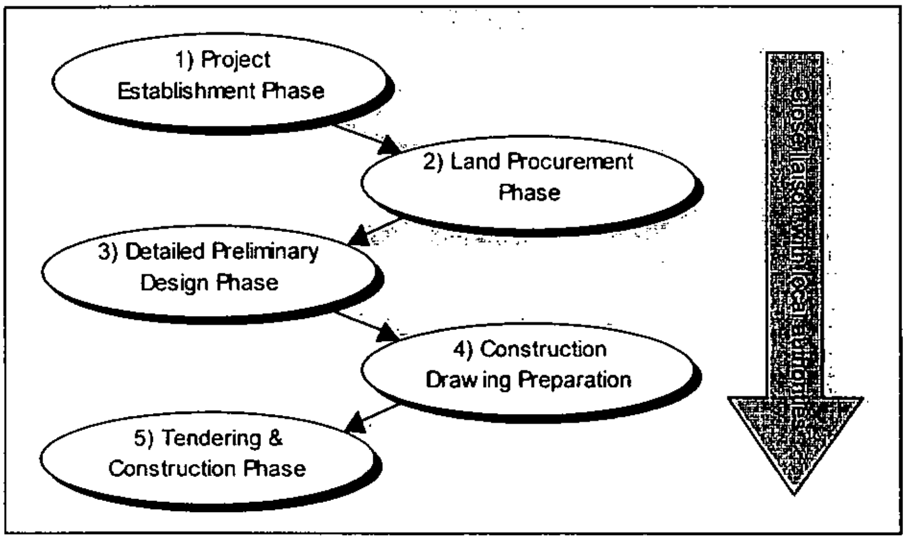


Figure 1.1 Major Government Approval Phases

Throughout the five phases, close liaison with the local authorities is essential in order to:

i) seek the advice of which authority's approval is required as there may not be a single authority to co-ordinate all approvals required;
ii) ensure the procedures and approvals are followed as the procedures and approvals may vary;
iii) seek the advice on the requirements of approvals;
iv) ensure the necessary documents are ready for the approvals;
v) be informed of any revision of requirements;
vi) be informed of the various approval charges;

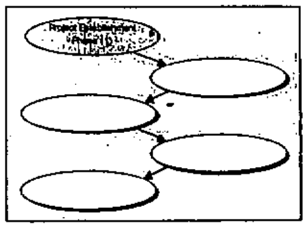
2. Project Establishment Phase (Phase 1)

About This Chapter

Read this chapter to find out

- Government approvals required in this phase
- Government procedure on project approval
- Documents required for the approval submissions
- Key project management elements required for this phase

2.0 Project Establishment Phase (Phase1)



2.1 Official Procedure of Project Establishment

In establishing a Joint Venture (JV) industrial project in China, there are 3 major steps to follow. The first step is to get the project approved by the Government and then secure the JV and Business approvals. Figure 2.1 shows the major submissions required and the Government authorities involved in the approving process.

2.1
Official Procedure of Project Establishment

2.2
Reports for Project Establishment

2.3
Project Management Elements

	Approval / licence	Approved by
☐	Project approval	State Planning Committee / Local planning committee
☐	Joint-venture licence	Ministry of Foreign Economic and Trade / Local foreign economic and trade committee
☐	Business licence	State Administration of Industry and Commerce / Local bureau of industry and commerce administration

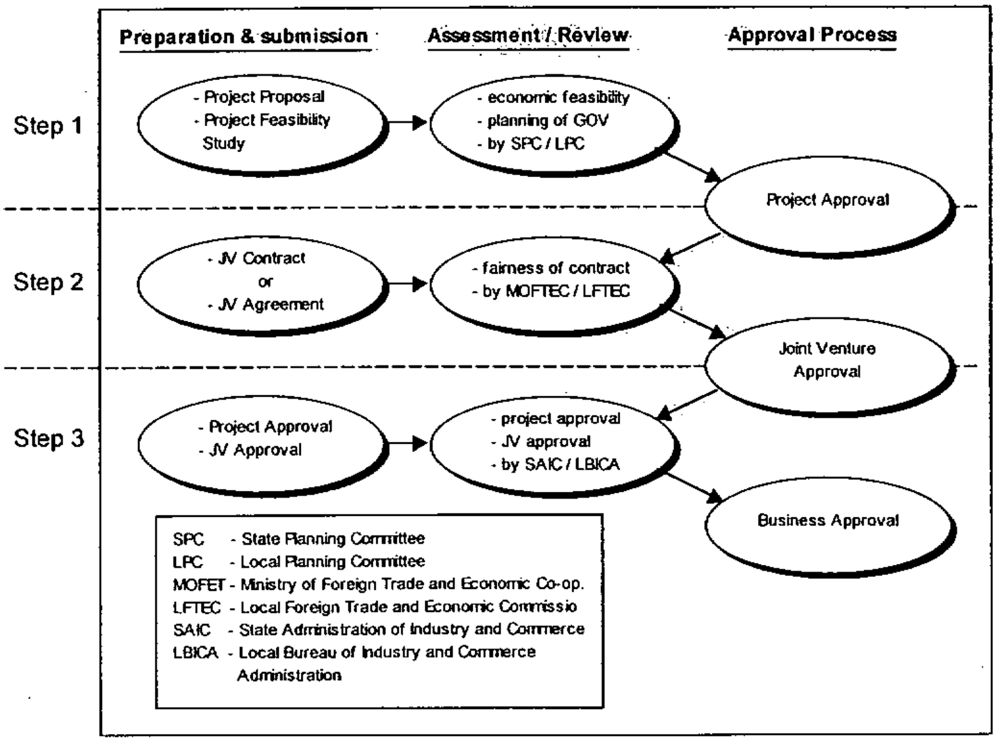


Figure 2.1 Government Procedure on Project Establishment (Phase 1)

In general, for projects of investment greater than USD30 million, approval from the State or Ministry level government authority is normally required. Thus, a longer approval period is necessary. It is also important to establish a project pre-submission meeting with the local authorities in advance to inform them of the proposed project and look for their comments. Figure 2.2 below indicates the sequential nature of the approvals in the project establishment phase.

□ Investment size

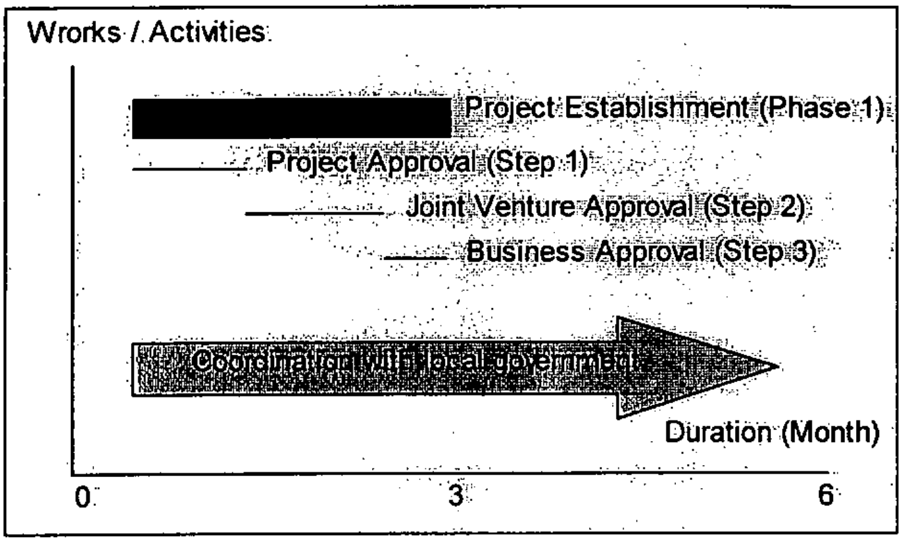


Figure 2.2 Project Establishment (Phase 1) Approvals

2.2 Reports Required for Project Establishment

2.2.1 Project approval report

In order to get the project approved, the Project Approval and/or Project Feasibility Study reports are required to be submitted to the State Planning Committee / local planning committee, e.g. Guangzhou Economic and Trade Development District Management Committee. In the reports, the financial aspects and èconomical feasibility are the key issues. Depending on the practice of the local government, approval from other Government authorities such as Environmental Protection Bureau is required. The suggested content of a Project Proposal / Project Feasibility Study report is attached in page Annex B 2.1. General information to be included is listed below.

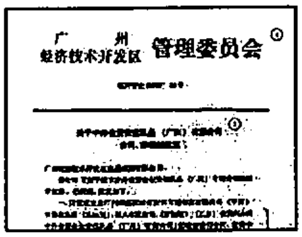
Annex B 2.1
- Suggested Content of Project Approval / Feasibility Report

□ Economic Feasibility
□ Financial Feasibility
□ Environmental Issue
□ Management Issue

Details required in Project Approval / Feasibility Study Report

- ☐ General project information
- ☐ Market analysis
- ☐ Economic forecast
- ☐ Financial forecast
- ☐ Product details
- ☐ Process details
- ☐ Environmental impact
- ☐ Preliminary schematic layout (1:500 layout plan)
- ☐ Materials to be imported

Annex B 2.2
- Sample of Project (Step1) and JV (Step2) Approval



In particular, the List of Imported Material is required to accomplish the Project Report (Step 1) submission. This is necessary for the application of custom approval and any import tax reduction. Figure 2.3 shows part of a typical form listing the necessary information and details required for approval.

Annex A 2.1
- List of Imported Material

- ☐ Production Plants
- ☐ Vehicles
- ☐ Office Equipments

List of Imported Materials

Project Title: IRIX Milk Product Shenzhen — JEN 9 7 I 2 3 6 0 7 7 1
Subdivision: Project Approval — Date: 01Dec1997 — Page: 1

	Type	Model and Specification	Country of Origin	Nos.	Price (,000) Unit Price	Price (,000) Sub-Total	Import Apprv. Date	Import Apprv. Nos.	Custom		Remarks
1)	Production Plant	a) Boiler	GEM	2	$200	$400					
		b) Chiller	UK	1	$300	$300					
		c) Air Handlin Unit	JPN	3	$100	$300					
		d) Glycol Cooler	GEM	2	$500	$1,000					
		e)	. . .	. . .							
2)	Vehicle	a) Nissan MX2	GEM	1	$200	$200					
		b) Mist P2800	JPN	2	$250	$500					
		c)	. . .	. . .							

Figure 2.3 List of Imported Materials

2.2.2 Joint venture agreement / contract

Upon the project approval, the JV agreement / contract is required to be examined by the Ministry of Foreign Trade and Economic Co-operation (MOFTEC) or the local foreign trade and economic administration

- ☐ Contract Details
- ☐ Fairness of Contract

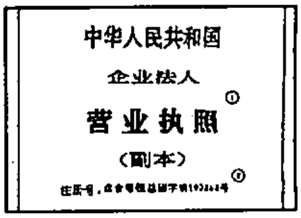
committee, e.g. the Guangzhou City Government. Although the contract details are usually determined by the contract parties, MOFTEC or local foreign economic and trade administration committee is required to review and ensure the agreement or contract is fair to both parties. A sample of the Foreign Investment Approval Certificate is enclosed in page Annex B 2.6.

Annex B 2.6
- Sample of Foreign Investment Certificate

2.2.3 Business approval

After the JV licence (Step2) or the foreign Investment Certificate / Licence is issued, then the project can be submitted to the State Administration of Industrial and Commerce (SAIC) or the local industry and commerce administration bureau to apply for a business licence (Step3). It is not until the project is officially established, that the JV is a legal entity in China and is legal to recruit staff, open bank accounts, sign contracts, etc. A sample of the Business Licence is given in Annex B for reference.

Annex B 2.7
- Sample of Project Business License



In addition, the consultant for the project (if any) is also required to apply for a business licence so as to officially carry out the consultancy for the project. (This can be on a project by project basis.)

- □ Project Approval
- □ JV Approval

2.2.4 Approval charges

Usually, charges are imposed on the approvals and these charges vary from province to province. Although each of the charges may not be high, coordinating with various departments of the local government for details of the charges is necessary. For rough estimates, 2.5% of the total construction cost can be allowed in the project budget for various approval charges and application fees throughout the whole project life cycle.

- Overall Approval Charges

- □ 2.5% of total construction cost

2.3 Project Management Elements

2.3.1 Project organisational structure

Although the temporary nature of projects makes the project group transient, establishing a suitable form of organisational structure is necessary to facilitate the works. This clarifies the function of each party involved and formalises the communication and coordination channel within the project group. Some basic factors in consideration of forming an effective project team are listed below.

Considerations required for team building

- relevant experience
- appreciation of project objectives
- level of available supporting resources
- technical qualifications
- creative / innovative ability
- enthusiasm and commitment
- team attitude
- communication skill

- Team Building

- Experience
- Communication Skill
- Innovative
- Commitment

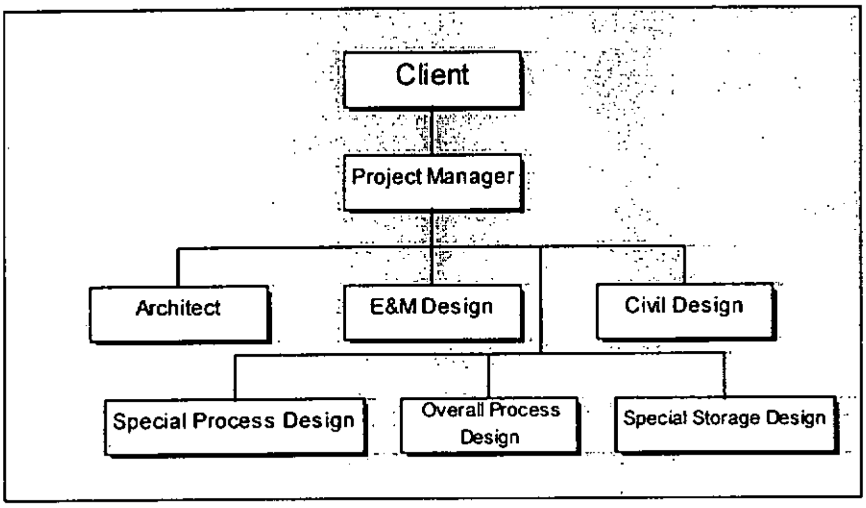
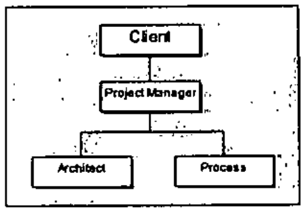


Figure 2.4 Design Stage Organisational Structure

- Leanest Team for Project Establishment Phase



- To produce basic information for project approval
- To give cost estimate

2.3.2 Value planning

In this phase (Phase 1) of a project, value management should be initiated to optimise the value of the project. As shown in Figure 2.5 & 2.6, value management consist of three sessions. They are the Value Planning Session, the Value Engineering Session and the Value Reviewing Session. The basic steps involved in each session included i) determine and weight the performance requirement of the project, ii) identify the alternatives and iii) review and examine both short and long term cost and value of each alternative. In addition, identifying and removal of unnecessary cost is one of the major considerations in the value management process.

- Value Management

- Performance criteria weighting
- Identify alternatives
- Weight alternatives
- Identify unnecessary items

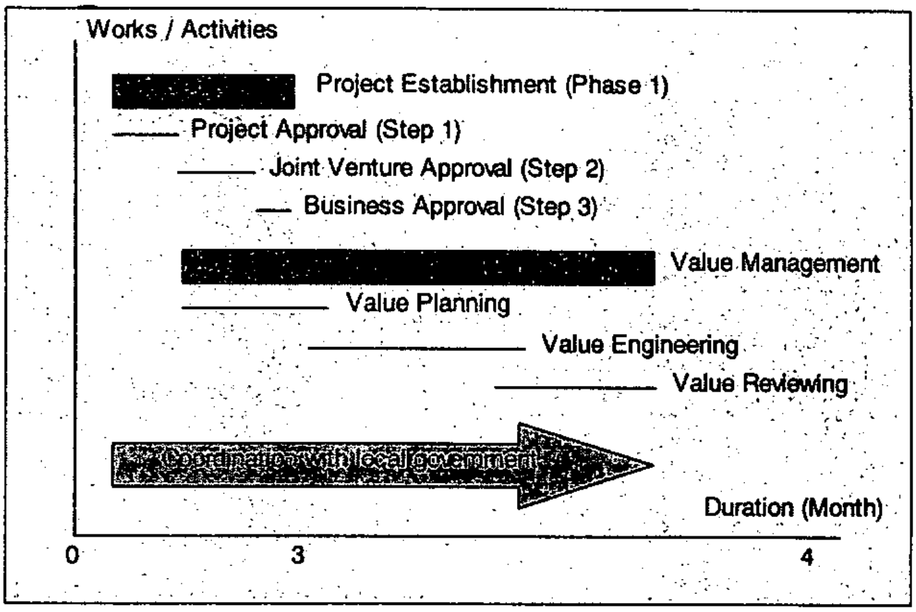


Figure 2.5 Value Management in Project Establishment

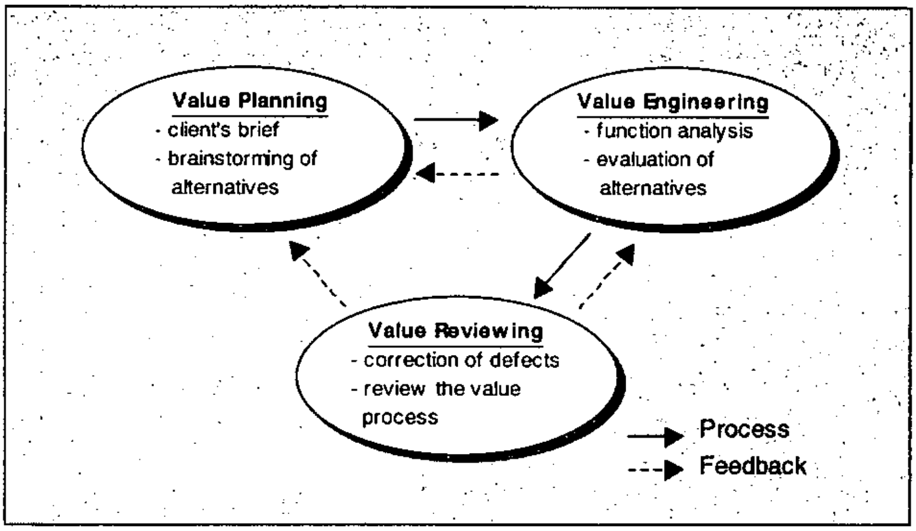


Figure 2.6 Value Management

2.3.3 Value weighting (Design Criteria)

The aim of the value weighting process is to define the objectives and weight the design criteria of the project. A value weighting table is prepared for this purpose. The value of each design criteria is determined by weighting the respective importance. Finally, the facilities are designed and compared with weighted criteria.

Annex A 2.2 - Value Planning Form

□ Design Criteria Weighting

As given in the example (Figure 2.7), the design criteria are breakdown into sub-divisions and weighted. The final weighting is then used in the

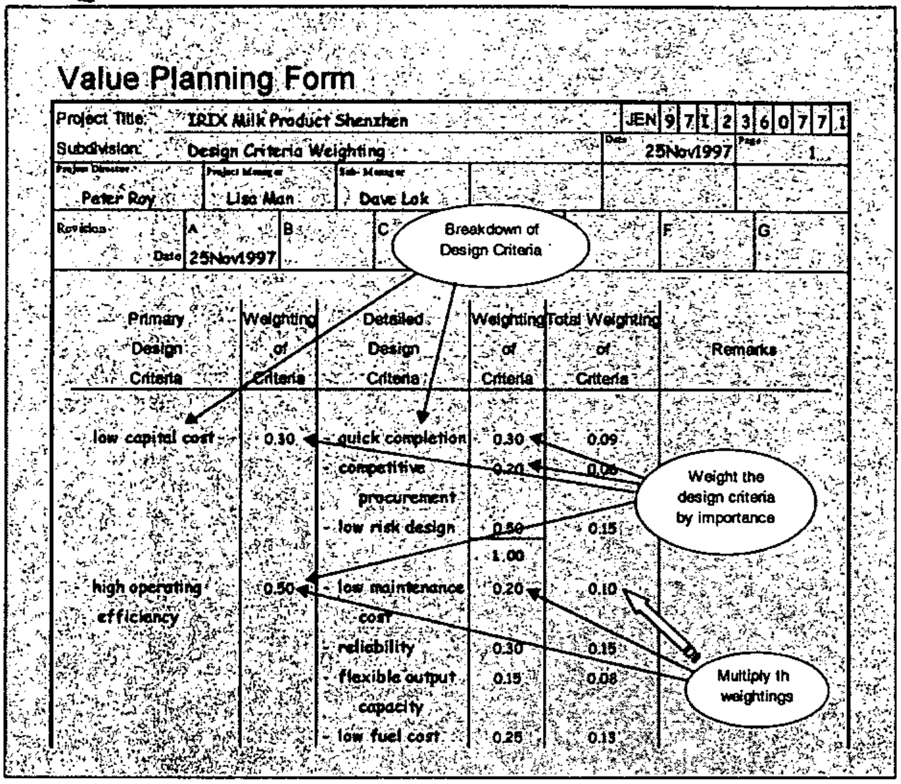


Figure 2.7 Value Planning

value engineering session for selection of the most value generated design.

2.3.4 Preparation of Master Works Programme

In order to control the works throughout the project life cycle, a master works programme is needed for this purpose. A project programme can be formed by following a logical sequence of i) Work Breakdown Structure (WBS) preparation, ii) Activity Code Scheduling, and iii) Works Allocation.

- Work Breakdown Structure
- Activity Code
- Precedence of Works

2.3.5 Works Identification and Planning

Annex A 2.3 - Work Breakdown Structure Form

The basic purpose of a WBS is to plan the project works by breaking down the works into manageable pieces which can be estimated, sequenced, assigned and monitored. The WBS gives an overview of the various tasks with relation to each other in a project. It also provides a mechanism for accumulating costs on the project. Actual costs are recorded for the work packages at the lowest level of the WBS and then summarized into higher levels.

- Hardware
- Software
- Document / Reports
- Review
- Approval
- Meetings

The most typical work breakdown structures break the work according to the physical components / deliverables of the project.

Project -> Architectural decomposition -> Design and Engineering, Hardware, Software, Documentation

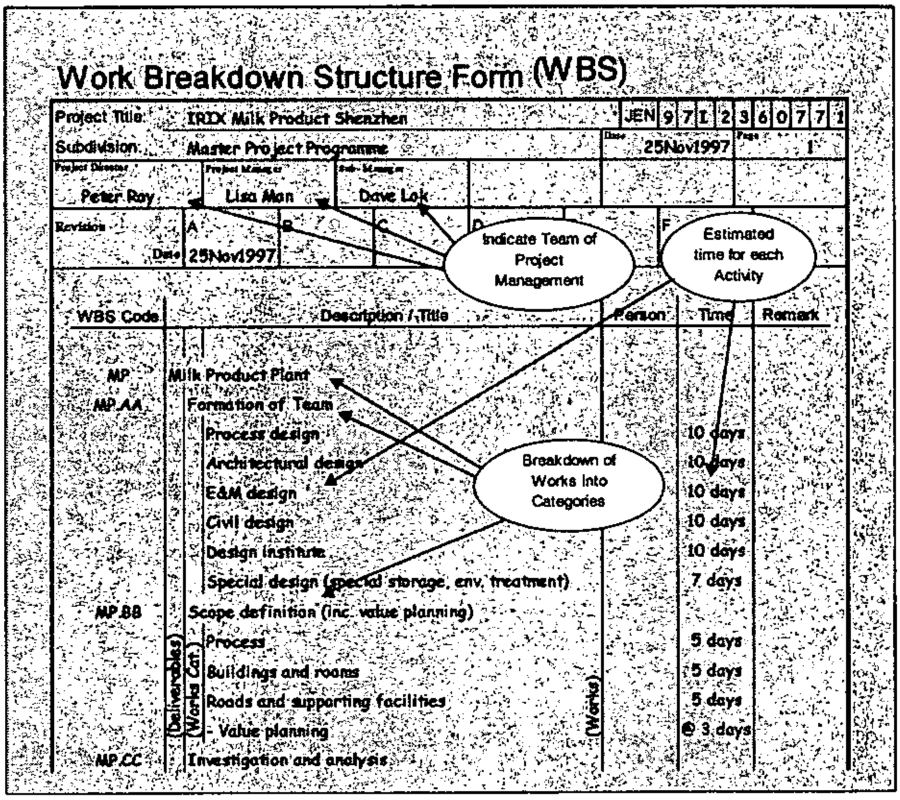


Figure 2.8 Work Breakdown Structure of Master Project Programme

However, it must be emphasised that there is not a fixed way to develop a WBS. It depends upon the type of projects and preference of project team. As shown in Figure 2.8, the WBS is developed with the following order.

Project -> Stages -> Deliverables at Stage -> Elements of works

Although WBS is a logical and systematic way to identify the works required in a project, it allow only one way to present and organise the works in a works programme. Therefore, Activity Code Scheduling method is usually provided in most project programme planning software for organising the works in different ways.

2.3.6 Activity Code Scheduling

The works identified in a WBS can generally be classified into specific categories, including phases, deliverables, responsibilities and milestones, etc. Besides, activity code scheduling also allow a more flexible way to organise the works items to suit different presentation requirements. In the example provide in Figure 2.9, the works are split into categories with the following order. As shown in Figure 2.10, this allowed the milestones sorted with a higher priority than works at each phase to remind the actions required.

Annex A 2.4 - Activity code Scheduling Form

Project -> Responsibility -> Phase -> Deliverables -> Works and milestone

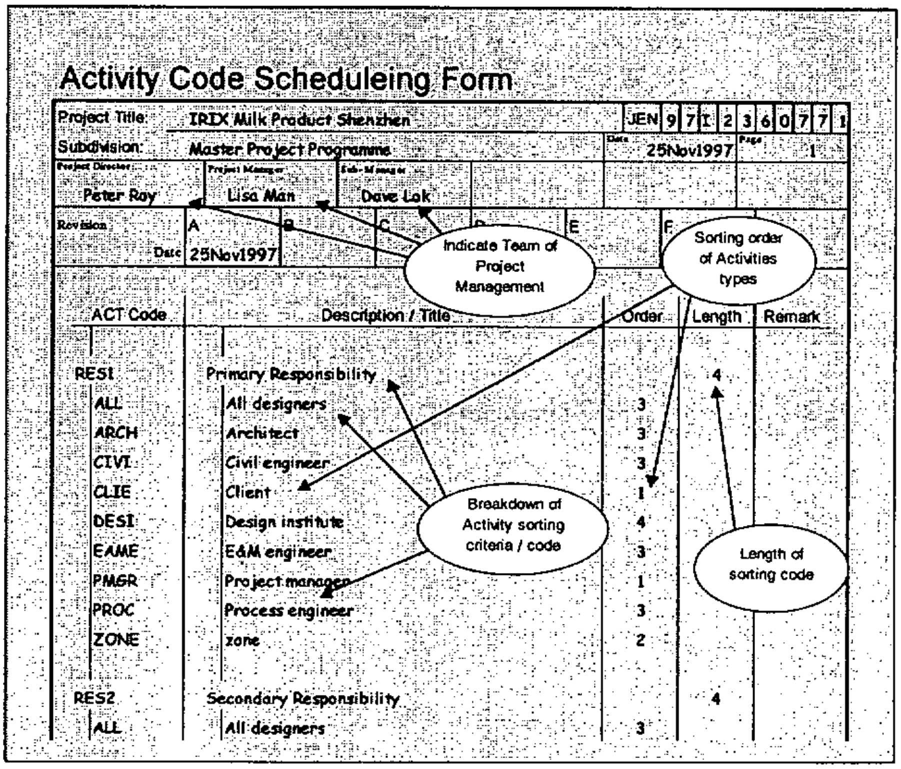


Figure 2.9 Activity Code Schedule for Master Project Programme

In addition, the works programme shall be expanded to included more details before the works are carried out. For example, a three months works programme shall be extracted from the master works programme and be expanded to reveal and plan the details of the works to be carried out.

Works and milestone -> Tasks -> Details of tasks

Annex A 2.5
- Project Status Check Form

Project Status Form

Project Title: IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision: Project Establishment Phase				Date 12Dec1997	Page 1
Project Director: Peter Roy	Project Manager: Lisa Man	Sub Manager: Dave Lok			

Revision	A	B	C	D	E	F	G
Date	02Dec1997						

Project Status / Information	O/A	P	R	Further Details
i) Process details	☐	☑	☐	
process design	☑	☐	☐	
plants layout	☐	☐	☑	Delcan Process Ltd.
ii) Expected investment sum (investment details)				USD 10 Milion
iii) Expected operation (labour/shift, shift/day)				20 head/shift ; 2 shift/day
iv) Project approval	☐	☐	☑	
project proposal report	☐	☑	☐	
general project information (JV parties, investment sum)	☑	☐	☐	IRIX - 80% ; Fuhua - 20%
market analysis	☐	☑	☐	
economical and financial forecast	☐	☑	☐	
production details	☐	☑	☐	
process details	☐	☐	☑	
environmental impacts	☐	☐	☑	
preliminary schematic layout	☐	☐	☑	
list of plants/material to be import	☐	☑	☐	
v) JV approval	☐	☑	☐	

Figure 2.11 Project Establishment Phase Status Report

Either a paragraph, a statement or an indicator to indicate the completion of "Phase I".

2.3.7 Formation of Master Works Programme

Upon identification of the works required for the project and project phases, the project master programme can be developed. Besides, determination of the logical relationship between each activities. The most typical relationship is the "Start to Finish" relationship, but a "Start to Start" and "Finish to Finish" may occasionally required. This can be done by formation of a Precedence Diagram. A sample portion of a master programme is shown in Figure 2.10 and given Annex A.

Annex A 2.4 - Sample Project Master Programme

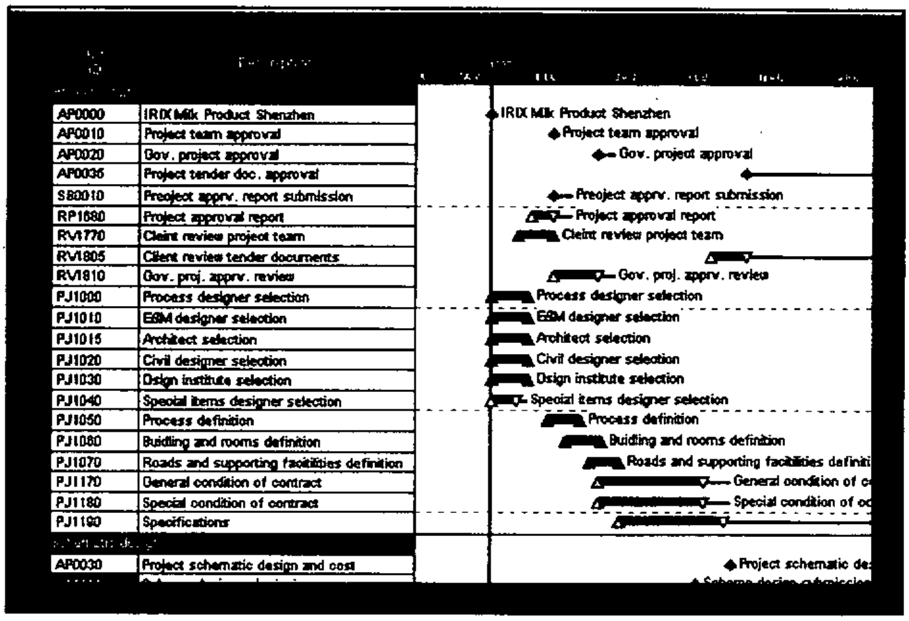


Figure 2.10 Project Master Programme

2.3.8 Project status record

At the end and during the development of each phase, a status record should be prepared to review and record the progress of works. Besides, this also help to identify any further input required for specific works items. As shown in Figure 2.11 is an example of the basic items required to adress at the project establish phase. A standard form of project status checklist is also provided in Annex A.

Annex A 2.5
- Project Status Check Form

Project Status Form

Project Title: IRIX Milk Product Shenzhen					JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision: Project Establishment Phase					Date 12Dec1997	Page 1	
Project Director: Peter Roy	Project Manager: Lisa Man	Sub-Manager: Dave Lok					
Revision / Date	A 02Dec1997	B	C	D	E	F	G

Project Status / Information	O/A	P	R	Further Details
i) Process details	☐	☑	☐	
process design	☑	☐	☐	
plants layout	☐	☐	☑	Delcan Process Ltd.
ii) Expected investment sum (investment details)				USD 10 Milion
iii) Expected operation (labour/shift, shift/day)				20 head/shift ; 2 shift/day
iv) Project approval	☐	☐	☑	
project proposal report	☐	☑	☐	
general project information (JV parties, investment sum)	☑	☐	☐	IRIX - 80% ; Fuhua - 20%
market analysis	☐	☑	☐	
economical and financial forecast	☐	☑	☐	
production details	☐	☑	☐	
process details	☐	☐	☑	
environmental impacts	☐	☐	☑	
preliminatry schematic layout	☐	☐	☑	
list of plants/material to be import	☐	☑	☐	
v) JV approval	☐	☑	☐	

Figure 2.11 Project Establishment Phase Status Report

The Project Establishment (Phase 1) is completed when all the previously mentioned approvals are acquired. Besides, the mentioned project management techniques should be an on-going process into the next project phase.

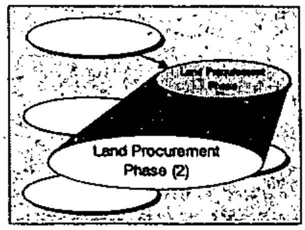
3. Project Land Procurement Phase (Phase 2)

About This Chapter

Read this chapter to find out

- Engineering considerations for site selection
- Government approvals required in this phase (Phase 2)
- Approval procedures to follow in this phase (Phase 2)
- Documents required for the approvals
- Key project management elements included
    - i) Detailed works programme planning
    - ii) Works coordination planning
    - iii) Value analysis

3.0 Project Land Procurement Phase



3.1 Selection of Site for the Project

After the project is officially established, the next step is to secure a suitable site for the project. This should follow a logical sequence of analysis which comprise of identification, analysis and selection of a suitable site with the following considerations.

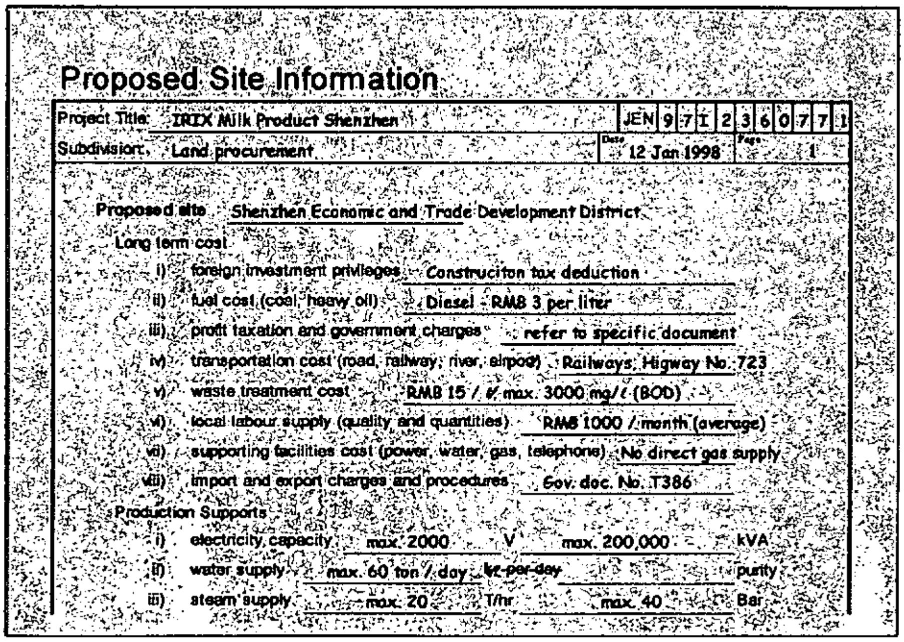
3.1
Selection of Site for the Project

3.2
Land Procurement Procedure

3.3
Project Management Elements

<u>Considerations for analysis of suitable site</u>

- ☐ Available of required raw material
- ☐ Taxation and government charges
- ☐ Foreign investment privileges
- ☐ Environmental protection requirements
- ☐ Land price and requirements
- ☐ Transportation
- ☐ Supporting facilities
- ☐ Meteorological conditions
- ☐ Geographical conditions
- ☐ Geological conditions
- ☐ Preferred site layout
- ☐ Products to be produce



Proposed Site Information

Project Title: IRIX Milk Product Shenzhen | JEN 9 7 I 2 3 6 0 7 7 1

Subdivision: Land procurement | Date 12 Jan 1998 | Page 1

Proposed site: Shenzhen Economic and Trade Development District

Long term cost
- i) foreign investment privileges: Construciton tax deduction
- ii) fuel cost (coal, heavy oil): Diesel - RMB 3 per liter
- iii) profit taxation and government charges: refer to specific document
- iv) transportation cost (road, railway, river, airport): Railways, Higway No. 723
- v) waste treatment cost: RMB 15 / ℓ max. 3000 mg/ℓ (BOD)
- vi) local labour supply (quality and quantities): RMB 1000 / month (average)
- vii) supporting facilities cost (power, water, gas, telephone): No direct gas supply
- viii) import and export charges and procedures: Gov. doc. No. T386

Production Supports
- i) electricity capacity: max. 2000 V max. 200,000 kVA
- ii) water supply: max. 60 ton / day ~~kz per day~~ purity
- iii) steam supply: max. 20 T/hr max. 40 Bar

<u>Figure 3.1 Proposed Site Details Gathering</u>

Annex A 3.1 - Proposed Site Information Record Form

- ☐ Cost of production Material
- ☐ Cost of labour
- ☐ Taxation and Charges
- ☐ Supporting Facility
- ☐ Environmental Protection Requirement
- ☐ Cost of Construction

The proposed site information as shown in Figure 3.1 should be gathered and compared with the project consumption as shown in Figure 3.2. An in depth analysis is then carried out to find the most cost saving site in both long and short run.

Annex A 3.2
- Project Production Consumption Record Form

□ Production Consumption
□ Pollutant treatment required

Production Consumption Data

Project Title: IRIX Milk Product Shenzhen		JEN	9 7 I 2 3 6 0 7 7 1
Subdivision: Production consumption - Site selection		Date 15Dec1997	Page 1

Initial data for operation :

Power consumption
- i) Required voltage 800 V
- ii) Required power 1700 kVA

Water consumption
- i) Quantity 50 ton /day ~~kg per day~~
- ii) Quality Ca, Na salt - 30 ppm max. purity, mineral content
- iii) Further treatment : Osmosis □; Distillation □; Others ______

Steam consumptio
- i) Quantity 5 T / hr
- ii) Pressure 20 Bar

Fuel consumption
- i) Diesel 30m³ per day ~~liter per day~~
- ii) Heavy oil ______ liter per day
- iii) Other ______

Waste generated
- i) Solid / Amount milk powder / 500 kg
  /
- ii) Liquid / Amount waste water / 1 ton / day; BOD - 1000 mg/ℓ

Figure 3.2 Production Consumption Data Sheet

Finally, a Site Selection Report should be composed for the client in recommendation of the most suitable site for the project.

3.2 Land Procurement Procedure

In identifying the suitable site for the project, a land use right should be procured from the relevant government authority. In general, the procurement of land in China means procurement of the land usage right, normally for up to 50 years for industrial project (70 years for residential developments). The procedure for procurement of land in the GETDD is shown in Figure 3.3. Although the details required for assessment / approval for land procurement may vary from province to province, a similar process is expected in most area.

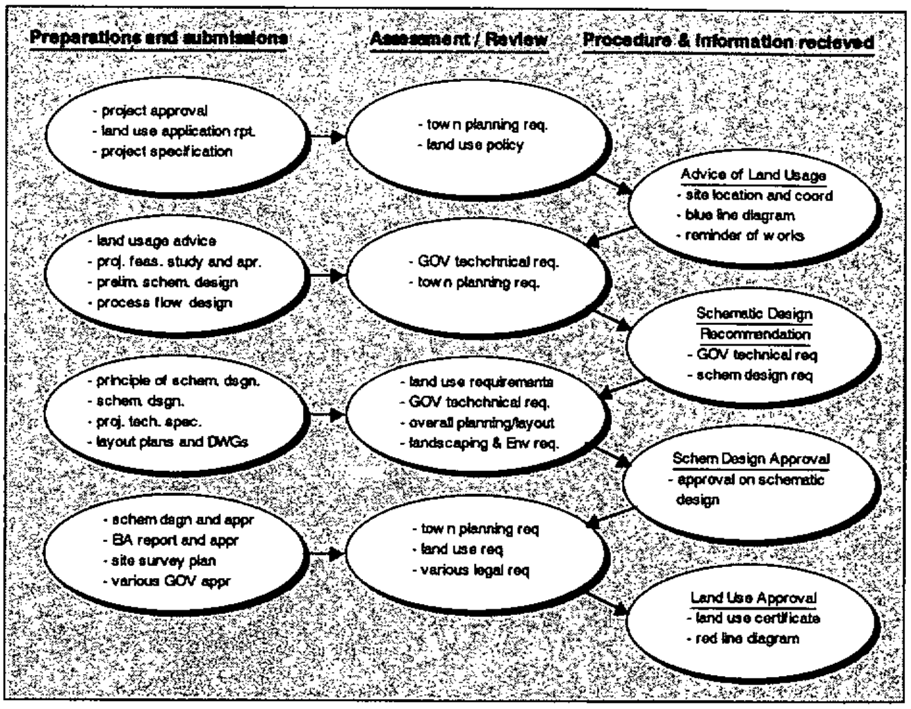
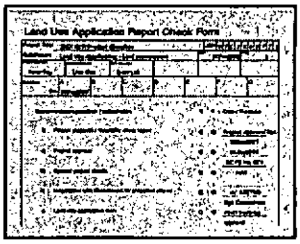


Figure 3.3 Details of Land Procurement

3.2.1 Land use application

Annex A 3.4
- Land Use Application Report Checklist



□ Type of Production
□ Type of Pollutant
□ Investment
□ Lot size required

In order to procure the selected site, a land use approval is required from the local government. In the GETDD, this is done by the submission of a Land Use Application Report. Another purpose of the submission is to officially inform the local government about the details of the proposed project. Besides, as shown in Figure 3.4, the site selection and land use works should go parallel with the project establishment works, and it is necessary to inform the local government throughout the process.

The authority responsible for approving the land procurement can be the local land administration bureau or the administration committee of a development district, e.g. GETDD Planning and Construction Administration Bureau (PCAB). In the GETDD, the following documents are required to be submitted.

Submission for Land Use Application

- ☐ project proposal / feasibility study report
- ☐ project approval
- ☐ project specification

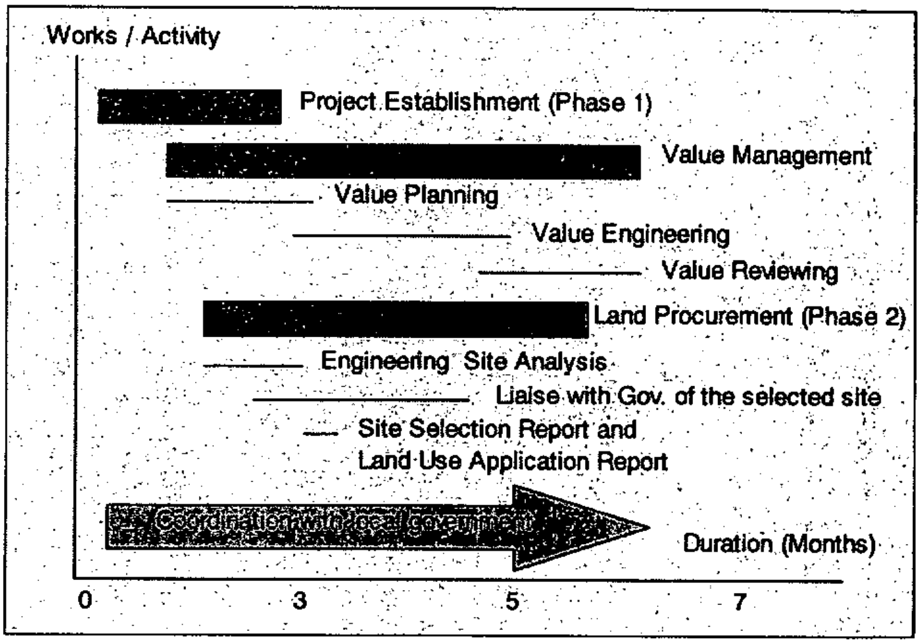
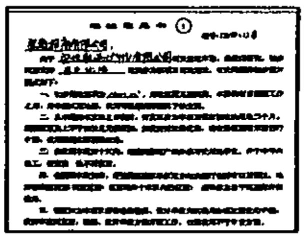


Figure 3.4 Works in Project Establishment (Phase 1) and Land Procurement Phase (Phase 2)

In assessing for the land use policy and planning requirements, the PCAB of GETDD will issue documents as listed below. These documents will be required in the subsequent approval phases. A sample of Land Use Application Report and the Lad Usage Advice is attached in Annex B.

Annex B 3.2
- Sample of Land Usage Advice



☐ Approved Site Lot
☐ Advice of Design Focus

Document from PCAB

i) advice of land usage
ii) approved site location and boundary/coordinate
iii) blue line diagram
iv) reminder of works to be carried out

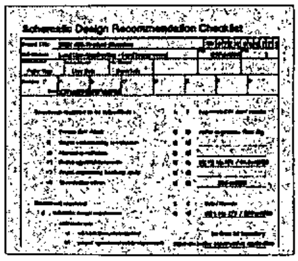
3.2.2 Schematic (Master Planning) Design Recommendation

In receiving the advice of land usage and the approved site location, the application of Schematic Design Recommendation should proceed. The aim of this procedure is to ensure the design team have acknowledged the relevant Government technical requirements. For example, a process flow diagram as shown in Figure 3.5 shall be included in the

Schematic Design Recommendation submission. In addition, the following documents are required to submit.

- ☐ process flow block diagram
- ☐ project workmanship specification
- ☐ material specification
- ☐ site selection advice
- ☐ project approval documents
- ☐ project engineering feasibility study

Annex A 3.5
- Schematic Design Recommendation Checklist



☐ Type of Production
☐ Process Flow
☐ Schematic Layout Plan
☐ Site Survey Plan

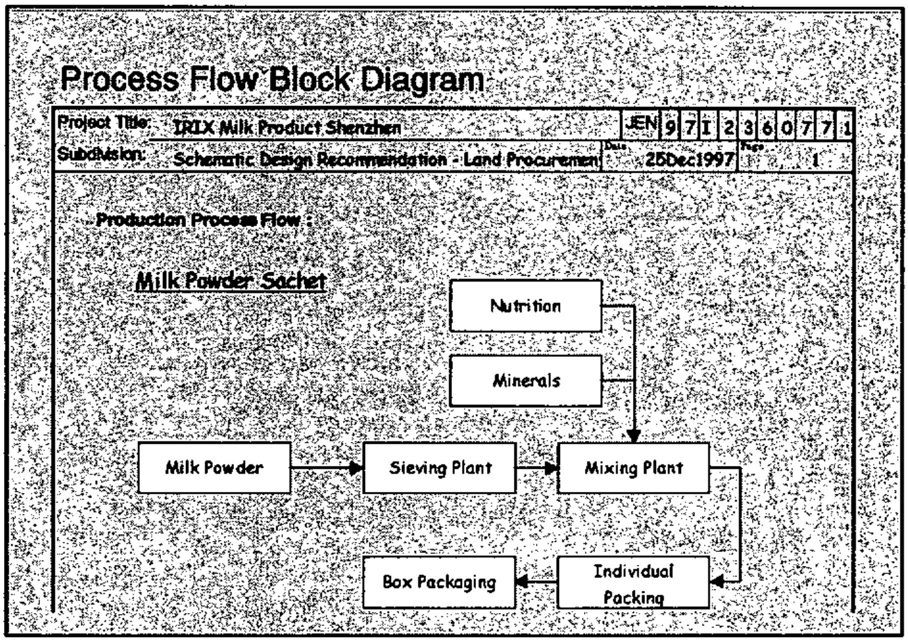
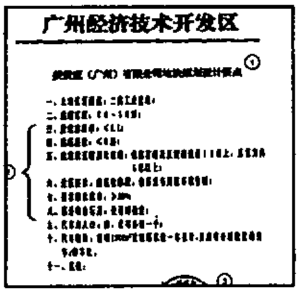


Figure 3.5 Process Flow Diagram

Annex B 3.5
- Sample of Schematic Design Recommendation



In the review, the project will be assessed for the government technical requirements on the type of project and the town planning specifications. In return of the submission, following document will be issued to guide the government requirement of the project.

i) schematic design requirement
ii) schematic design reminders

☐ Approval Type of Industrial Facility
☐ Landscape & Plot Ratio
☐ F.S.& Environmental Protection Requirement

As shown in Figure 3.6, a Design Institute (D.I.) and various experts for the project should also be appointed at this stage, as a formal registration of the specialist, consultants and design institute are required before the Government endorsement of the submission and approval of schematic design. A sample of the Schematic Design

Recommendation is attached in Annex B for reference.

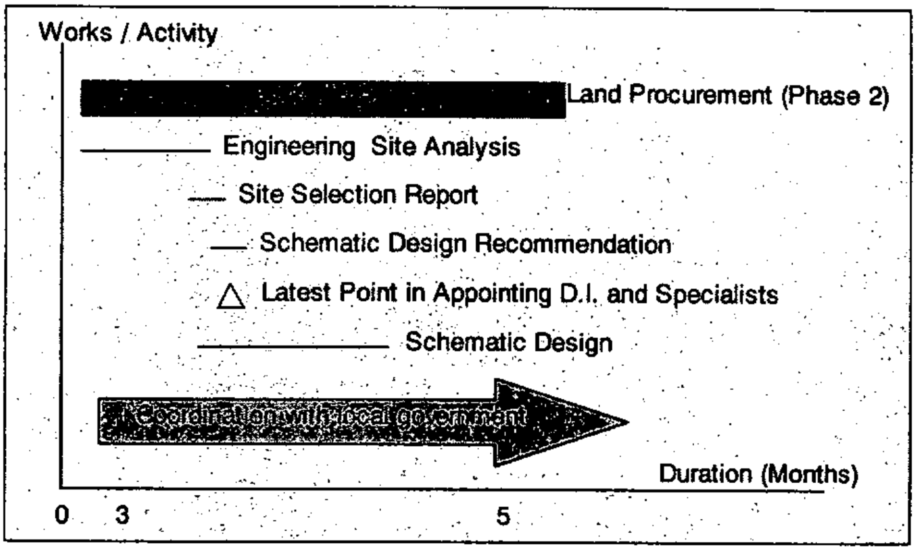


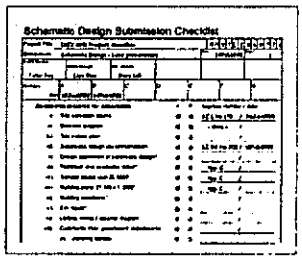
Figure 3.6 Works for Land Procurement (Phase 2)

3.2.3 Schematic design preparation

In receiving the schematic design requirements, the schematic design should be prepared accordingly. The completed schematic design shall be endorsed by the D.I. and the specialists of the project. In addition to the schematic design requirements, the following issue shall also be addressed and catered in the schematic design.

- satisfy land use requirement i.e. minimum set back from site boundary
- project operation safety requirement
- fire protection requirement
- environmental protection requirement
- government technical specifications
- overall planning and layout
- landscaping details and ratio

Annex A 3.7 - Schematic Design Report Checklist



□ Schematic Layout Plan
□ F.S. Design
□ Environmental Treatment Facility Design
□ Landscape & Plot Ratio
□ Production Safety Measures

The following is a list of documents required for the submissions of the Schematic Design Approval.

- ☐ principle of schematic design
- ☐ schematic design
- ☐ technical requirements

- ☐ fire service requirements
- ☐ environmental protection requirement
- ☐ general layout plan (1:500; 1:2000)
- ☐ building plans (1:100; 1:200)
- ☐ elevations
- ☐ site survey plan
- ☐ environmental impact assessment study
- ☐ utilities connections diagram
- ☐ advice from various government department, such as water and power supply, sewage treatment, fire service, labour safety and hygiene

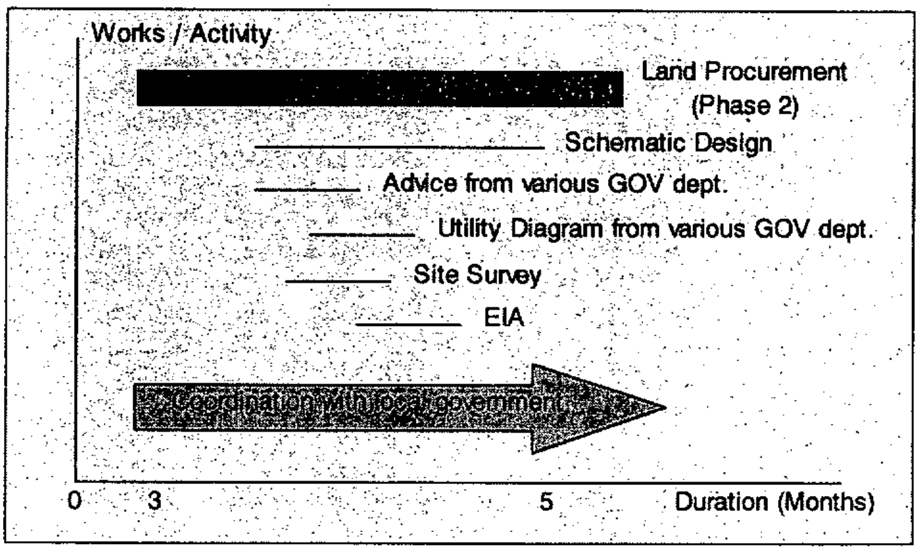
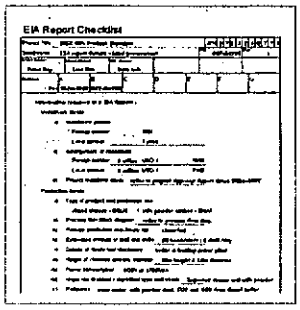


Figure 3.7 Schematic Design in Land Procurement (Phase 2)

It is necessary to note that the environmental assessment study is an important issue in an industrial project, and the Chinese government normally require a project to carry out a detailed environmental study. The study shall be carried out by a recognised environmental specialist and the following project details shall be provided for the production of the environmental assessment report.

Annex A 3.6
- EIA Report Checklist



- ☐ Production Details
- ☐ Process Flow
- ☐ Pollutants

Information required for preparation of EIA report

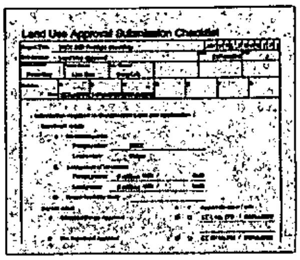
- ☐ details of the investment parties
- ☐ annual production rate
- ☐ annual raw material usage
- ☐ process flow of the production
- ☐ primary production plants

- ☐ annual fuel consumption and type of fuel to be used
- ☐ location plan and the operational details
- ☐ details of wastes produced

3.2.4 Land Use Approval

Upon receipt of the Schematic Design Approval, it should be submitted to the local land administration bureau for approval. In addition to the Schematic Design Approval, the following approvals shall also be submitted.

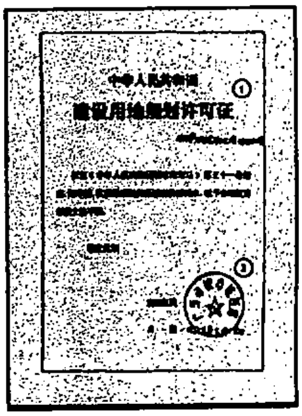
Annex A 3.8
- Land Use Approval Submission Checklist



Documents to be submitted for land use approval

- ☐ Schematic Design Approval
- ☐ EIA report and approval
- ☐ Site survey plan
- ☐ various Government approvals

Annex B 3.7
- Sample of Construction Land Use Certificate



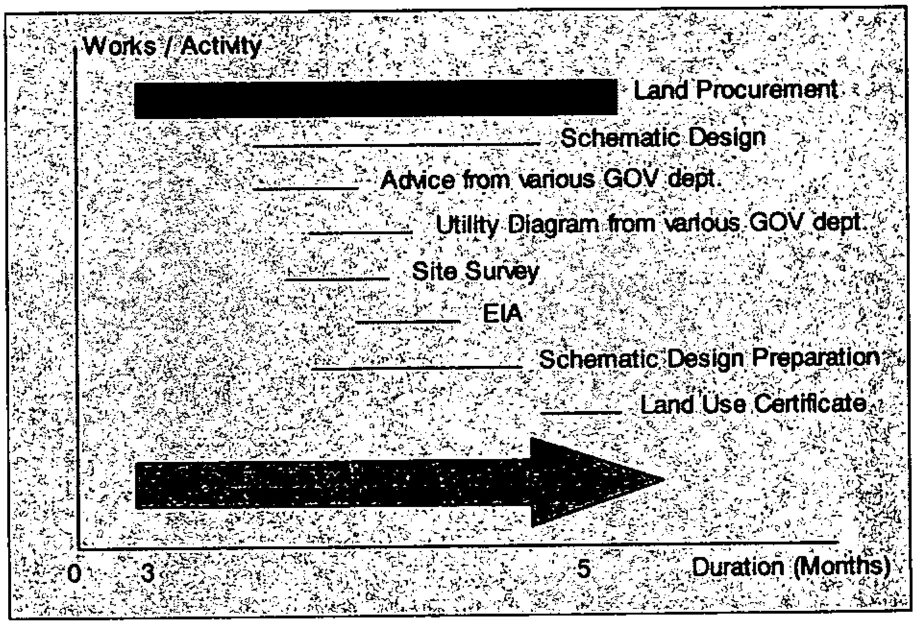
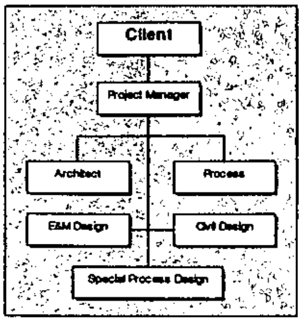


Figure 3.8 Land Use Certificate Application (Phase 2)

In granting the Construction Land Use Approval, a construction land use certificate and a red line diagram will also be issued which shows the location of the approved lot boundary and the coordinates of the corners. Afterwards, a land use contract is required to be signed between the local land administration bureau, and this contract is required to be signed within 1 month after the approval. The details of transaction of is depended on the contract, however, a 5% deposit is normally required within 1 week after the sign of contract. A sample of the Land Use Certificate is attached in Annex B.

3.3 Project Management Elements

- Leanest Team for Land Procurement Phase



3.3.1 Works Planning and coordination

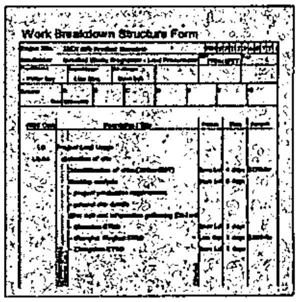
In this phase, the organisational structure is changed to incorporate the need of E&M, civil engineering and fire service design works. In addition, detailed planning of the works is also required. This is achieved by preparation of detailed works programme. The works coordination plan shall also be formed to plan and allocate the works for different team members.

- □ Identify suitable site
- □ Prepare Schematic Design
- □ Value Engineering of Schematic Design
- □ Environment Impact Assessment

3.3.2 Detailed Works Programme

Similar to the Work Breakdown Structure (WBS) for a master project programme, a WBS for a detailed works programme is formed with the same logical considerations. However, more detailed considerations are required to identify the works or activities to be carried out. Finally, the logical sequence are considered in detailed to form a detailed works programme. As shown in Figure 3.9 is part of a detailed works programme for Land Procurement Phase.

Annex A 3.9
- WBS for Detailed Works Programme of Land Procurement Phase



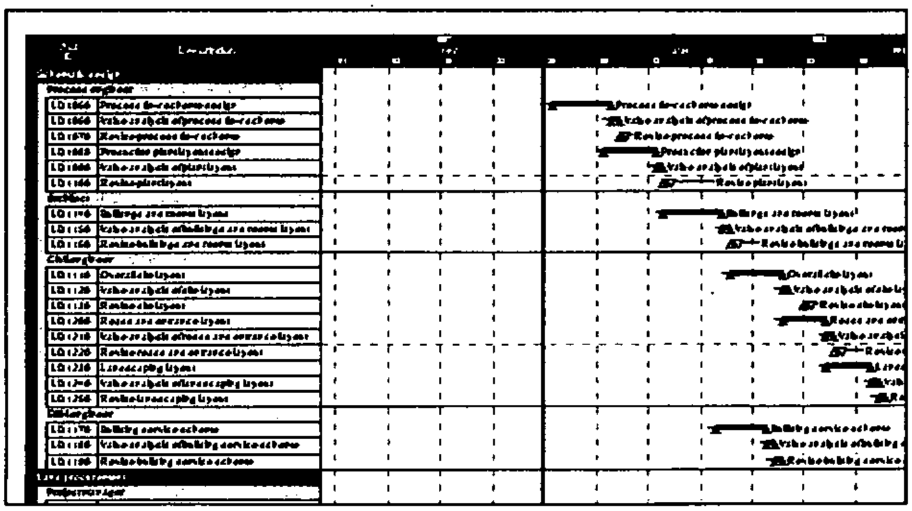


Figure 3.9 Land Procurement Phase Detailed Works Programme

- □ Hardware
- □ Software
- □ Documents / Reports
- □ Reviews
- □ Approvals
- □ Meetings

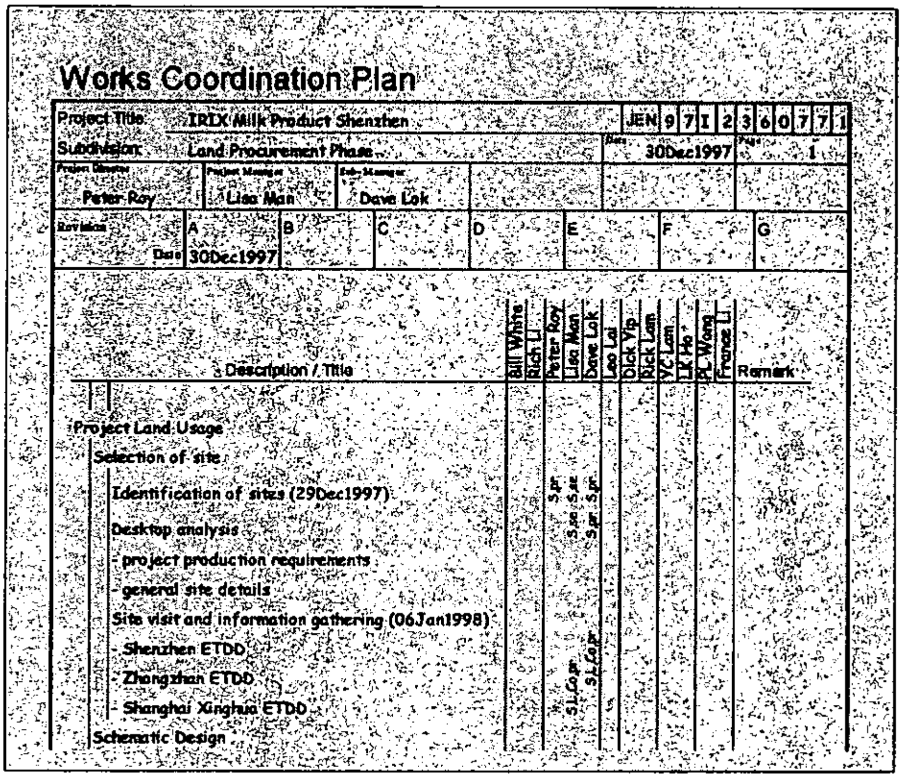
Also, the Activity Code of the Master Works Programme was used in the detailed works programme.

3.3.3 Works coordination plan

As the number of people involved and the amount of works increased, a Works Coordination Plan shall be prepared. This help to identify the person responsible for different pieces of works and ensure that the all the works were taken care of. In a Works Coordination Plan, the works extracted from the WBS were allocated to a specific project team member. Besides, levels of responsibility were also determined for the works. Therefore, the works progress were reported from the specific team member at the regular progress meeting. A sample of a Works Coordination Plan is as shown in Figure 3.10 is given in Annex A 2.10.

Annex A 3.10 - Works Coordination Plan

□ Type of Works
□ Responsibilities


Works Coordination Plan

Project Title: IRIX Milk Product Shenzhen — JEN 9 7 I 2 3 6 0 7 7 1
Subdivision: Land Procurement Phase — Date: 30Dec1997 — Page: 1
Project Director: Peter Roy — Project Manager: Lisa Man — Sub-Manager: Dave Lok
Revision: A B C D E F G — Date: 30Dec1997

Description / Title — Bill White, Rich Li, Peter Roy, Lisa Man, Dave Lok, Leo Lai, Dick Yip, Rick Lam, YC Lam, LK Ho, PL Wong, France Li — Remark

Project Land Usage
Selection of site
Identification of sites (29Dec1997) — S.pr, S.se, S.pr
Desktop analysis — S.se, S.pr
- project production requirements
- general site details
Site visit and information gathering (06Jan1998)
- Shenzhen ETDD — S.L.Co.pr, S.L.Co.pr
- Zhangzhan ETDD
- Shanghai Xinghua ETDD
Schematic Design

Figure 3.10 Works Coordination Plan (Phase 2)

3.3.4 Value engineering

Upon identified all the requirements, works and site conditions of the project, the value engineering process should proceed. This involved the comparison of various alternatives and determination of the highest value generated option. Formation of the Function Breakdown Structure (FBS) is useful in identifying the functions provided in each option and comparison the cost effectiveness of different options for the

□ Function Breakdown

project. Besides, identify the unnecessary functions in each option also helped to reduce the cost of project.

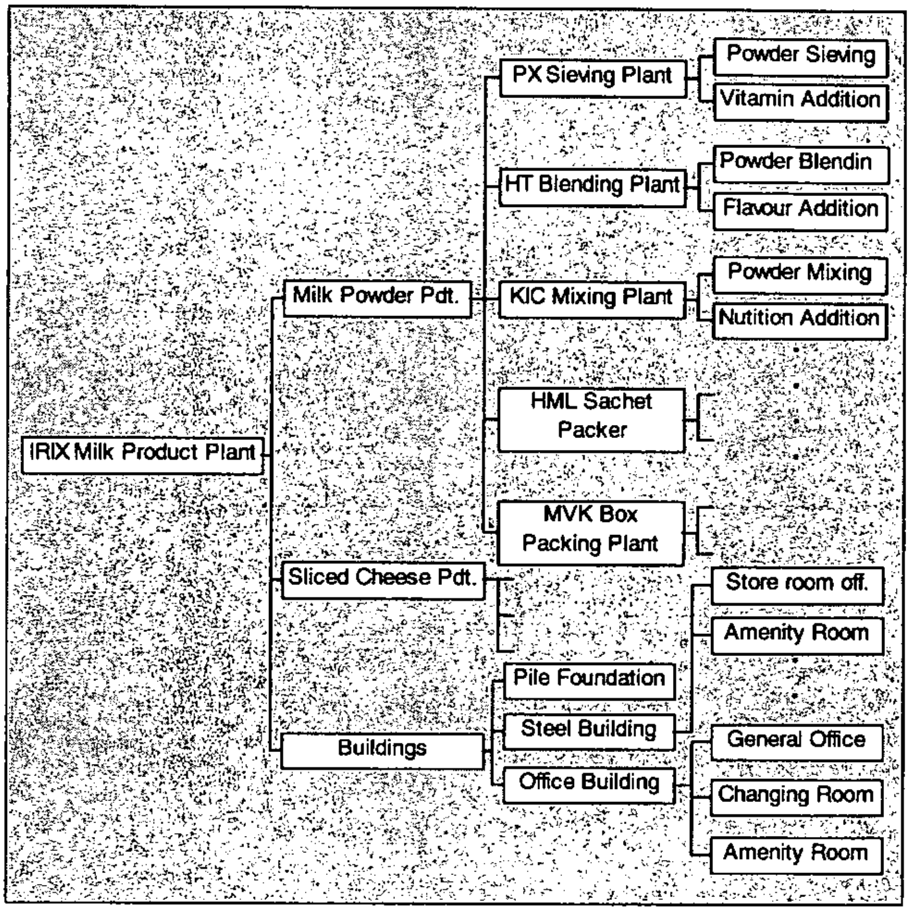


Figure 3.11 Function Breakdown Structure

Similar to the WBS, a FBS (Figure 3.11) is formed by breaking down the design items. The FBS is prepared for the function and value analysis process. In the analysis, the unnecessary function is identified in the FBS and various options are compared for the project.

Finally, with the design weighting determined in the Value Planning Session, comparison as shown in Figure 3.12 is carried out to determine the cost effectiveness of each alternatives. In the analysis, all the secondary function of a design is given a value of zero and the values of the primary function are weighted and compared to determine the most optimum solution.

Annex A 3.11
- Value Analysis Form

□ Function Weighting

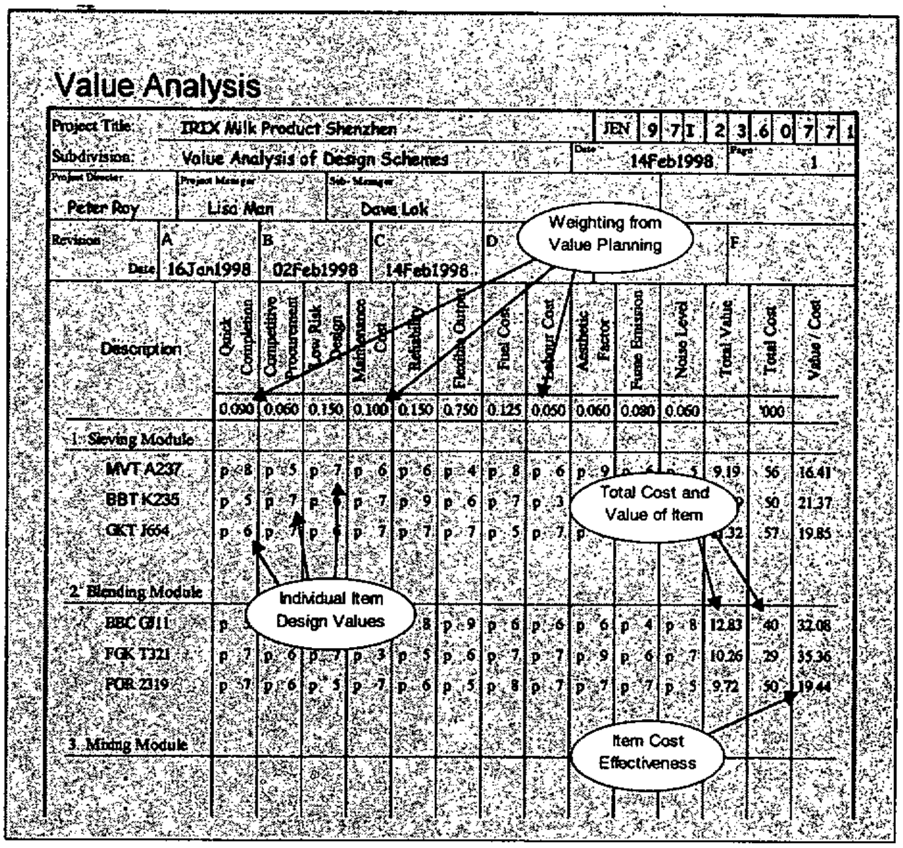
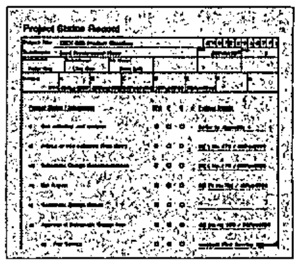


Figure 3.12 Value Analysis of Design Scheme A (Phase 2)

3.3.5 Project status record

Project status record checklist shall be prepared to review and compare the progress of the project during the development and at the end of the project phase. An example of project status record for the Land Procurement Phase is given in Annex A.

Annex A 3.12 - Project Status Record Form



- ☐ Land Usage Advice
- ☐ Schematic Design Advice
- ☐ Schematic Design Report
- ☐ EIA Report
- ☐ Various Government Authorities Approval
- ☐ Land Use Approval

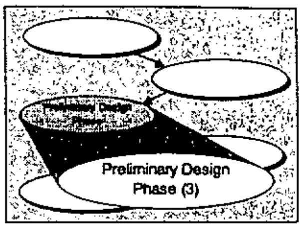
4. Preliminary Design Phase (Phase 3)

About This Chapter

Read this chapter to find out

- The Government departments involved in preliminary design (Phase 3) approval
- Design requirements of various works
- The approval procedure to follow in this phase (Phase 3)
- Documents to be prepared in this phase (Phase 3)
- Key project management elements included
  - i) Design management
  - ii) Preliminary design cost estimation
  - iii) Off-site production works coordination
  - iv) Information management

4.0 Preliminary Design Phase



4.1 Detailed Preliminary Design

Upon approval of the proposed land and completion of schematic design, the preparation of preliminary design followed. In China, the amount of details required in a preliminary design is almost equivalent to a detailed design except the detailed structural design and drawings are not required at this phase. Besides, as shown in Figure 4.1, separate approvals are normally required form different government authorities

4.1
Detailed Preliminary Design

4.2
Preparation of Preliminary Design

4.3
Project Management Elements

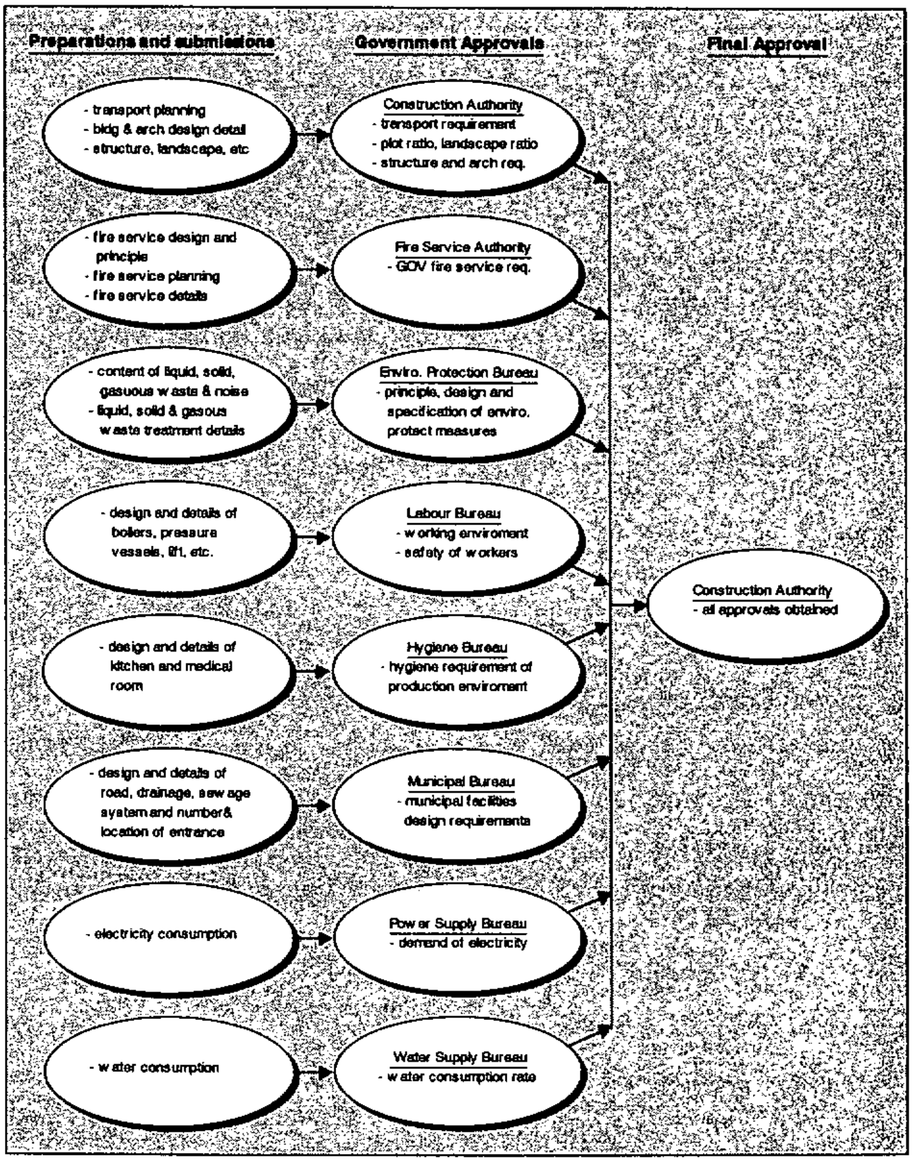


Figure 4.1 Preliminary Design Approval

- Government Approvals

- Construction Bureau
- Public Security Bureau
- Environmental Protection Bureau
- Labour Bureau
- Hygiene Bureau
- Municipal Bureau
- Power Supply Company
- Water Supply Company

including the construction authority (e.g. GETDD Planning and

Construction Administration Bureau), Fire Service Authority (Public Security Bureau), Environmental Protection Bureau, Labour Bureau, Hygiene Bureau and Municipal Bureau. Furthermore, the preliminary design preparation works shall go parallel with the land procurement works as in Figure 4.2 which shows the relative time frame of works in the Land Procurement Phase and Preliminary Design Phase.

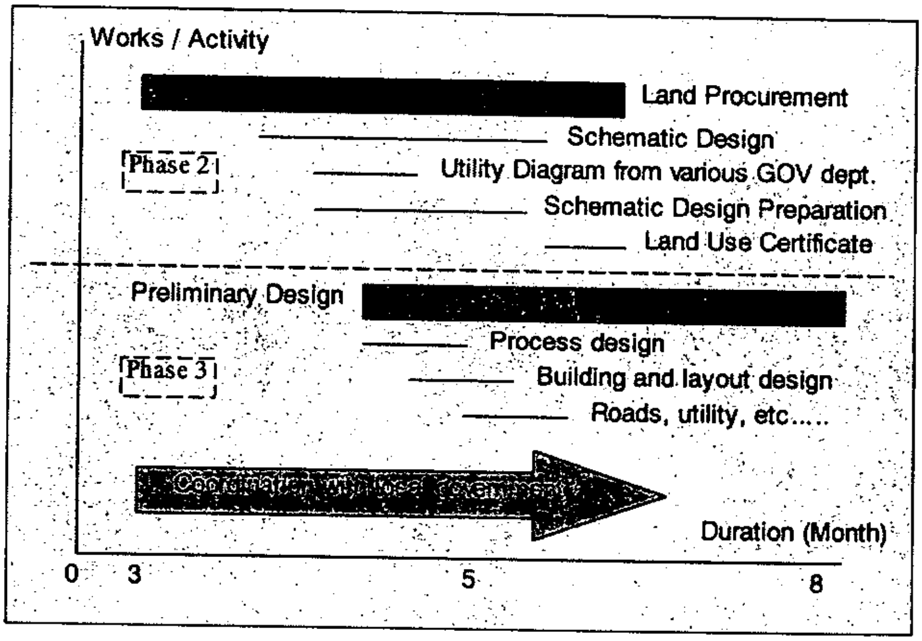


Figure 4.2 Land Procurement (Phase 2) and Preliminary Design (Phase 3)

4.2 Preparation of Preliminary Design

4.2.1 Design requirements

The preparation of preliminary design shall follow the requirements of China design standards, e.g. requirements of fire service system in GBJ 16-97, GBJ 84-85 and GBJ 116-88 for sprinkler and fire alarming system. The relevant design standard as listed in Figure 4.3 should be identified for preparation of preliminary design, and a list of the design code is given in Annex A. However, it must be emphasised that the government bodies have the ultimate interpretation of the design codes. Therefore, advice should be sought from the relevant government departments on special circumstances. For example, putting fire extinguisher or sprinkler system in a cold store may not be useful but it is a legal requirement to install fire protection system in all storage area. Upon completion of the preliminary design, it should be endorsed and submitted by a local design institute.

Annex A 4.1
- Design Code Checklist

- ☐ Building Plan
- ☐ Fire Service System
- ☐ Water Supply and Drainage
- ☐ Waste Treatment Facility

- ☐ Design Institute Endorsement

Design Code Checklist

Project Title: IRIX Milk Product Shenzhen					JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision: Design Code Usage					Date 05Jan1998	Page 1
Project Director: Peter Ray	Project Manager: Lisa Man	Sub-Manager: Dave Lok				
Revision / Date	A 05Jan1998	B	C	D	E	F	G

PRC Design Standard for Preliminary Design

	Design Code	Title	Required
i)	GBJ 1-86	Standard for Building and Structural Drawings Preparation	☑
ii)	GBJ 103-87	Standard for General Layout Plans Preparation	☑
iii)	GBJ 104-87	Standard for Building Plans Preparation	☑
iv)	GBJ 106-87	Standard for Water Supply and Drainage Drawings Preparation	☑
v)	GBJ 114-88	Standard for Air Conditioning System Drawings Preparation	☑ Off. Bld. only

Figure 4.3 PRC Design Codes

4.2.2 Components of a preliminary design

There are three major parts in a preliminary design for the submission. They are the preliminary design details, the preliminary design drawings and the preliminary design cost estimate. Besides, a geological investigation is also necessary to be included in the preliminary design submission. In particular, a detailed description of the principle of the design is required to be addressed in the preliminary design report. The items required in a preliminary design submission are listed below. The suggested content of a preliminary design report is also given in Annex B for reference.

- ☐ a preliminary design report / statement
- ☐ general layout plans and technical requirements
- ☐ landscaping design
- ☐ roads and drainage design
- ☐ fire service design plans
- ☐ water supply pipeline diagrams
- ☐ power supply and distribution system diagrams
- ☐ process plant flow diagram
- ☐ civil works drawings

Annex B 4.1
- Content of Preliminary Design

- ☐ General Design Statement
- ☐ Products and Plant Construction Details
- ☐ Site Selection and Schematic Design
- ☐ Geological Investigation Report
- ☐ Production Flow
- ☐ Civil Engineering Details
- ☐ Plumbing and Drainage
- ☐ Fire Service
- ☐ E&M Design
- ☐ Environmental protection Facility Design

- ☐ E&M, BS, MVAC drawings
- ☐ geological investigation assessment report
- ☐ schematic design approval
- ☐ construction land use approval / land use right certificate

Annex B 4.6
- Sample of Preliminary Design Approval

4.2.3 Permits to apply after preliminary design

Upon approval of the preliminary design, the construction authority will issue a letter of approval with reminders of the next stage works. As shown in Figure 4.4 this included the application of Fixed Asset Investment Permit and Construction Development Permit

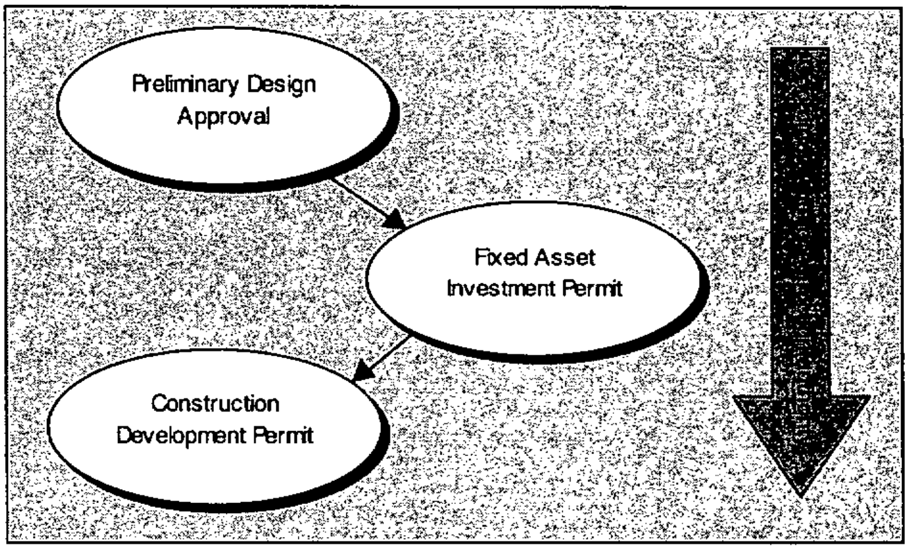
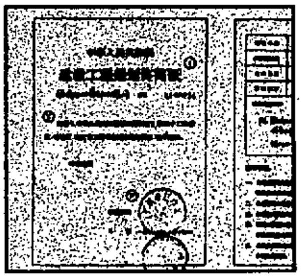


Figure 4.4 Approvals after Preliminary Design (Phase 3)

Annex B 4.8
- Sample of Construction Development Permit

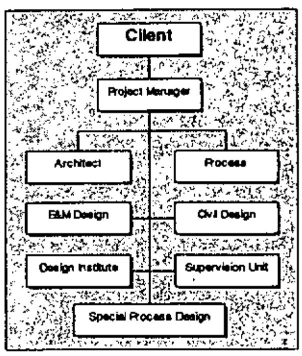


- ☐ Project Approval
- ☐ Business License
- ☐ Land Use Right Certificate
- ☐ Preliminary Design Approval

4.3 Project Management Elements

4.3.1 Design Management

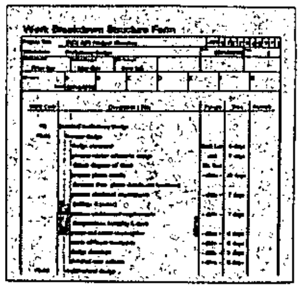
- Leanest Team for Preliminary Design Phase



Design management should be carried out in the Preliminary Design Phase. This included organising the project team, defining the works required in the preliminary design, coordination of the design information, planning and production of preliminary design drawings, and monitor of the progress of the design works. Besides, regular meeting shall be carried out to ensure the design details are matched. The meeting also allow the monitoring of progress of the design works. Furthermore, interim reports shall be submit to notify the client of the project progress.

4.3.2 Design works planning

Annex A 4.2 - WBS for Preliminary Design



In order to manage the works, defining the deliverables required in the preliminary design is necessary. In attaining this purpose, a detailed WBS can be formed to identify the deliverables and works in a logical way. The design works are then scheduled, designated and carried out. As shown in Annex A, the works in the WBS scheduled for a preliminary design is sort out in the following order. The duration of activities is also estimated and assigned.

Preliminary design -> Design works category -> Works / Activity

- ☐ Hardware
- ☐ Software
- ☐ Documents / Reports
- ☐ Reviews
- ☐ Approvals
- ☐ Meetings

Upon identification of the works, they should be scheduled according to the resource available and their logical sequence to form a detailed works programme. The detailed works programme is necessary as it gives more accurate information of the works to be carried out shortly. In general, the detailed works programme can be planned to have a life cycle ranging from two weeks to a quarter, and this depended on the accuracy of the information to present.

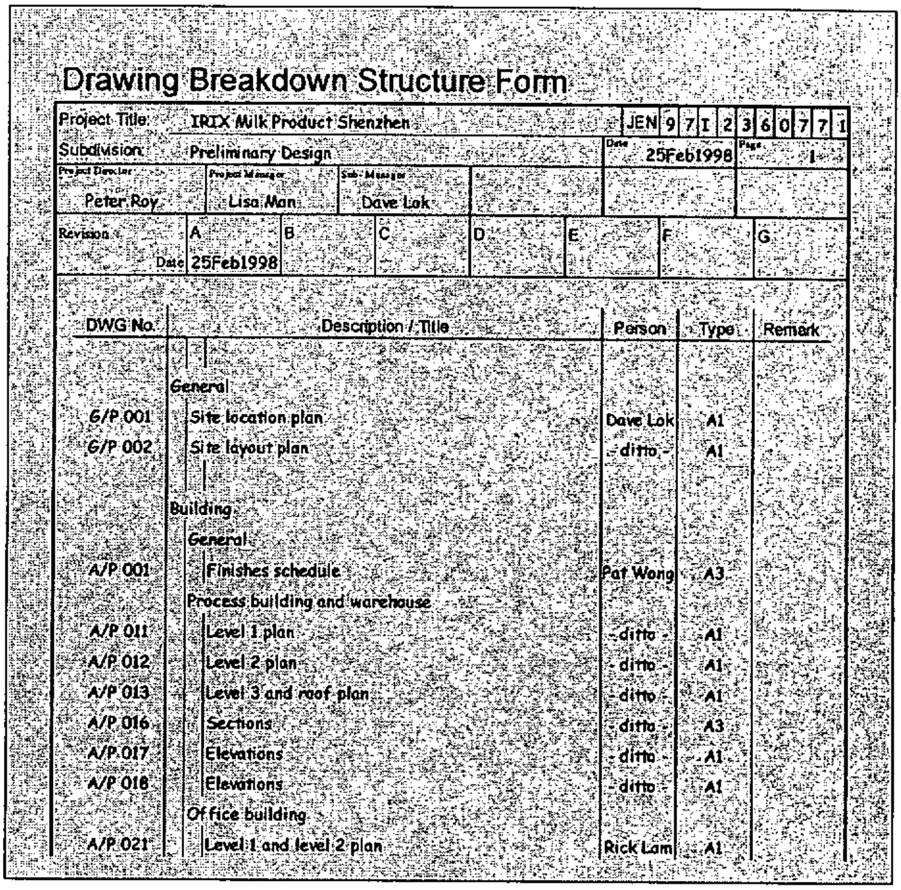
4.3.3 Preliminary design drawing preparation

In preparing the preliminary design, the preliminary design drawing should also be prepared. The preliminary design drawing should be prepared in complied with the relevant design code. As the details required in every project are different, a drawing breakdown structure (DBS) should be prepared to identify the drawings needed. This is similar to the preparation of a WBS. The purpose of a DBS schedule is to plan the details required to present the preliminary design. Besides, the components of the drawings should also be planned. This therefore enable a more accurate estimation of the drawings preparation.

The schedule can be formed by breaking down the drawings according to physical components of the project and then further breakdown to works category or vice versa. For example, a DBS schedule as shown in Figure 4.5 is split with the works categories first then further breakdown to the buildings such as warehouse, process and office etc.

Drawings of works categories -> Buildings -> Particular details

Annex A 4.3
- DBS Form for Preliminary Design



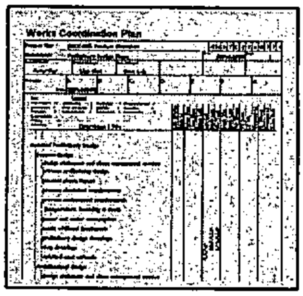
Drawing Breakdown Structure Form

Project Title: IRIX Milk Product Shenzhen					JEN 9 7 1 2 3 6 0 7 7 1		
Subdivision: Preliminary Design					Date 25Feb1998	Page 1	
Project Director: Peter Roy	Project Manager: Lisa Man	Sub-Manager: Dave Lok					
Revision / Date	A 25Feb1998	B	C	D	E	F	G

DWG No.	Description / Title	Person	Type	Remark
	General			
G/P 001	Site location plan	Dave Lok	A1	
G/P 002	Site layout plan	-ditto-	A1	
	Building			
	General			
A/P 001	Finishes schedule	Pat Wong	A3	
	Process building and warehouse			
A/P 011	Level 1 plan	-ditto-	A1	
A/P 012	Level 2 plan	-ditto-	A1	
A/P 013	Level 3 and roof plan	-ditto-	A1	
A/P 016	Sections	-ditto-	A3	
A/P 017	Elevations	-ditto-	A1	
A/P 018	Elevations	-ditto-	A1	
	Office building			
A/P 021	Level 1 and level 2 plan	Rick Lam	A1	

Figure 4.5 Drawing Breakdown Structure

Annex A 4.4
- Works Coordination Plan



Finally, upon identification of the design and drafting works, they should be assigned and disseminated, and this can be achieved by preparation of a works coordination plan.

4.3.4 Preliminary design cost estimation

The preliminary design cost estimation is required to be accomplished during the submission of the preliminary design. Therefore, the cost of various types of plants and works should also be determined during the preparation of preliminary design. A Cost Breakdown Structure as shown in Figure 4.6 is a useful tool to breakdown the cost of the project into measurable items. It is formed with the same principle as a WBS. In addition, it is necessary to note that the cost estimation shall be prepared in accordance with China practice. The preliminary cost is required to extract from the Government standard cost index document.

Annex A 4.5
- Cost Breakdown Structure Form

□ Government Standard Cost Index

Cost Breakdown Structure

Project Title: IRIX Milk Product Shenzhen						JEN 9 7 I 2 3 6 0 7 7 I	
Subdivision: Preliminary Design						Date 19Apr1998	Page 1
Project Director Peter Roy		Project Manager Lisa Man	Sub-Manager Dave Lok				
Revision	A	B	C	D	E	F	G
Date	05Mar1998	19Apr1998					

Cost Code			Description / Title	RMB	HKD	Total (USD)
				('000)	('000)	('000)
1			Site Investigation and Site Preparation			
1	1	1	Site Investigation		128	16
1	2	1	Site Filling		1,903	244
1	3	1	Site Office, store and temporary fencing		500	64
1	4	1	Temporary power supply		100	13
1	5	1	Temporary water supply		20	3
1	6	1	Temporary telecommunication		20	3
2			Process and Office Building			
2	7	1	Pilling		8,276	1,061
2	8	1	Structure		22,074	2,830
2	8	2	Architectural works		10,355	1,328
2	9	1	Electrical	13,000		1,428

Figure 4.6 Cost Breakdown Structure of Preliminary Design (Phase 3)

4.3.5 Off-site production and E&M works

It is essential to emphasis that procurement and fabrication of process plants for industrial facility usually take a long period. Therefore, as shown in Figure 4.7, it is necessary to identify the long lead items initially and procure these items before the commencement of on-site construction or production. The long lead items should be identified in the master works programme. Also, close coordination of the preparation of workshop drawing and fabrication is required.

□ E&M design and coordination

□ E&M shop drawing preparation

In particular, the E&M design are also needed to be focus. This is due to the different E&M works practice in China. In China, the E&M works are carried out after the preparation of detailed E&M design by the E&M works designer. This is unlike the practice of E&M works in Hong Kong which shop drawings and detailed design are prepared by the E&M contractor, while the E&M works designer only responsible for the preliminary / schematic design. Therefore, for China projects, upon completion of the schematic design, the E&M designer should also prepare the major E&M detailed design and shop drawings.

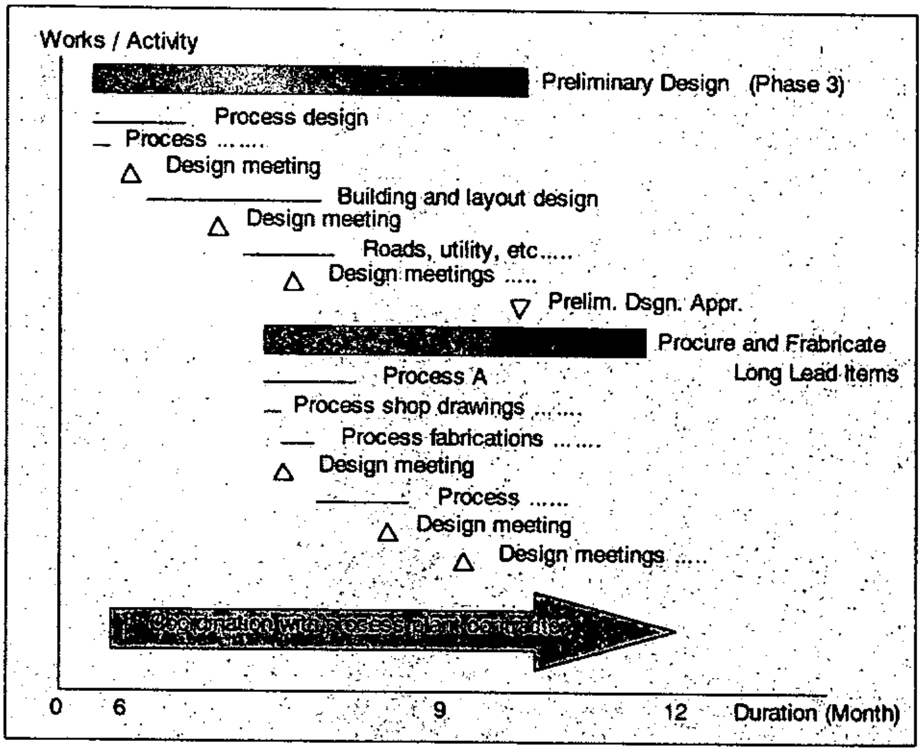


Figure 4.7 Long Lead Item Procurement in Phase 3

4.3.6 Communication and Information Management

Although communication management and information management is an important project management aspect throughout the whole project life cycle, it is particularly important in the preliminary design stage as more parties are getting involved and the information flow is seriously increased. For example, design information including process, civil engineering, F.S., environmental protection, etc. are required to be communicated and coordinated. It is therefore necessary to formalise the communication and information system. This can be in the form of information coding and filing system, reporting system and information dissemination system.

4.3.7 Design coordination and meeting

The works programme is useless until it can be controlled and managed. In controlling the progress of works, this means recording, revising and correcting the status of every activity in an ongoing basis. Besides, close coordination of the work details are necessary. In case of any delay, the project manager should revise the works programme to review the current progress, and to seek suitable arrangement to catch up with the planned progress.

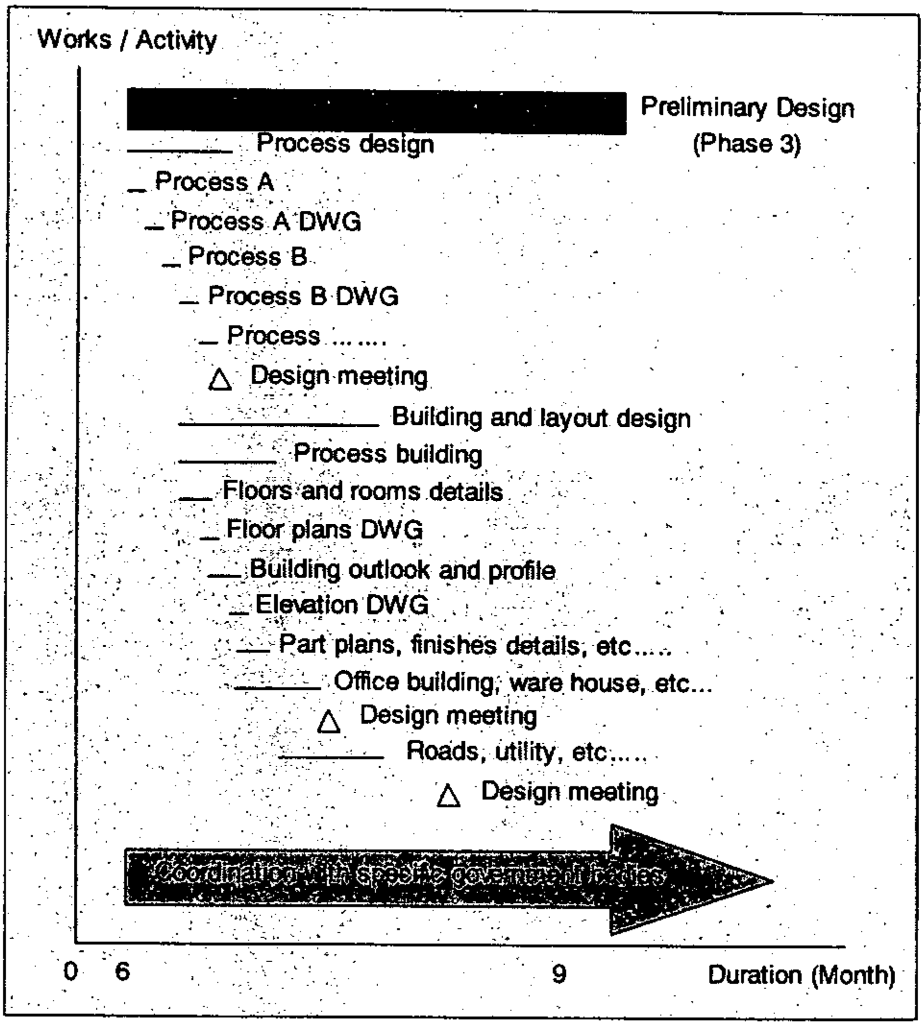
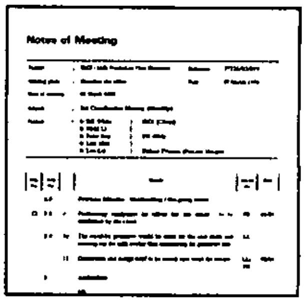


Figure 4.8 Preliminary Design Works (Phase 3)

Annex B 4.4
- Standard Form of Meeting Minutes



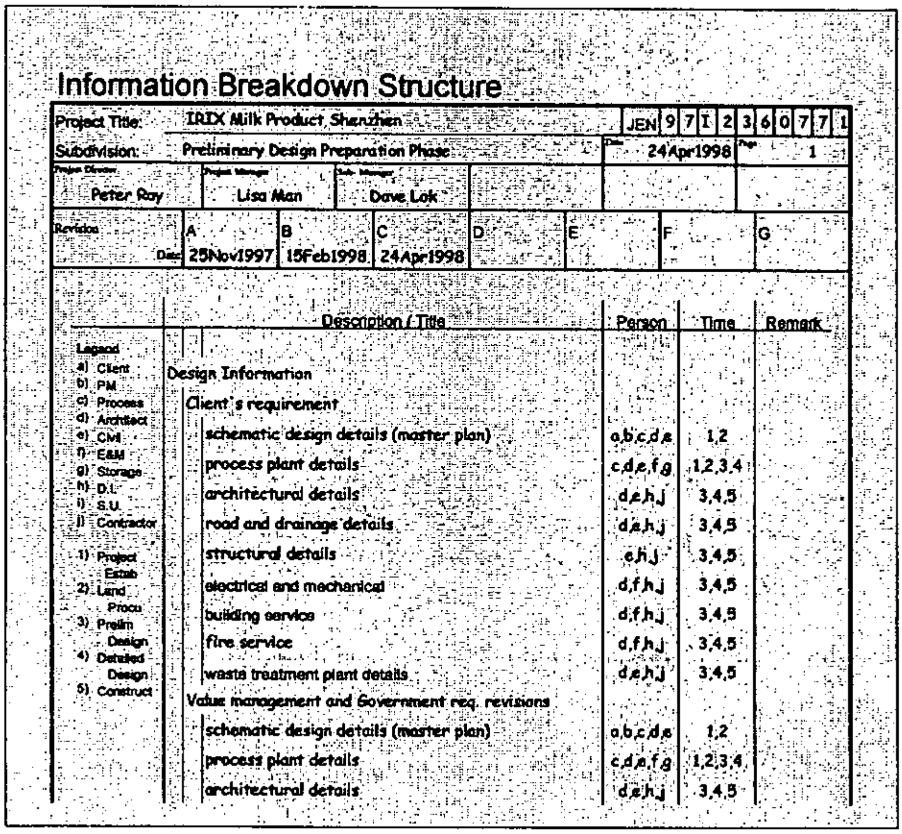
- ☐ Outstanding and On-going Issues
- ☐ Authority
- ☐ Design
- ☐ Construction
- ☐ Contractual
- ☐ Financial

In order to facilitate the management and control of the project, interim project meetings and reports as indicated in Figure 4.8 is required. Through these meetings and reports, the works need to be done, progress status and delays are communicated and identified. There is not a fixed rule for meetings that a project must have, but a biweekly meeting or monthly meeting may be essential to keep up-to-date the project status. The details of the meeting should be properly documented which should at least include the agreed items, the outstanding works and the actions to proceed. A standard form of meeting minutes is given in Annex B.

4.3.8 Information Management

The management of information included the process of information planning, storage and dissemination. In the information planning process, the information and communication needs are determined. This included identification of the information required and determination of when the piece of information is in needed by which team member. The information planning can be implemented by formation of an Information Breakdown Structure as shown in Figure 4.9. It is essential to note that a filing list is usually revised to included information that was not included initially. Besides, this satisfy the information need of different team member at different stage.

Annex A 4.6 - Information Breakdown Structure


Information Breakdown Structure

Project Title:	IRIX Milk Product, Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Preliminary Design Preparation Phase		Date 24Apr1998	Page 1
Project Director: Peter Ray	Project Manager: Lisa Man	Sub-Manager: Dave Lok		

Revision	A	B	C	D	E	F	G
Date	25Nov1997	15Feb1998	24Apr1998				

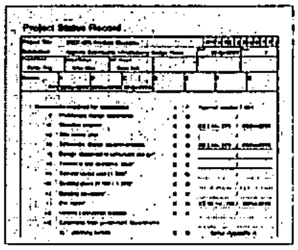
Legend
a) Client
b) PM
c) Process
d) Architect
e) CM
f) E&M
g) Storage
h) D.I.
i) S.U.
j) Contractor

1) Project Estab
2) Land Procu
3) Prelim Design
4) Detailed Design
5) Construct

Description / Title	Person	Time	Remark
Design Information			
Client's requirement			
schematic design details (master plan)	a,b,c,d,e	1,2	
process plant details	c,d,e,f,g	1,2,3,4	
architectural details	d,e,h,j	3,4,5	
road and drainage details	d,e,h,j	3,4,5	
structural details	e,h,j	3,4,5	
electrical and mechanical	d,f,h,j	3,4,5	
building service	d,f,h,j	3,4,5	
fire service	d,f,h,j	3,4,5	
waste treatment plant details	d,e,h,j	3,4,5	
Value management and Government req. revisions			
schematic design details (master plan)	a,b,c,d,e	1,2	
process plant details	c,d,e,f,g	1,2,3,4	
architectural details	d,e,h,j	3,4,5	

Figure 4.9 Information Breakdown Structure

Annex A 4.7 - Project Status Record



4.3.9 Project Status Record and Report

The status of the preliminary design preparation shall be record as the works in progress. A standard form of project status record for preliminary design phase is given in Annex A.

In addition to the Project Status Record, the Interim Project Progress Report shall also be prepared to summarise and notify the client of the project progress. The suggested content of an Interim Progress Report is given in Annex B.

Annex B 4.9 - Suggested Content of an Interim Progress Report

- ☐ Progress Details
- ☐ Programme Update
- ☐ Planning and Co-ordination
- ☐ Procurement Report
- ☐ Financial
- ☐ Milestone Status
- ☐ Three Month Rolling Programme

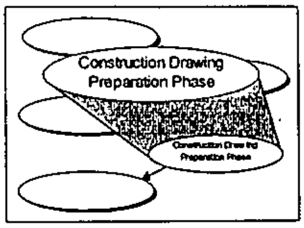
5. Construction Drawing Preparation Phase (Phase 4)

About This Chapter

Read this chapter to find out

- Government approvals required in this phase (Phase 4)
  - i) Construction approval
- Approval procedure to follow in this phase (Phase 4)
- Documents required for the approvals
- Key project management elements included :
  - i) Risk planning
  - ii) Document management

5. Construction Drawing Preparation Phase



5.1 Construction Design and Drawings

In completion of the preliminary design and granting of the preliminary design approval, the construction drawing preparation phase is followed. In this phase, the Government procedure is relatively simple. The works involved in this phase included the preparation of structural detailed design and construction drawings for the building structures. Unlike the construction practice in Hong Kong, the detailed design does not require to be assessed and approved in detailed by a government authority. Instead, only the consent of construction drawings from the construction authority is required before construction.

5.1
Construction Design and Drawings

5.2
Procedure for Construction Approval

5.3
Project Management Elements

5.2 Procedure for Construction Approval

As shown in Figure 5.1 is the Construction Approval process. It required the preparation and submission of Construction Drawing for government consent.

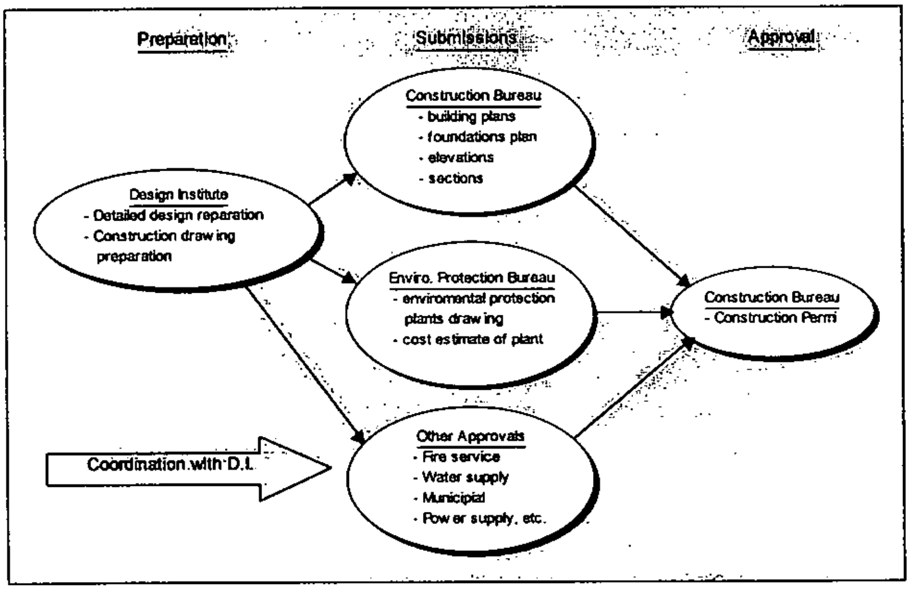


Figure 5.1 Construction Approval Process (Phase 4)

5.2.1 Preparation of detailed design and construction drawing

The detailed design preparation is a continuation of the preliminary design preparation. The relevant design code is given in Annex B. It is important to note that earth quake is an important factor to be catered in the structural detailed design. Although the detailed design can be prepared by a foreign design consultant, it is required to be endorsed by a local design institute for construction drawing consent. In particular, the process, E&M and architectural detailed design are usually carried

Annex B 4.1
- Design Code Checklist

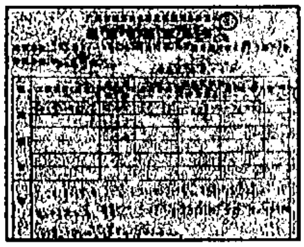
- □ Design Load
- □ R.C. Design
- □ Structural Steel Design
- □ E&M Design
- □ Architectural Design

out by a foreign design team. On the other hand, the structural detailed designs and preparation of the structural drawings are usually prepared by a licenced China design institute. Therefore, close coordination and design management is required to facilitate the progress and exchange of information.

5.2.2 Construction Application

Construction Application is the process for submission and consent of construction drawings. This process focused mainly on the detailed structural drawings. Besides, special items such as pressurised vessels are also required to undergo a construction application process. In the process, the building floors plans, sections, elevations, foundation plans and reinforcement details are required to be submitted. Although separating the construction applications of the individual buildings or building elements increases the workload, this legal arrangement enabled an early commencement of the construction works. The relative schedule of the design works and construction application is shown in Figure 5.2. Also, a sample of the Construction Application Consent is given in Annex B for reference.

Annex B 5.2
- Sample of Construction Application Consent



□ Structural Details Drawings

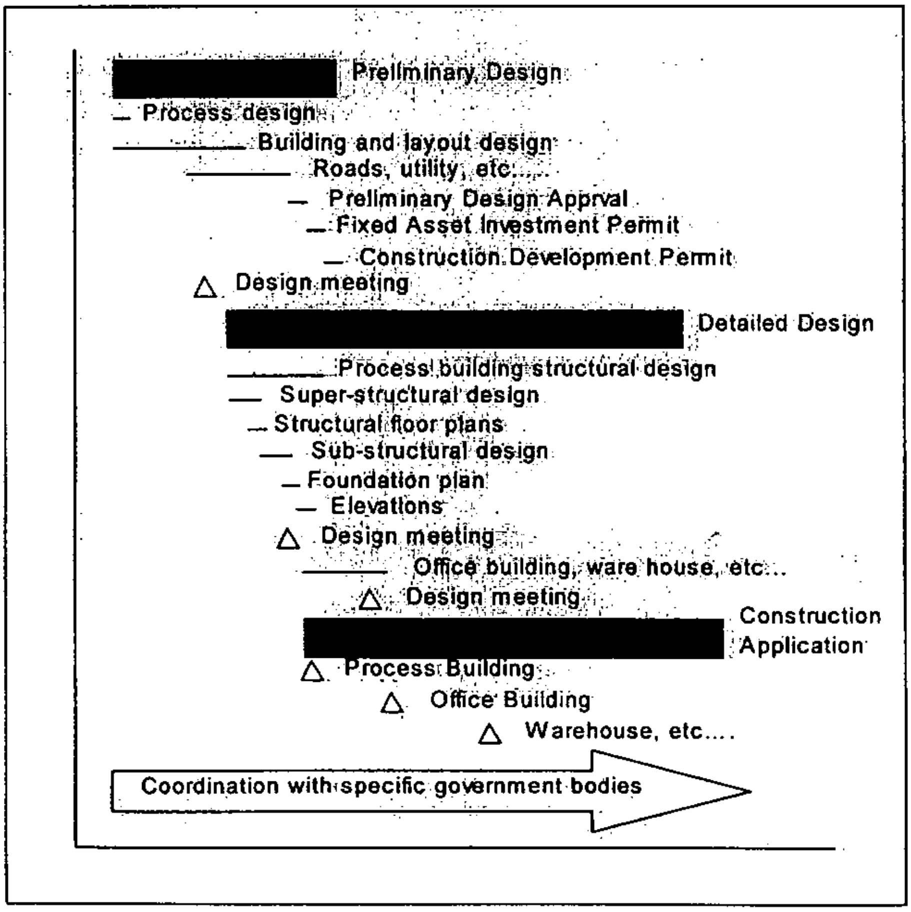
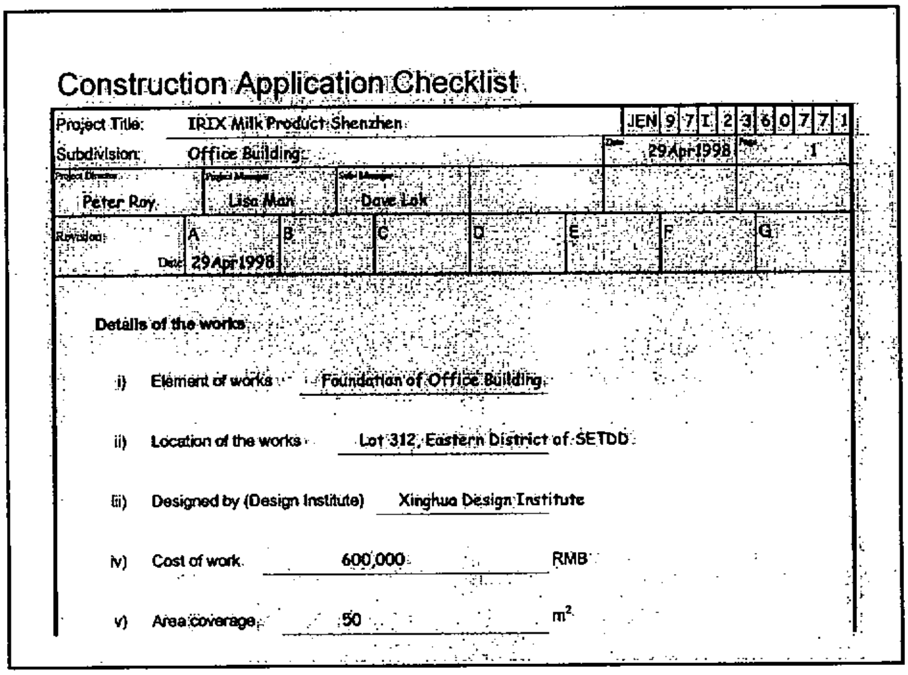


Figure 5.2 Detailed Design and Construction Application (Phase 3 / 4)

In addition to the submission of construction drawings to the construction management authority, e.g. GETDD Construction Planning Office, submission of the environmental protection facility drawings and the environmental protection facility cost estimate to the Environmental Protection Bureau is also required. An environmental protection charge is imposed based on the cost of the environmental protection facility. Upon the approvals, a Construction Permit as given in Annex B will be issued to the project after the payment of the construction application fee and the as-constructed drawing deposit. Besides, a standard construction application checklist as shown in Figure 5.3 is prepared to assist the submission process.



Construction Application Checklist

Project Title: IRIX Milk Product Shenzhen					JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision: Office Building					Date 29Apr1998	Page 1	
Project Director Peter Roy	Project Manager Lisa Man	Site Manager Dave Lok					
Revision: Date	A 29Apr1998	B	C	D	E	F	G

Details of the works

i) Element of works Foundation of Office Building

ii) Location of the works Lot 312, Eastern District of SETDD

iii) Designed by (Design Institute) Xinghua Design Institute

iv) Cost of work 600,000 RMB

v) Area coverage 50 m²

Figure 5.3 Construction Application Checklist

Annex A 5.1
- Construction Application Checklist

Annex B 5.3
- Sample of Construction Permit

□ Construction Application Fee
□ As-constructed Drawing Deposit

5.2.3 Construction Supervision Team Appointment

The Construction Supervision System in China is a mechanism to ensure the construction projects progress smoothly. The Supervising Engineers in a Construction Supervision Unit are allowed to supervise wide range of activities in a construction project. This included supervision of the preliminary design preparation, detailed design preparation and the construction execution. In China, construction supervision is compulsory in the construction phase by a licenced construction supervision unit. Besides, the construction supervision units are usually licenced body to prepare tender documents. Therefore, a construction supervision unit should be employed before the tendering commences.

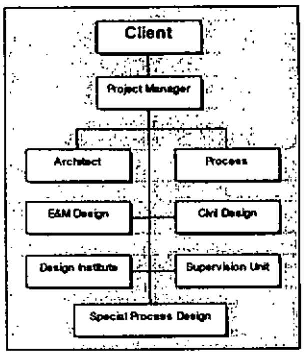
However, having a perception to secure the benefit of the society, the supervising engineers supervise the works in a different perspective. They focused on the government procedures, requirements and submissions, therefore, the quality of the works are often off-balanced.

5.3 Project Management Elements

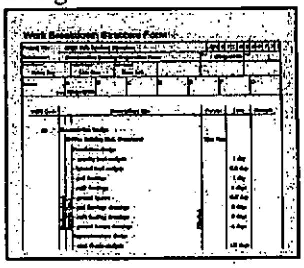
5.3.1 Design management

As most of the works in this phase are carried out by the project team, teaming up the members is important to ensure the design works progress smoothly. The WBS, DBS and works coordination plan shall also be formed to identify, schedule and plan the design works to be done. The detailed quarterly and monthly works programme shall be prepared to monitor the progress of works. Besides, regular meetings are required to channel the design details, requirements, and review the progress of the design works and submissions.

- Leanest Team for Preliminary Design Phase



Annex A 5.2
□ WBS for Detailed Design



□ DBS for Detailed Design
□ Works Coordination Plan
□ Detailed Works Programme
□ Progress Meeting
□ Value Management

Annex A 5.3
- Risk Planning Form

5.3.2 Value management and risk planning

In addition to the monitoring and coordination of design works, the value engineering process shall still be carried out in this phase to optimise the value of the design. Besides, risk planning shall be carried out to cater for any adverse effect.

Risk Planning Form

Project Title: IRIX Milk Product Shenzhen					JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision: Construction Drawing Preparation Phase					Date 25May1998	Page 1	
Project Director: Peter Roy	Project Manager: Lisa Man	Sub-Manager: Dave Lok					
Revision	A	B	C	D	E	F	G
Date	20Feb1998	15Apr1998	25May1998				

Problems (Deliverables)	Impact	Likelihood	Severity	Rank	Tracker	Action / Contingency Plan
i) Drawing is not completed before tendering stage	8	2	16	6	PKI	- close monitoring - early completion bonus
ii) Building tender documents not completed on time	7	2	14	7	LOY	- shorten the SCC - sep. sup. and sub. tender
iii) Delay of construction application	7	4	28	4	PKI	- action plan A
iv) Contractor's price much higher than expected	6	4	24	5	KOP	- contingency plan C
v) Contractor's plant failure	7	5	35	2	BHI	- action plan C
vi) Substructure work fall behind schedule	8	5	40	1	HGUI	- issue a 2nd sub. tender
vii) Material not supply on time contractor shortage of $	7	4	28	4	JGUY	- contingency plan E

Figure 5.4 Risk Analysis (Phase 4)

There are various ways to carry out risk planning, but most of these methods require the intuition of the specific subject. One of the most simple methods would be the development of a risk analysis table as shown in Figure 5.4.

Although assuming everything will go wrong is somewhat pessimistic, this help to spot, analysis and reduce the impacts when problems arise. The risk analysis table required the identification of possible problems initially. Then the problems are weighted and prioritised according to the impacts and severity. Finally, suitable persons are assigned to keep track of the possible problems and develop actions and contingency plans for the risks. Besides, a list of major risks at the phases is given in Annex A for reference.

Annex A 5.4
- Summary of risk at various phase of project

5.3.3 Document Management

Annex A 5.5
- Filing List Form

As information accumulates, a proper documentation system is required. This can be in the form of a traditional paper storage system or an electronic archive system. The documents are usually coded in a systematic way, and this simplified the searching and storage process. A sample of the filing list for a documentation system as shown in

Filing List

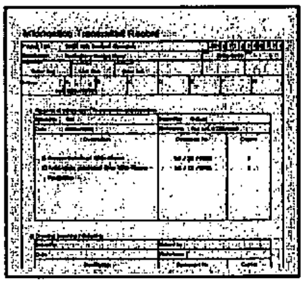
Project Title	IRIX Milk Product Shenzhen		JEN 9 7 1 2 3 6 0 7 7 1		
Subdivision	[illegible] Preparation Phase		Date 10Apr1998	Page 1	
Project Director: Peter Roy	Project Manager: Lisa Man	Sub-Manager: Dave Lok			

Revision	A	B	C	D	E	F	G
Date	05Dec1997	10Apr1998					

Filing Code			Description / Title	Revised	Remarks
9712	6		General Files		
			Professionals parties (fees and services)		
9712	6	1	SW - PM team		
9712	6	2	Delcan Process - Production process		
9712	6	3	Ho & Wong - Architect		
9712	6	4	Yeung's Associate - Building and E&M Services		
9712	6	5	WPL - Civil Engineering		
9712	6	6	Others		
			Project Control		
9712	6	11	Quality Assurance		
9712	6	12	Cost		
9712	6	13	Organisational Structure		
			Site Office		
9712	6	21	In coming	10Apr1998	
9712	6	22	Out going	10Apr1998	
			Correspondence		

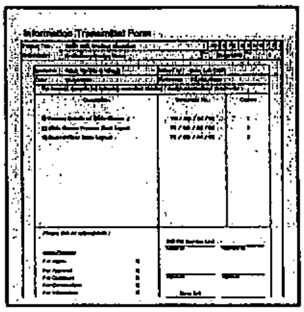
Figure 5.5 Filing List Form

Annex A 5.6
- Information Transmittal Record



□ Incoming and Outgoing Information Record

Annex A 5.7
- Information Transmittal Form



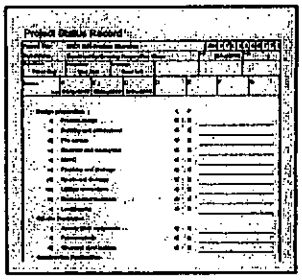
□ Control of Information Issued

Figure 5.5 is given in Annex A. It is necessary to note that a filing list is revised periodically to included information that was not planned initially. Besides, standard forms including information transmittals and information record forms for controlling and recording the flow of information are also provided in Annex A for reference.

5.3.4 Project Status Record and Progress Report

The progress status of the detailed design works and construction drawing preparation should be recorded throughout the Construction Drawing Preparation Phase. This helped to monitor the progress of works and review the project status. A standard project status record form for the Construction Drawing Preparation Phase is given in Annex A.

Annex A 5.8
- Project Status Record



In addition to the project status record that summarised the progress information of the project within the project management team, the project progress report shall also be prepared and report to the client of the project status periodically.

Annex A 4.9
- Suggested Content of Project Progress Report

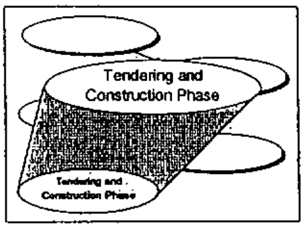
6. Tendering and Construction Phase (Phase 5)

About This Chapter

Read this chapter to find out

- Government requirements in this phases (Phase 5) included :
  - i) tendering procedure
  - ii) construction works approval procedure
  - iii) testing and commissioning procedure
- Documents required for the approvals submissions
- Key project management elements included :
  - i) Earned value analysis
  - ii) Performance trend analysis

6. Tendering and Construction Phase



In acquired the construction approval, the works should be tendered and carried out. The practice of tendering was reestablished in the China as a requirement of the World Bank and Asia Development Bank funded projects in the 1980's. In 1993, the Tender and Bidding Administration Ordinance (Provisional) was issued by the Ministry of Construction of the PRC, and the Ordinance was finalised in 1995.

6.1
Tendering Practice and Procedure

6.2
Official Procedures for Construction

6.3
Official Procedures for Testing and Commissioning

6.4
Project Management Elements

6.1 Tendering practice and procedure

The tendering procedure for construction works are confined in the Ordinance as shown in Figure 6.1. Methods of tendering like public or short-listed tender is generally suggested, while nominated contracting is only allowed under some special circumstances.

Before carrying out the tendering, the works is required to be reported and registered with the local tender administration committee. The tender documents are also required to be assessed and endorsed by the committee. Joint assessment of the bids is required by the client or his representative and the tender administration committee. This is to ensure selecting the best contractor for a project.

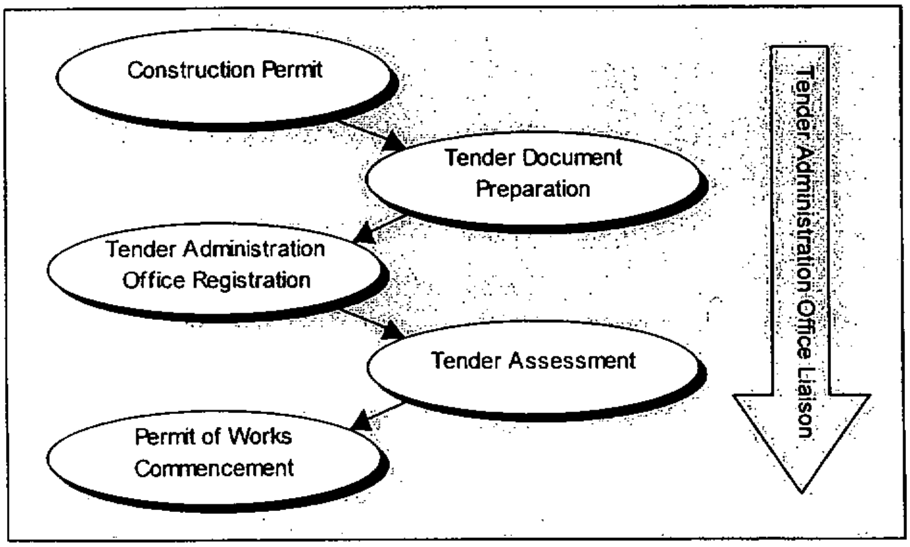


Figure 6.1 Tendering of Works (Phase 5)

Furthermore, tender meetings as indicated in Figure 6.2 are usually conducted between each tenderers to allow them in explaining their works planning.

6.1.1 Tender document preparation and approval

The Government Standard Condition of Contract GF-91-0201 is generally recommended for the preparation of tender documents. The tender document normally consisted of the Standard Conditions of Contract, Particular Conditions of Contract, Drawings, etc. However, the B.Q. (Tender Base) is excluded from the tender documents. This is due to the traditional practice that the contractors are required to estimate the construction cost with the tender drawings on their own experience. The purpose of this practice is to ensure the contractor have a detailed understanding of the works before entering a bid.

- GF-91-0201 Government Standard Condition of Contract for construction works

□ Tender Base Preparation

Annex B 6.1 - Sample of Tendering Application

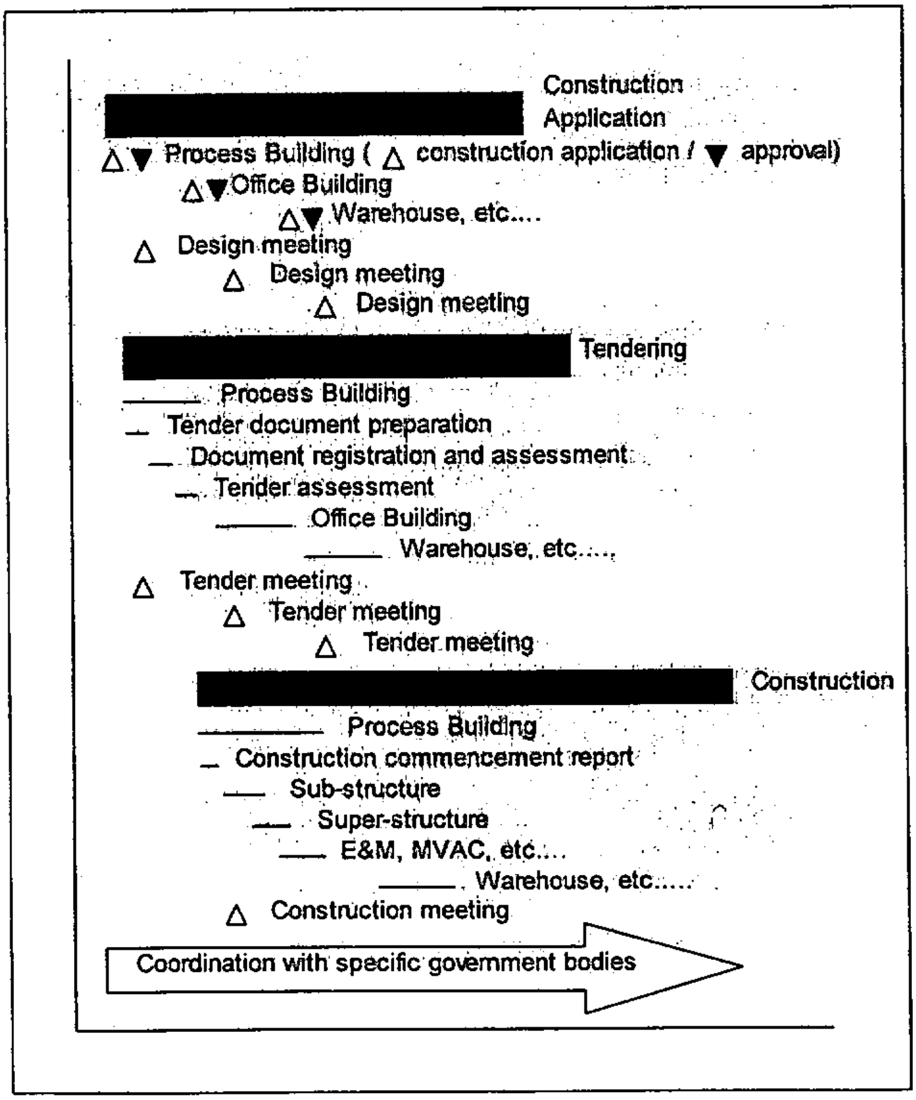


Figure 6.2 Tendering and Construction Works (Phase 4/5)

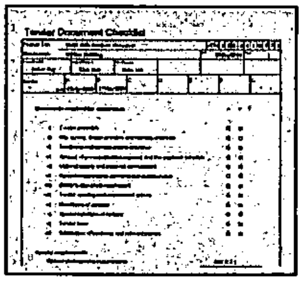
Furthermore, other types of General Conditions of Contract, e.g, FIDIC were allowed, but required separate approval by Tender Administration

Committee. The schedule of works in the construction design preparation phase and construction phase are shown in Figure 6.2.

In general, tender documents comprised the followings are required to be prepared and endorsed by a licenced agent. Usually, the Construction Supervision Unit is a licenced agent in preparation of tender document and assessing tenders.

Documents comprised the tender document

Annex A 6.1 - Construction Tender Document Checklist



- ☐ Tender preamble
- ☐ Site survey, design principle and working drawings
- ☐ Scheduled works period
- ☐ Tendering method and pricing reference (the Government standard price index)
- ☐ Details of pre-construction payment and payment schedule
- ☐ Material supply and payment arrangement (by Client / Contractor)
- ☐ Special requirements of works and workmanship
- ☐ Tender assessment criteria and result announcement date
- ☐ Conditions of contract
- ☐ Special condition of contract
- ☐ Information of tendering and relevant parties

6.1.2 Contractor short-listing

- List of approved contractors from local construction authority

The contractor short-listing process is similar to that in Hong Kong. However, the contractors can only be short-listed from the Government approved contractor list. Upon short-listed the contractors, they are then issued the tender documents. The result of the tenders is announced in the predetermined date in the presence of the tender assessment team including the local construction authorities, site supervision unit and the tenderer, etc.

6.1.3 Tender assessment and award

There are generally two type of tender assessment methods, they are the tender price (or single factor) assessment method and the combined effect (or multiple factor) assessment method. As the names suggested, only the tender prices are compared in the tender price assessment method while the tender price, works programme, method statement and reputation, etc are compared together in the combined effect assessment method.

Annex A 6.2
- Tender Assessment Form

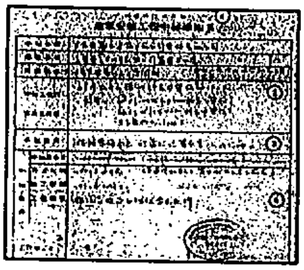
□ Detailed Tender Comparisons

Tender meetings are also conducted between the tenderers during the assessment for the reasons of unusual high or low rates. Then the tender assessment report is required to be submitted to the local construction authority for Tender Acceptance Approval. Finally, the selected contractor is issued the Letter of Acceptance, and with the Letter of Acceptance the contractor can apply for the Construction Works Commencement Permit. It is interesting to note that a compensation fee is required to pay to the tenderers who is not selected to enter a contract with the client.

Annex A 6.3
- Tender Meeting Assessment Form

□ Tenderer Works Planning

Annex B 6.4
- Sample of Construction Tender Acceptance Approval



□ Compensation Fee to Tenderers not Selected

6.2 Official Procedures for Construction

Reports and submissions as shown in Figure 63 are required to make before the construction works can be started. Some of the reports and registration are to be carried out by the Contractor while some are required to be completed by the project team.

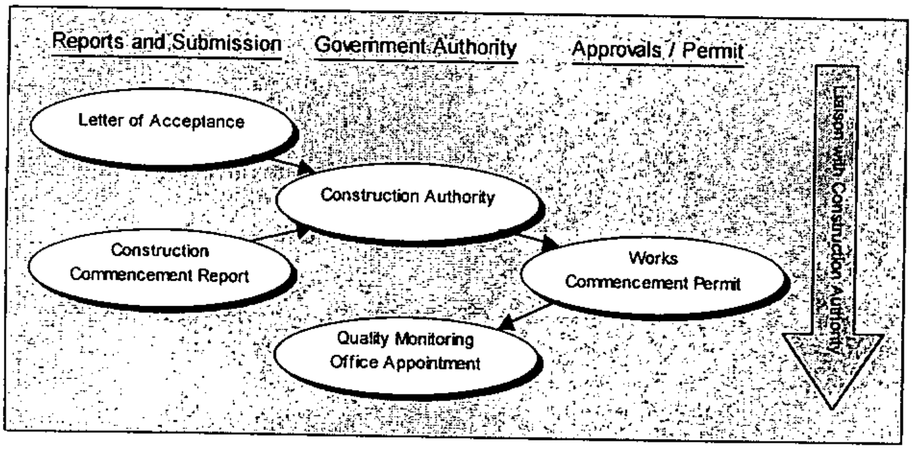


Figure 6.3 Works Commencement Procedure

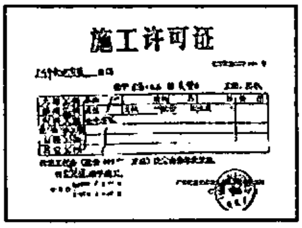
6.2.1 Reports for construction commencement

Upon appointed the contractor for the works, the contractor is required to prepared a Construction Commencement Report, register the contract with the local construction authority and apply for the Construction

- Construction Commencement Report by Contractor

Works Commencement Permit. Besides, the appointment of quality inspection office and installation application is followed. It is important to note that the Construction Works Commencement Permit is required to be posted outside the site for checking.

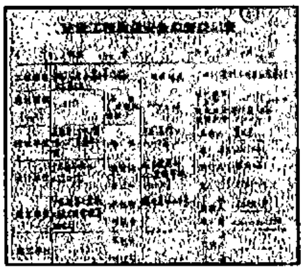
Annex B 6.6 -Sample of Works Commencement Permit



6.2.2 Construction quality monitoring

As shown in Figure 6.3, the Quality Inspection Office is required to be employed after the works commenced. The Quality Inspection Office is an organisation under the Construction Authority. It is responsible for periodic checking as indicated in Figure 6.4. This included quality of major items, such as the concrete quality, reinforcement quality, structure workmanship quality and piling completion, etc. Upon inspection and acceptance of each major items, a quality inspection report is issued. These reports are required to be recorded and properly

Annex B 6.7 - Sample of Construction Quality Inspection Record



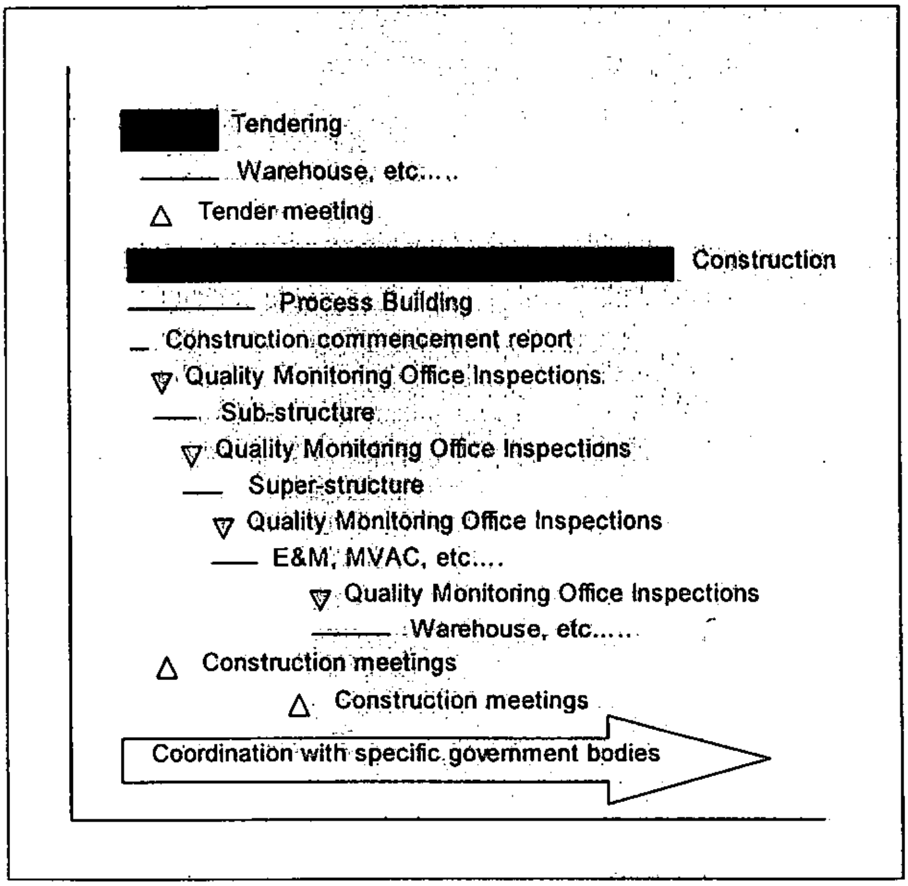


Figure 6.4 Quality Monitoring Office Inspections (Phase 5)

documented. Upon completion of the project, these reports are required to be resubmitted to the Construction Authority to demonstrate the construction works were completed properly. The charge of the Quality Inspection Office normally is 15% of the project estimation cost.

□ 15% of Construction Cost for the Quality Inspection Charges

6.2.3 Construction supervision units

Construction supervision is compulsory for construction projects in China. The function of a construction supervision unit is to ensure the works are carried out accordingly. However, having the perception of securing the benefit of the society, the supervising engineers usually ensured only the necessary government procedures or requirements are followed. The quality of the project is often off-focused and additional site staff are usually recruit to supervise the construction works.

6.2.4 Public utilities connection

The application procedure for public utilities including the power supply, water supply, town gas, steam and telephone are similar. However, the problem of inadequate supply capacity may sometimes occur. Therefore, it is important to liaise with the utility companies to ensure sufficient supply capacity is available, and the liaison shall be started in the Schematic Design Phase. The application for the supply is usually go to the consumption division of the company, e.g Power Consumption Division of the Guangzhou Power Supply Corporation.

Annex A 6.4
- Public Utility Connection Checklist

□ Approved consumption
□ Construction Permit
□ Payment of Connection Installation Charges
□ Coordination of Connection Installation

Annex B 6.9
- Sample of Utility Connection Approval

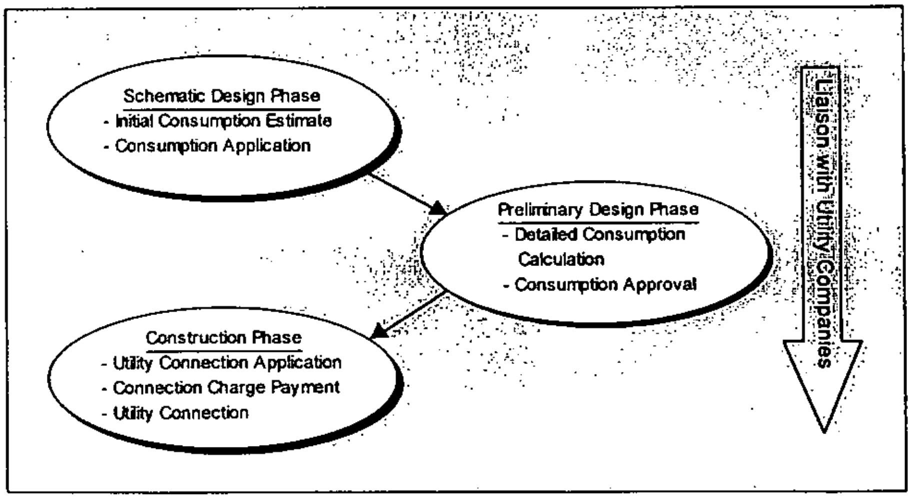


Figure 6.5 Utilities Application and Connection (Phase 5)

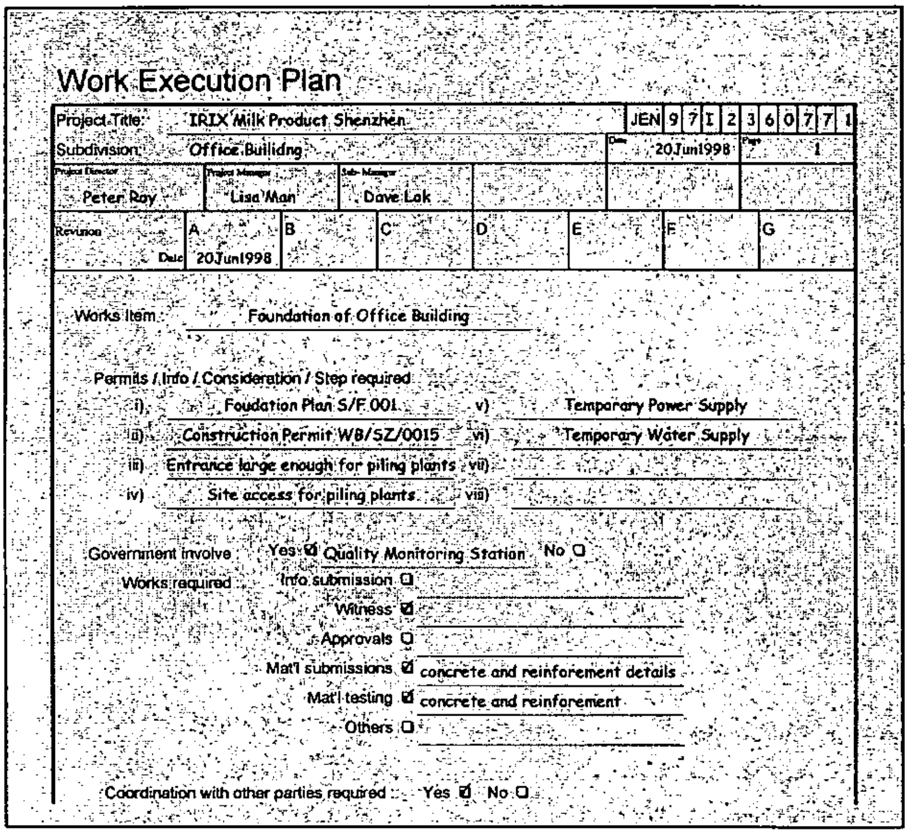
It is important to note that the connection works are normally carried out by a sub-contractor nominated by the utility company. Besides, the connection works do not commence until the connection charge is paid. Therefore, punctual payment of the connection charge is important after the application is approved.

6.2.5 Electrical and mechanical works

It is necessary to emphasis that the contractors of E&M, plumping and drainage and fire service works usually do not properly plan the works. Thus, the shop drawings are always in conflict and frequent alteration are required. In order to minimise the adverse effects, the shop drawing should be prepared in detailed with the project team members to coordinate various installation works. Besides, Works Execution Plan as shown in Figure 6.6 is also required to identify the information, coordination, method statement or detailed mark up wiring diagrams

Annex A 6.5
- Works Execution Plan

□ Required information, drawings & plants
□ Coordination required
□ Quality Monitoring Office witness
□ Method Statement


Work Execution Plan

Project Title: IRIX Milk Product Shenzhen JEN 9 7 I 2 3 6 0 7 7 1
Subdivision: Office Builidng Date 20Jun1998 Page 1
Project Director: Peter Roy | Project Manager: Lisa Man | Sub-Manager: Dave Lok
Revision A B C D E F G
Date 20Jun1998

Works Item: Foundation of Office Building

Permits / Info / Consideration / Step required
i) Foudation Plan S/F 001 v) Temporary Power Supply
ii) Construction Permit W8/SZ/0015 vi) Temporary Water Supply
iii) Entrance large enough for piling plants vii)
iv) Site access for piling plants viii)

Government involve: Yes ☑ Quality Monitoring Station No □
Works required: Info submission □
Witness ☑
Approvals □
Mat'l submissions ☑ concrete and reinforement details
Mat'l testing ☑ concrete and reinforement
Others □

Coordination with other parties required: Yes ☑ No □

Figure 6.6 Works Execution Plan

needed. Joint completion inspection with the E&M works contractor is also required after the E&M works installation. In addition, it is necessary to confirm with the client and the E&M works designer that there are no further alteration upon completion of works.

6.3 Official Procedure for Testing and Commissioning

The testing and commissioning of the plants formed the final stage of the project. In this stage of the project, the operation plants and various machines are to be tested. Besides, as shown in Figure 6.7 reports based on the test results and quality inspection records are required to be submitted for occupation and operation.

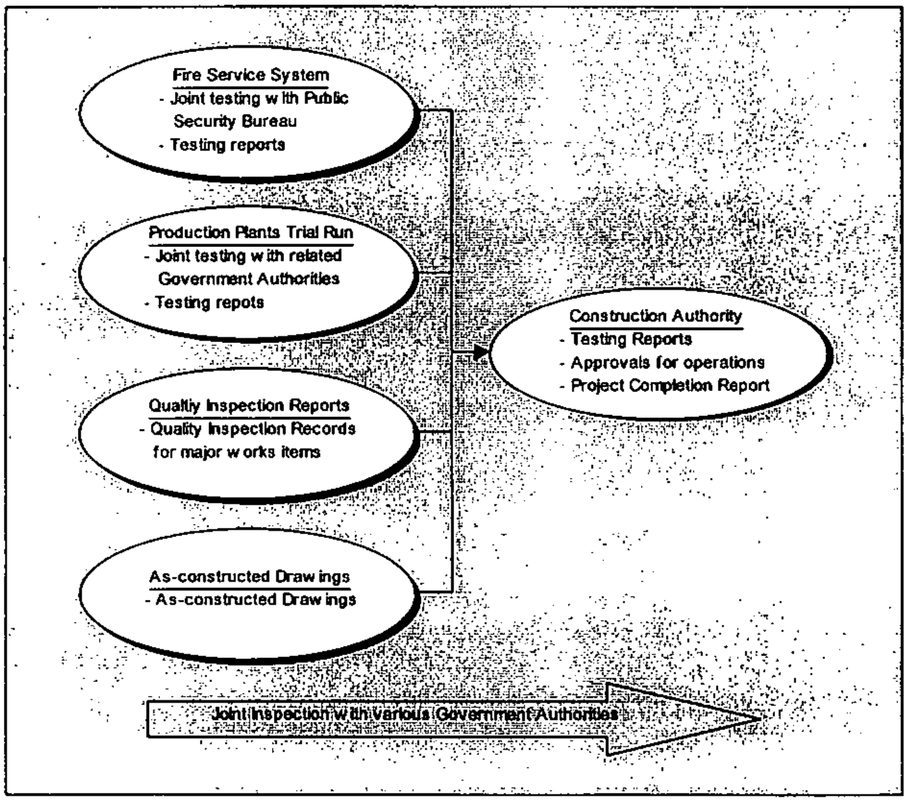


Figure 6.7 Project Completion Procedure (Phase 5)

6.3.1 Fire service system testing

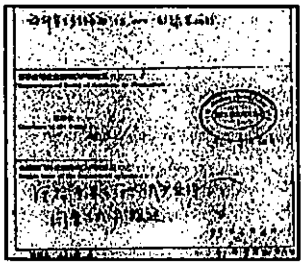
Annex A 6.6 - Fire Service Inspection Checklist

Testing of the fire service system is one of the most important item in a China project. The fire service system is required to be test according to the relevant China design codes and the test result is also required to be submitted to the Fire Service Authority (Public Security Bureau) before the project can be operated. Besides, joint inspection of fire service system testing shall be organised with the Fire Service Authority for project operation approval.

6.3.2 Trial run of production plants

The production trail run is normally carried out by the client's specialist. Therefore, coordination and schedule for a suitable time for the trial run is important. Besides, trial run of the individual parts is also required to spot any operational problems of the plants. The trial runs should also be witness by the local authorities as listed below including the construction authority, industry administration authority, etc. The plant is only allowed to operate upon satisfaction of all these government authorities.

Annex B 6.10
- Sample of Process Trial Run Endorsement



Joint Inspection of Production Trial Run

Annex A 6.7
- Construction Completion Inspection Checklist

- ☐ Industrial Administration Authority
- ☐ Construction Administration Authority
- ☐ Environmental Protection Authority
- ☐ Fire Service Authority
- ☐ Labour Security Administration Authority
- ☐ Hygiene Administration Authority
- ☐ Municipal Authority
- ☐ Local Economic Commission

6.3.3 Completion and commissioning report

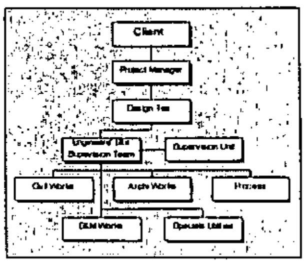
Upon completion of the project, a construction completion report, the quality inspection reports and the as-constructed drawings shall bind to form a report to the Construction Administration Authority to justify the project is properly completed. Finally, a completion certificate will be issued by the Construction Authority to the project.

Annex B 6.11
- Suggested content of the Project Completion Report

6.4 Project Management Elements

In this phase of the project, the working parties involved and the amount of works are increased enormously. The organisational structure is required to change to incorporate the new team members included at least the contractors. Proper planning and execution included the preparation of detailed works programme, risk analysis, progress control reports and performance analysis, etc. are necessary.

- Leanest Team for Construction Phase



6.4.1 Detailed Works Programme (biweekly, monthly and quarterly)

In carrying out the construction works, the detailed works programmes should be prepared. In order to plan the works in detailed, a biweekly and quarterly detailed works programme is required.

As the contractors in China usually do not get use to plan the works detailed in advance, therefore, the detailed works programme should be prepared together with the contractor so that the works programme is agreed and carried out properly. It is also important to note that the details of coordination with different contractors should also be catered in the detailed works programmes. The method statement which is not a common practice in China should also be prepared with the contractor to identify the sequence and required resource for the works.

- □ WBS for Works
- □ Detailed Works Programme
- □ Works Execution Plan
- □ Works Coordination Meeting
- □ Works Progress Meeting

6.4.2 Construction coordination and meetings

Works coordination is one of the important mechanism to enable the works to be carried out fluently. A works coordination plan is a useful tool for coordination of works. This identified the coordination required for various works to be carried out. Besides, possible conflicts

- □ Works Coordination Plan
- □ Works Coordination Meetings
- □ Minutes of Coordination Meetings

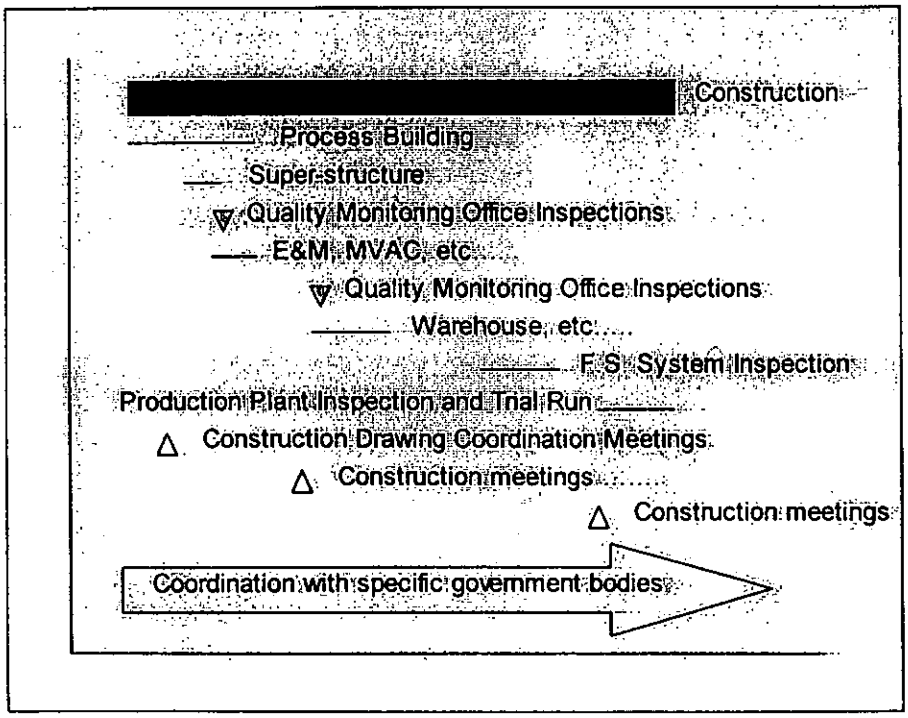


Figure 6.8 Construction Meetings and Inspections (Phase 5)

between various works are also identified, planned and resolved during the works execution.

Construction meetings are important and necessary in construction projects. This enabled the communication between the contractors and the supervision teams. In addition, construction drawing coordination meeting is a standard practice in China. This ensured the contractors aware of the works of other contractors and enable the contractors to spot any conflict of works between each others.

6.4.3 Construction Risk Analysis

Risk is incurred in all construction projects, therefore planning for the uncertainties are important. The risk in the form of conflicts between contracted parties is increased as the number of parties involved increased during the construction phase. Therefore, preparation of risk planning is necessary to reduce the impact of any risk. A summary of risk during construction stage is given in Annex B for reference.

Annex A 5.3
- Risk Planning Form

Annex A 5.4
- Summary of risk at various phase of project

- □ Risk Identification
- □ Risk Analysis
- □ Action Plan or Continency Plan Preparation

6.4.4 Control of changes

Unknown site condition always impose constrains to construction projects, change of project details is therefore necessary. However, it is important to formalise the control and record procedure for the changes. Site Instruction Form for recording the proposed changes and Variation Order Form for recording the cost incurred due to the change is given in Annex A for this purpose.

6.4.4 Construction progress control

There are various method to monitor and control the progress of a construction project. The most common method included the Earned Value Analysis and the Performance Trend Analysis. The earned value analysis control the progress by comparing the actual project completion value and the planned project completion value. The performance trend analysis then made use of the result from the earned value analysis and further the information in graphical format, and predict the performance trend of the contractor.

6.4.5 Earned value analysis

Earned value analysis in its various forms is the most commonly used method of performance measurement. It integrates scope, cost, and schedule measures to assess project performance. Earned value involves calculating three key values for each activity:

- The budget, also called the budgeted cost of work scheduled (BCWS), is that portion of the approved cost estimate planned to be spent on the activity during a given period.
- The actual cost, also called the actual cost of work performed (ACWP), is the total of direct and indirect costs incurred in accomplishing work on the activity during a given period.
- The earned value, also called the budgeted cost of work performed (BCWP), is a percentage of the total budget equal to the percentage of the work actually completed. Many earned value implementations use only a few percentages (e.g., 30 percent, 70 percent, 90 percent, 100 percent) to simplify data collection. Some earned value implementations use only 0 percent or 100 percent (done or not done) to help ensure objective measurement of performance.

These three values are used in combination to provide measures of whether or not work is being accomplished as planned. The most commonly used measures are the cost variance (CV = BCWP – ACWP), the schedule variance (SV = BCWP – BCWS), and the cost performance index (CPI = BCWP / ACWP). The cumulative CPI (the sum of all individual BCWPs divided by the sum of all individual ACWPs) is widely used to forecast project cost at completion. In some application areas, the schedule performance index (SPI = BCWP / BCWS) is used to forecast the project completion date.

6.4.6 Performance trend analysis

Trend analysis involves examining project results over time to determine if performance is improving or deteriorating.

6.4.8 Project progress record and report

The project progress status shall be record and report to the client periodically. Besides, during the construction phase, the cost statu report shall also be prepared to monitor and control the construction cost.

Reference

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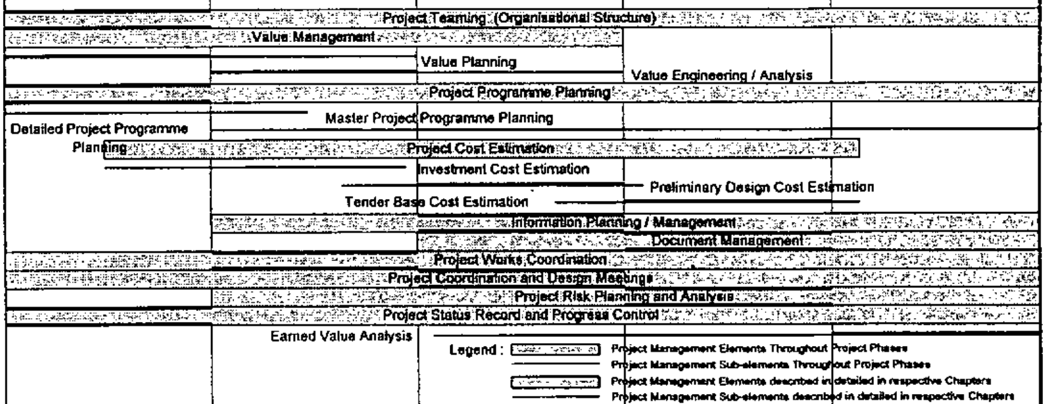
Annex A1

Key Project Management Elements and Approval Procedures for China Construction Projects

	Project Establishment Phase	Land Procurement Phase	Preliminary Design Phase	Construction Drawing Preparation Phase	Tendering and Construction Phase
Details of Procedure and Approvals to fulfill and follow	Chapter 2 - Project Approval - Joint Venture Approval - Business Approval	Chapter 3 - Schematic Design Approval - EIA Report and Approval - Land Use Right Approval	Chapter 4 - Preliminary Design Approval - Fixed Assess Investment Approval - Construction Development Permit - Design Institute Appointment	Chapter 5 - Detailed Structural Design - Detailed Structural Drawings - Construction Application - Construction Permit - Supervision Unit Appointment	Chapter 6 - Tender Document Approval - Contractor Short-listing from Gov list - Tender Assessment Consent - Construction Commencement License Application - Quality Monitoring Office Appointment
Reports and Submissions Required	- Project Feasibility Report - List of Imported Material - Joint Venture Contract - Business License Application	- Site Selection Report - Schematic Design Recommendation Report - Schematic Design Report - EIA Report - Land Use Application	- Preliminary Design Report - Preliminary Design Drawings	- Construction Drawings - Construction Application Report - Construction Permit	- Tender Document Consent Submission - Construction Works Registration - Tender Assessment Consent - Letter of Tender Acceptance - Construction Quality Inspection Record - Fire Service Inspection Report - Production Trial Run Report
Involved Government Authority	- State Planning Committee or Local Planning Commission - Ministry of Foreign Economic and Trade or Local Foreign Economic and Trade Commission - State Administration of Industry and Commerce or Local Industry Admin. Commission	- Local Land Administration Bureau - Local Construction Administration Bureau - Local Town Planning Bureau - Environmental Protection Bureau - Fire Service Bureau	- Local Construction Administration Bureau - Local Planning Bureau or Commission - Environmental Protection Bureau - Fire Service Bureau - Labour Bureau - Hygiene Bureau - Power Supply Bureau - Water Supply Bureau - Municipal Bureau	- Local Construction Administration Bureau - Environmental Protection Bureau - Fire Service Bureau - Labour Bureau - Hygiene Bureau - Power Supply Bureau - Water Supply Bureau - Municipal Bureau	- Local Construction Management Office - Local Economic Commission - Local Industry Commission - Local Tender Administration Committee - Environmental Protection Bureau - Fire Service Bureau - Labour Bureau - Hygiene Bureau
Sample Documents	Annex B 2 - Content of Project Feasibility Report - Project and JV Approval - Foreign Investment Approval - Business Approval	Annex B 3 - Land Use Application Report Form - Gov Advice on Land Usage - Schematic Design Recombination Report Form - Gov Schematic Design Recommendation - EIA Report Form - Land Use Certificate	Annex B 4 - Content of Preliminary Design Report - Project Preliminary Design Approval - Construction Development Approval - Note of Meeting Form - Content of Interim Progress Report	Annex B 5 - Construction Application Report - Construction Application Consent - Construction Permit	Annex B 6 - Construction Tender Application Report - Invitation Tender Acceptance Approval - Nominated Tender Acceptance Approval - Construction Quality Inspection Record - Process Trial Run Record Approval
Key Project Management Elements at Project Phase	Chapter 2	Chapter 3	Chapter 4	Chapter 5	Chapter 6



	Project Establishment Phase	Land Procurement Phase	Preliminary Design Phase	Construction Drawing Preparation Phase	Tendering and Construction Phase
Sample Checklist and Forms	Annex A 2 *Procedural* - List of Imported Material *Project Management* - Value Planning Form - Work Breakdown Structure Form - Activity Code Scheduling Form - Project Master Programme - Project Status Record Form	Annex A 3 *Procedural* - Land Use Application Report Checklist - Schematic Design Recommendation Report Checklist - EIA Report Checklist - Schematic Design Submission Checklist - Land Use Approval Submission Checklist *Project Management* - Proposed Site Information Form - Production Consumption Data Form - Process Flow Diagram Form - Work Breakdown Structure Form - Works Coordination Plan - Value Analysis Form - Detailed Works Programme - Project Status Record Form	Annex A 4 *Procedural* - Design Code Checklist *Project Management* - Work Breakdown Structure Form - Drawing Breakdown Structure Form - Works Coordination Plan - Cost Breakdown Structure - Information Breakdown Structure Form - Project Status Record Form	Annex A 5 *Procedural* - Construction Application Checklist *Project Management* - Work Breakdown Structure Form - Risk Planning Form - Summary Possible Risks - Filing List Form - Information Transmittal Record Form - Information Transmittal Form - Project Status Record Form	Annex A 6 *Procedural* - Tender Document Checklist - Tender Assessment Form - Tender Meeting Assessment Form - Public Utility Connection Checklist - Fire Service Inspection Checklist - Project Completion Inspection Checklist *Project Management* - Work Breakdown Structure Form - Earned Value Analysis Form - Performance Trend Analysis Form - Works Execution Plan - Site Instruction Form - Variation Order Form - Works Execution Plan - Cost Status Report Form - Project Status Record Form

Key Project Management Elements and Approval Procedures for China Construction Projects

	Project Establishment Phase	Land Procurement Phase	Preliminary Design Phase	Construction Drawing Preparation Phase	Tendering and Construction Phase
Details of Procedure and Approvals to fulfill and follow	Chapter 2 - Project Approval - Joint Venture Approval - Business Approval	Chapter 3 - Schematic Design Approval - EIA Report and Approval - Land Use Right Approval	Chapter 4 - Preliminary Design Approval - Fixed Assess Investment Approval - Construction Development Permit - Design Institute Appointment	Chapter 5 - Detailed Structural Design - Detailed Structural Drawings - Construction Application - Construction Permit - Supervision Unit Appointment	Chapter 6 - Tender Document Approval - Contractor Short-listing from Gov list - Tender Assessment Consent - Construction Commencement License Application - Quality Monitoring Office Appointment
Reports and Submissions Required	- Project Feasibility Report - List of Imported Material - Joint Venture Contract - Business License Application	- Site Selection Report - Schematic Design Recommendation Report - Schematic Design Report - EIA Report - Land Use Application	- Preliminary Design Report - Preliminary Design Drawings	- Construction Drawings - Construction Application Report - Construction Permit	- Tender Document Consent Submission - Construction Works Registration - Tender Assessment Consent - Letter of Tender Acceptance - Construction Quality Inspection Record - Fire Service Inspection Report - Production Trial Run Report
Involved Government Authority	- State Planning Committee or Local Planning Commission - Ministry of Foreign Economic and Trade or Local Foreign Economic and Trade Commission - State Administration of Industry and Commerce or Local Industry Admin. Commission	- Local Land Administration Bureau - Local Construction Administration Bureau - Local Town Planning Bureau - Environmental Protection Bureau - Fire Service Bureau	- Local Construction Administration Bureau - Local Planning Bureau or Commission - Environmental Protection Bureau - Fire Service Bureau - Labour Bureau - Hygiene Bureau - Power Supply Bureau - Water Supply Bureau - Municipal Bureau	- Local Construction Administration Bureau - Environmental Protection Bureau - Fire Service Bureau - Labour Bureau - Hygiene Bureau - Power Supply Bureau - Water Supply Bureau - Municipal Bureau	- Local Construction Management Office - Local Economic Commission - Local Industry Commission - Local Tender Administration Committee - Environmental Protection Bureau - Fire Service Bureau - Labour Bureau - Hygiene Bureau
Sample Documents	Annex B.2 - Content of Project Feasibility Report - Project and JV Approval - Foreign Investment Approval - Business Approval	Annex B.3 - Land Use Application Report Form - Gov Advice on Land Usage - Schematic Design Recombination Report Form - Gov Schematic Design Recommendation - EIA Report Form - Land Use Certificate	Annex B.4 - Content of Preliminary Design Report - Project Preliminary Design Approval - Construction Development Approval - Note of Meeting Form - Content of Interim Progress Report	Annex B.5 - Construction Application Report - Construction Application Consent - Construction Permit	Annex B.6 - Construction Tender Application Report - Invitation Tender Acceptance Approval - Nominated Tender Acceptance Approval - Construction Quality Inspection Record - Process Trial Run Record Approval
Key Project Management Elements at Project Phase	Chapter 2	Chapter 3	Chapter 4	Chapter 5	Chapter 6
Sample Checklist and Forms	Annex A.2 *Procedural* - List of Imported Material *Project Management* - Value Planning Form - Work Breakdown Structure Form - Activity Code Scheduling Form - Project Master Programme - Project Status Record Form	Annex A.3 *Procedural* - Land Use Application Report Checklist - Schematic Design Recommendation Report Checklist - EIA Report Checklist - Schematic Design Submission Checklist - Land Use Approval Submission Checklist *Project Management* - Proposed Site Information Form - Production Consumption Data Form - Process Flow Diagram Form - Work Breakdown Structure Form - Works Coordination Plan - Value Analysis Form - Detailed Works Programme - Project Status Record Form	Annex A.4 *Procedural* - Design Code Checklist *Project Management* - Work Breakdown Structure Form - Drawing Breakdown Structure Form - Works Coordination Plan - Cost Breakdown Structure - Information Breakdown Structure Form - Project Status Record Form	Annex A.5 *Procedural* - Construction Application Checklist *Project Management* - Work Breakdown Structure Form - Risk Planning Form - Summary Possible Risks - Filing List Form - Information Transmittal Record Form - Information Transmittal Form - Project Status Record Form	Annex A.6 *Procedural* - Tender Document Checklist - Tender Assessment Form - Tender Meeting Assessment Form - Public Utility Connection Checklist - Fire Service Inspection Checklist - Project Completion Inspection Checklist *Project Management* - Work Breakdown Structure Form - Earned Value Analysis Form - Performance Trend Analysis Form - Works Execution Plan - Site Instruction Form - Variation Order Form - Works Execution Plan - Cost Status Report Form - Project Status Record Form

Key Project Management Elements at Project Phase:

- Project Teaming (Organisational Structure)
- Value Management
- Value Planning
- Value Engineering / Analysis
- Project Programme Planning
- Master Project Programme Planning
- Detailed Project Programme Planning
- Project Cost Estimation
- Investment Cost Estimation
- Preliminary Design Cost Estimation
- Tender Base Cost Estimation
- Information Planning / Management
- Document Management
- Project Works Coordination
- Project Coordination and Design Management
- Project Risk Planning and Analysis
- Project Status Record and Progress Control
- Earned Value Analysis

Legend:
- Project Management Elements Throughout Project Phases
- Project Management Sub-elements Throughout Project Phases
- Project Management Elements described in detailed in respective Chapters
- Project Management Sub-elements described in detailed in respective Chapters

Annex A2

List of Imported Material

Project Title:	IRIX Milk Product Shenzhen	JEN	9	7	I	2	3	6	0	7	7	1
Subdivision:	Design Criteria Weighting	Date 01Dec1997	Page 1								

	Type	Model and Specification	Country of Origin	Nos.	Price (' 000) Unit Price	Price (' 000) Sub - Total	Import Apprv. Date	Import Apprv. Nos.	Custom		Remarks
1)	Production Plant	a) Boiler	GEM	2	$200	$400					
		b) Chiller	UK	1	$300	$300					
		c) Air Handling Unit	JPN	3	$100	$300					
		d) Glycol Cooler	GEM	2	$500	$1,000					
		e)	. . .	. . .							
2)	Vehicle	a) Nissan MX2	GEM	1	$200	$200					
		b) Mist P2800	JPN	2	$250	$500					
		c)	. . .	. . .							
3)	Office Equipment	a) Telephone System	JPN	1	$150	$150					
		b) Security System	USA	1	$250	$250					
		c) UPS (12kVA)	FNC	2	$200	$400					
		d)	. . .	. . .							

Note : Production date should be specified for 2nd hand facilities

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Value Planning Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Design Criteria Weighting		Date 25Nov1997	Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok		

Revision	A	B	C	D	E	F	G
Date	25Nov1997						

Primary Design Criteria	Weighting of Criteria	Detailed Design Criteria	Weighting of Criteria	Total Weighting of Criteria	Remarks
- low capital cost	0.30	- quick completion	0.30	0.09	
		- competitive procurement	0.20	0.06	
		- low risk design	0.50	0.15	
			1.00		
- high operating efficiency	0.50	- low maintenance cost	0.20	0.10	
		- reliability	0.30	0.15	
		- flexible output capacity	0.15	0.08	
		- low fuel cost	0.25	0.13	
		- low labour cost	0.10	0.05	
			1.00		
- environmental friendly	0.20	- aesthetically pleasing	0.30	0.06	
		- low fume emission	0.40	0.08	
		- low noise level	0.30	0.06	
			1.00		
	1.00			1.00	

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Master Project Programme	Date 25Nov1997	Page 1
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	25Nov1997						

WBS Code	Description / Title	Person	Time	Remark
MP	Milk Product Plant			
MP.AA	Formation of Team			
	Process design		10 days	
	Architectural design		10 days	
	E&M design		10 days	
	Civil design		10 days	
	Design institute		10 days	
	Special design (special storage, env. treatment)		7 days	
MP.BB	Scope definition (inc. value planning)			
	Process		5 days	
	Buildings and rooms		5 days	
	Roads and supporting facilities		5 days	
	- Value planning		@ 3 days	
MP.CC	Investigation and analysis			
	Geographical details		5 days	
	Geological details		5 days	
	Transportation details		5 days	
	Resources and supply details		5 days	
	Supporting facility details		5 days	
MP.DD	Design and cost estimate (inc. value engineering)			
	Schematic (master plan) design and cost est.		20 days	
	Preliminary design and cost est.		40 days	
	Detailed design and cost est.		40 days	
	- Value engineering		@ 3 days	

(Deliverables) (Works Cat.) (Works)

Note : Value / Reference should be indicated in the blank space of the items

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Master Project Programme	Date 25Nov1997	Page 2

Project Director	Project Manager	Sub- Manager			
Peter Roy	Lisa Man	Dave Lok			

Revision	A	B	C	D	E	F	G
Date	25Nov1997						

WBS Code	Description / Title	Person	Time	Remark
MP.EE	Tendering document preparation			
	General condition of contract		30 days	
	Special condition of contract		30 days	
	Specifications		30 days	
MP.FF	Construction (inc. serise I)			
	Site clearence and groundworks		40 days	
	Substructures		70 dyas	
	Superstructures		130 days	
	Services, fit-outs and finishes		170 days	
	- MVAC installation		40 days	
	- Fire service installation		40 days	
	- Plumbing and drainages		55 days	
	- E&M fit-outs		55 days	
	- Architectural finishes		55 days	
	Landscaping and exteranal works		130 days	
MP.GG	Process and E&M			
	Process plants production and shipment		180 days	
	Process installation		45 days	
	Special E&M installations		45 days	
MP.HH	Post-construction			
	Trial Run		10 days	
	As-built drawings		50 days	Gov. also
	Defect monitoring		50 days	

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

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Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Master Project Programme	Date 25Nov1997	Page 3

Project Director	Project Manager	Sub- Manager			
Peter Roy	Lisa Man	Dave Lok			

Revision	A	B	C	D	E	F	G
Date	25Nov1997						

WBS Code	Description / Title	Person	Time	Remark
MP.II	Reports preparation and submission			
	Reports to clients			
	- schematic design repport		7 days	Gov. also
	- Site selection report		7 days	
	- preliminary design report		7 days	Gov. also
	- progress reports		@ 7 days	Mth_end
	- production trial run report		7 days	Gov. also
	Reports to Government			
	- project approval report		7 days	
	- schematic design report		7 days	Clin. also
	- preliminary design report		7 days	Clin. also
	- land use application report		7 days	
	- construction permission report		7 days	
	- project completion report		7 days	Clin. also
	- production trial run report		7 days	Clin. also
MP.JJ	Reviews and approvals			
	Client			
	- project team approval		10 days	
	- schematic design scheme and cost		10 days	
	- preliminary design and cost		10 days	
	- detailed design and cost		10 days	
	- tender doc. approval		10 days	

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

												File
To:												
Initial:												
Copy:												

NOT TO BE COPIED WITHOUT PROJECT MANAGER'S PERMISSION

Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Master Project Programme	Date 25Nov1997	Page 4
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	25Nov1997						

WBS Code	Description / Title	Person	Time	Remark
MP.KK	Reviews and approvals			
	Government approvals			
	- project approval		10 days	
	- schematic design approval		10 days	
	- preliminary design approval		20 days	
	- land use approval		10 days	
	- construction approval		7 days	
	- production trial run approval		10 days	
	- project completion approval		5 days	
	Serise I			
	- Detailed (const. drawing) design and cost est.			
	- Cleint apprv. of detailed design and cost			
	- Gov. aprv. of detailed design (const. app.)			
	- Tenderer short-list			
	- Tender doc. pre.			
	- Client apprv. of tender doc.			
	- Gov. apprv. of tender doc.			
	- Tender assessment			
	- Client apprv. of appointment			
	- Gov. apprv. of appointment			
	- Construction commencement report			
	- Construction works			
	- Inspection and reworks			
	- Construction completion report			

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

NOT TO BE COPIED WITHOUT PROJECT MANAGER'S PERMISSION

Activity Code Scheduleing Form

Project Title: IRIX Milk Product Shenzhen					JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision: Master Project Programme					Date 25Nov1997	Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok				
Revision	A	B	C	D	E	F	G
Date	25Nov1997						

ACT Code (Code) (Sub-code)	Description / Title	Order	Length	Remark
RES1	Primary Responsibility		4	
ALL	All designers	3		
ARCH	Architect	3		
CIVI	Civil engineer	3		
CLIE	Client	1		
DESI	Design institute	4		
EAME	E&M engineer	3		
PMGR	Project manager	1		
PROC	Process engineer	3		
ZONE	zone	2		
RES2	Secondary Responsibility		4	
ALL	All designers	3		
ARCH	Architect	3		
CIVI	Civil engineer	3		
CLIE	Client	1		
DESI	Design institute	4		
EAME	E&M engineer	3		
PMGR	Project manager	1		
PROC	Process engineer	3		
ZONE	zone	2		

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Annex A 2.4.1

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Activity Code Scheduleing Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Master Project Programme		Date 25Nov1997	Page 2
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok		

Revision	A	B	C	D	E	F	G
Date	25Nov1997						

ACT Code (Code)	(Sub-code)	Description / Title	Order	Length	Remark
STEP		Step		4	
	ANAL	Information analysis	2		
	AWAR	Award	7		
	COMT	Comment by client/GOV	5		
	CONS	Construction	8		
	DESN	Design / decision	3		
	DOCU	Tender document preparation	4		
	INFO	Inforation gathering	1		
	TEND	Tendering	6		
PHAS		Phase		4	
	CDWG	Construction design, drawing and appli	5		
	COMP	Testing and commissioning	7		
	CONT	Construction and tendering	6		
	ESTH	Project establishment	1		
	LAND	Land procurement	3		
	PREM	Detailed preliminary design	4		
	SCHE	Schematic design	2		

Note : Value / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

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Activity Code Scheduleing Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Master Project Programme	Date 25Nov1997	Page 3
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	25Nov1997						

ACT Code (Code)	(Sub-code)	Description / Title	Order	Length	Remark
DEIL		Deliverables		4	
	BULD	Buildings	5		
	DESG	Designs	3		
	MILE	Milestone	1		
	PLNT	Plants	6		
	REPT	Reports and submissions	4		
	SCOP	Project scope definition	2		
TYPE		Type of works		4	
	WORK	Works	2		
	APPG	Government approvals	1		
	APPC	Cleint approvals	1		
		<u>Activity Sub-ID</u>		2	
	AP	Approvals	1		
	BD	Building Structure	5		
	EN	Waste treatment	6		
	LS	Landscaping	8		
	PJ	Project	4		
	PT	Process Plant	5		
	RD	Road and drainages	7		
	RP	Reports	2		
	RV	Reivew	3		
	SB	Submission	1		
	UT	Utilities	5		

Note : Value / Reference should be indicated in the blank space of the items

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Project Status Form

Project Title:	IRIX Milk Product Shenzhen	JEN	9	7	I	2	3	6	0	7	7	1

Subdivision:	Project Establishment Phase	Date 12Dec1997	Page 1

Project Director	Project Manager	Sub- Manager			
Peter Roy	Lisa Man	Dave Lok			

Revision	A	B	C	D	E	F	G
Date	02Dec1997						

Project Status / Information	O/A	P	R	Further Details
i) Process details	☐	☑	☐	
process design	☑	☐	☐	
plants layout	☐	☐	☑	Delcan Process Ltd.
ii) Expected investment sum (investment details)				USD 10 Milion
iii) Expected operation (labour/shift, shift/day)				20 head/shift ; 2 shift/day
iv) Project approval	☐	☐	☑	
project proposal report	☐	☑	☐	
general project information	☑	☐	☐	IRIX - 80% ; Fuhua - 20%
(JV parties, investment sum)				
market analysis	☐	☑	☐	
economical and financial forecast	☐	☑	☐	
production details	☐	☑	☐	
process details	☐	☐	☑	
environmental impacts	☐	☐	☑	
preliminatry schematic layout	☐	☐	☑	
list of plants/material to be import	☐	☑	☐	
v) JV approval	☐	☑	☐	
JV contract/agreement details	☐	☑	☐	
vi) Business approval	☐	☐	☑	

Legend : O/A - Obtained/Available
P - In progress or being prepared
R - Require further input

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

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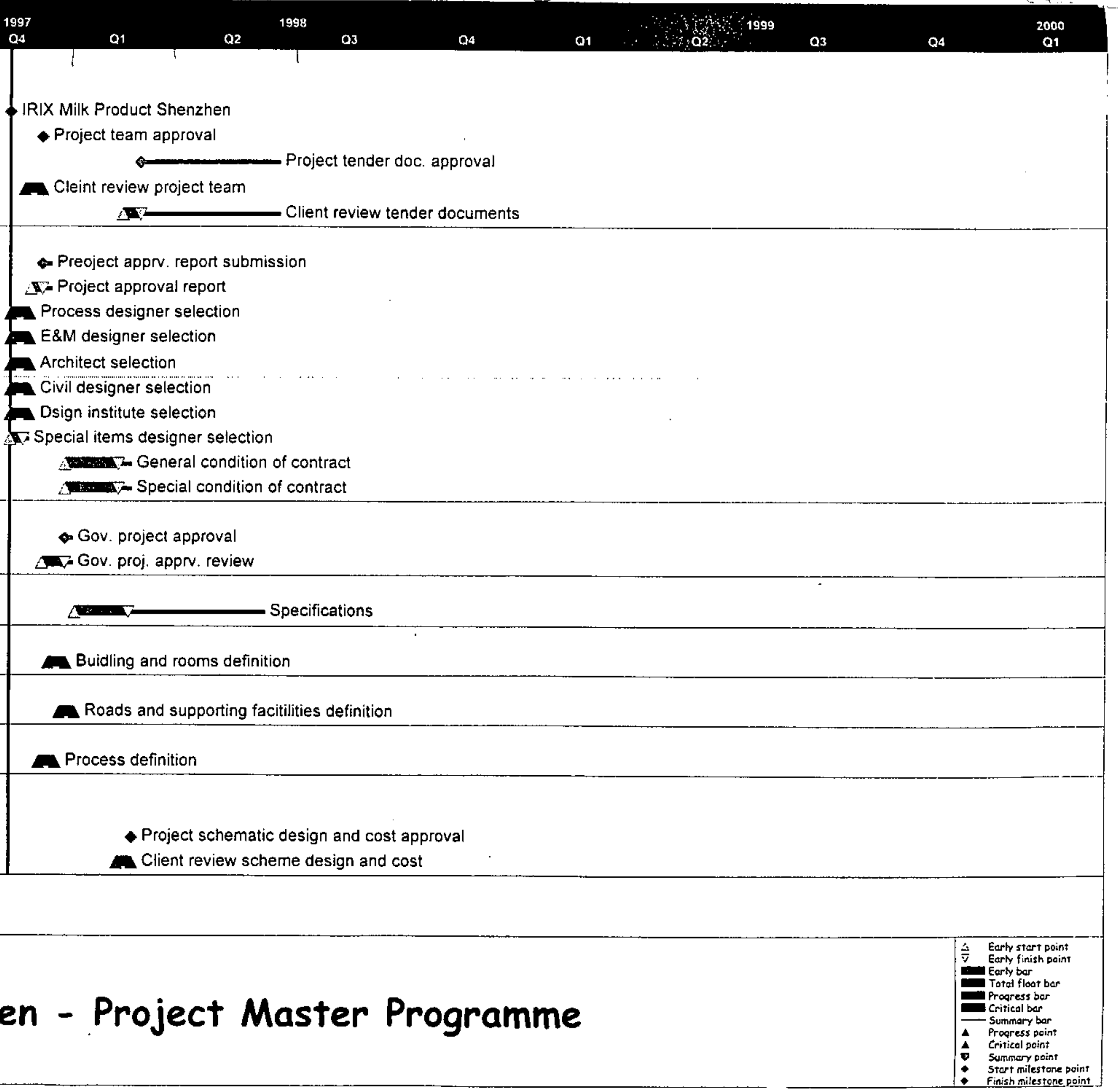
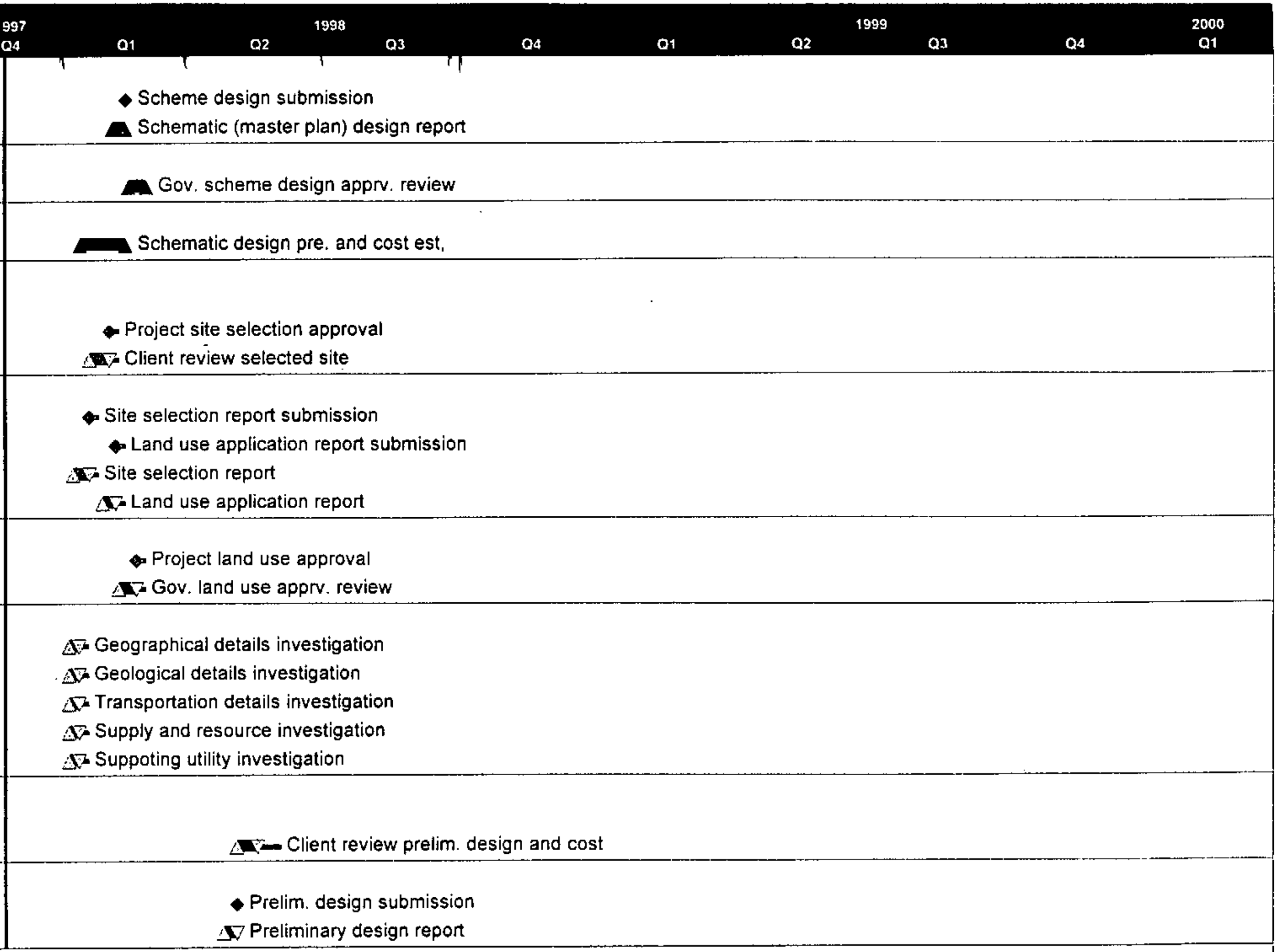
IRIX Milk Product Shenzhen - Project Master Programme

Act ID	Description
Project establishment	
Client	
AP0000	IRIX Milk Product Shenzhen
AP0010	Project team approval
AP0035	Project tender doc. approval
RV1770	Cleint review project team
RV1815	Client review tender documents
Project manager	
SB0010	Preoject apprv. report submission
RP1680	Project approval report
PJ1000	Process designer selection
PJ1010	E&M designer selection
PJ1015	Architect selection
PJ1020	Civil designer selection
PJ1030	Dsign institute selection
PJ1040	Special items designer selection
PJ1170	General condition of contract
PJ1180	Special condition of contract
zone	
AP0020	Gov. project approval
RV1810	Gov. proj. apprv. review
All designers	
PJ1190	Specifications
Architect	
PJ1060	Buidling and rooms definition
Civil engineer	
PJ1070	Roads and supporting facitilities definition
Process engineer	
PJ1050	Process definition
Schematic design	
Client	
AP0030	Project schematic design and cost approval
RV1780	Client review scheme design and cost



IRIX Milk Product Shenzhen - Project Master Programme

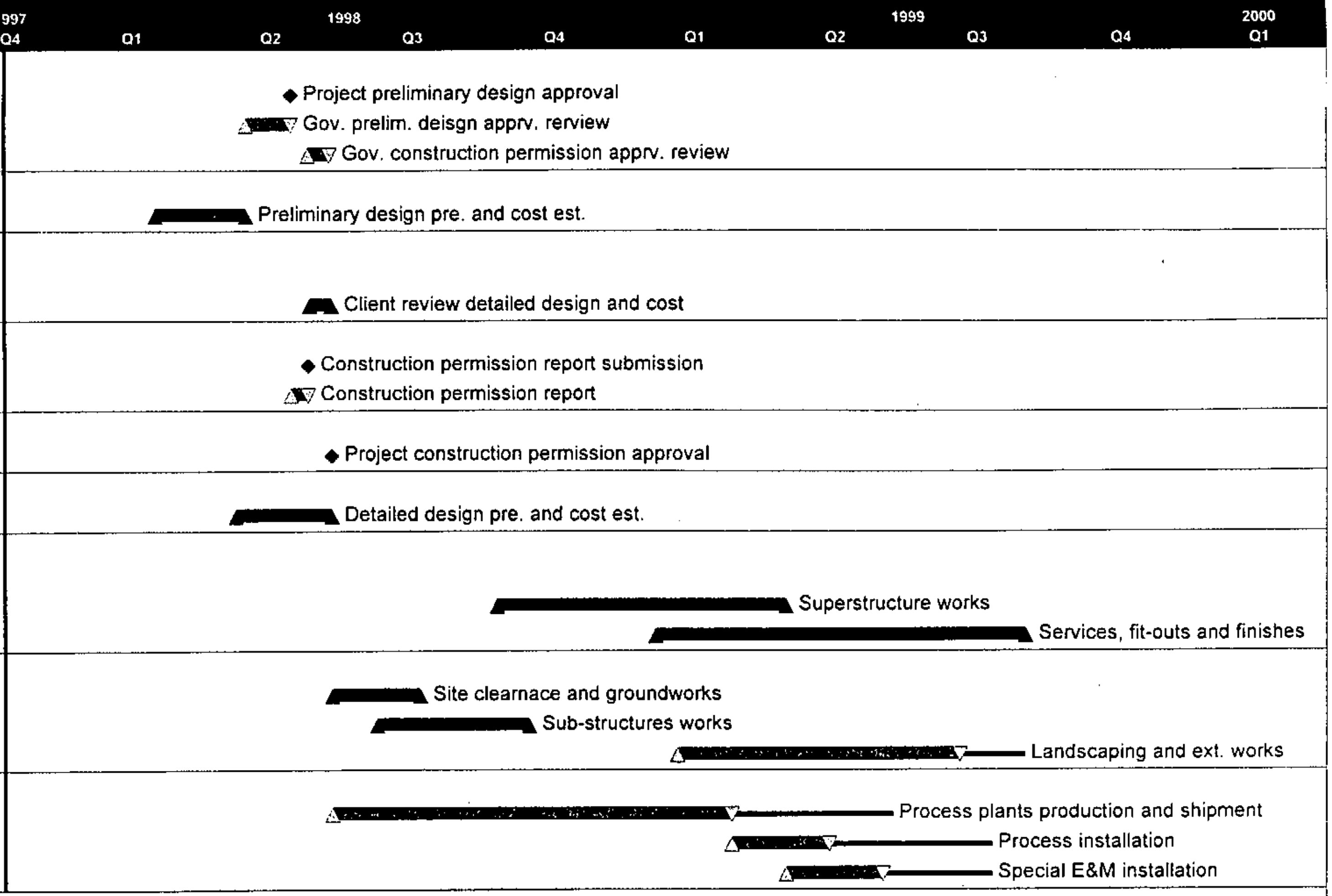
Act ID	Description
Project manager	
SB0020	Scheme design submission
RP1690	Schematic (master plan) design report
zone	
RV1820	Gov. scheme design apprv. review
All designers	
PJ1140	Schematic design pre. and cost est,
Land procurement	
Client	
AP0037	Project site selection approval
RV1785	Client review selected site
Project manager	
SB0030	Site selection report submission
SB0040	Land use application report submission
RP1700	Site selection report
RP1720	Land use application report
zone	
AP0040	Project land use approval
RV1830	Gov. land use apprv. review
Civil engineer	
PJ1080	Geographical details investigation
PJ1090	Geological details investigation
PJ1110	Transportation details investigation
PJ1120	Supply and resource investigation
PJ1130	Suppoting utility investigation
Detailed preliminary design	
Client	
RV1790	Client review prelim. design and cost
Project manager	
SB0050	Prelim. design submission
RP1730	Preliminary design report



- Early start point
- Early finish point
- Early bar
- Total float bar
- Progress bar
- Critical bar
- Summary bar
- Progress point
- Critical point
- Summary point
- Start milestone point
- Finish milestone point

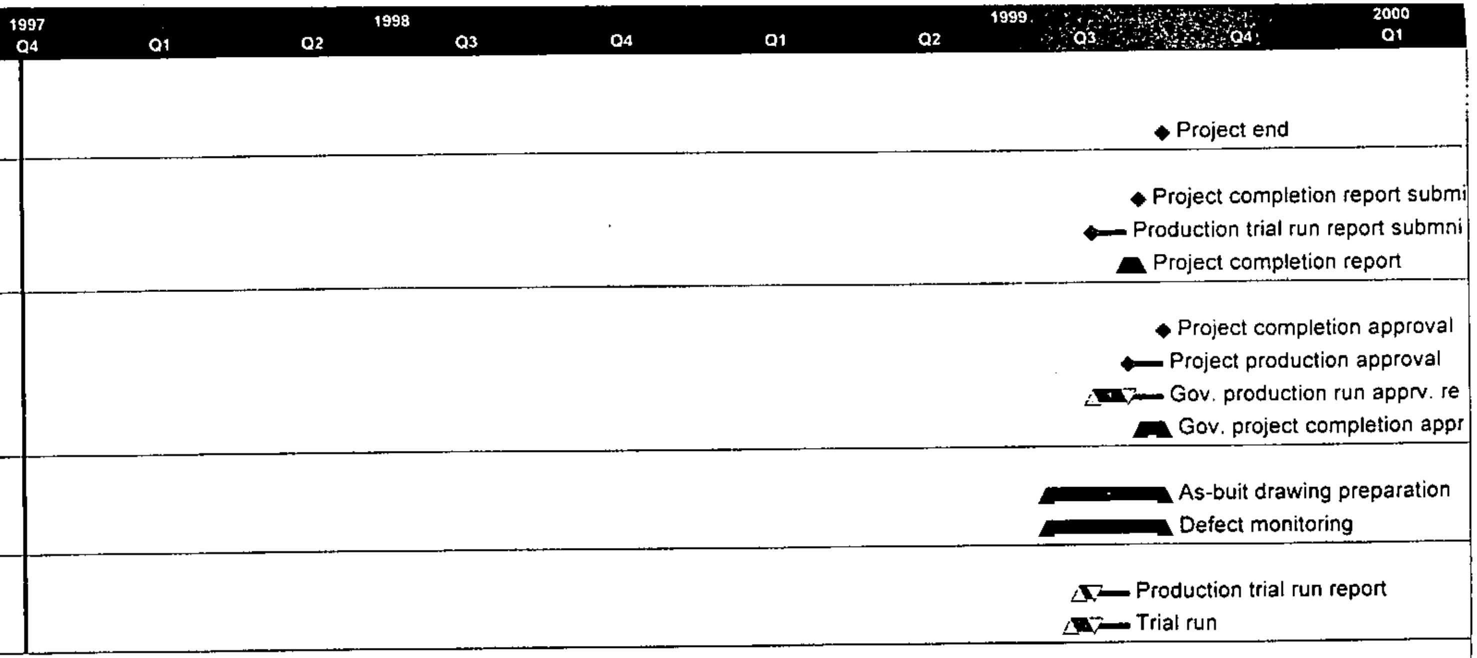
IRIX Milk Product Shenzhen - Project Master Programme

Act ID	Description
zone	
AP0050	Project preliminary design approval
RV1840	Gov. prelim. deisgn apprv. rerview
RV1850	Gov. construction permission apprv. review
All designers	
PJ1150	Preliminary design pre. and cost est.
Construction design, drawing and application	
Client	
RV1800	Client review detailed design and cost
Project manager	
SB0060	Construction permission report submission
RP1750	Construction permission report
zone	
AP0060	Project construction permission approval
All designers	
PJ1160	Detailed design pre. and cost est.
Construction and tendering	
Architect	
PJ1280	Superstructure works
PJ1290	Services, fit-outs and finishes
Civil engineer	
PJ1200	Site clearnace and groundworks
PJ1240	Sub-structures works
PJ1520	Landscaping and ext. works
Process engineer	
PJ1560	Process plants production and shipment
PJ1600	Process installation
PJ1640	Special E&M installation



Early start point
Early finish point
Early bar
Total float bar
Progress bar
Critical bar
Summary bar
Progress point
Critical point
Summary point
Start milestone point
Finish milestone point

Act ID	Description
Testing and commissioning	
Client	
AP2000	Project end
Project manager	
SB0070	Project completion report submission
SB0080	Production trial run report submnission
RP1785	Project completion report
zone	
AP0070	Project completion approval
AP0080	Project production approval
RV1870	Gov. production run apprv. review
RV1875	Gov. project completion apprv. review
All designers	
PJ1670	As-buit drawing preparation
PJ1680	Defect monitoring
Process engineer	
RP1780	Production trial run report
PJ1650	Trial run



IRIX Milk Product Shenzhen - Project Master Programme

- △ Early start point
- ▽ Early finish point
- Early bar
- Total float bar
- Progress bar
- Critical bar
- Summary bar
- ▲ Progress point
- ▲ Critical point
- Summary point
- ◆ Start milestone point
- ◆ Finish milestone point

Annex A3

Proposed Site Information

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Land procurement	Date 12Jan1998	Page 1

Proposed site Shenzhen Economic and Trade Development District

Long term cost

i) foreign investment privileges — Construciton tax deduction

ii) fuel cost (coal, heavy oil) — Diesel - RMB 3 per liter

iii) profit taxation and government charges — refer to specific document

iv) transportation cost (road, railway, river, airport) — Railways, Higway No. 723

v) waste treatment cost — RMB 15 / ℓ; max. 3000 mg/ℓ (BOD)

vi) local labour supply (quality and quantities) — RMB 1000 / month (average)

vii) supporting facilities cost (power, water, gas, telephone) — No direct gas supply

viii) import and export charges and procedures — Gov. doc. No. T386

Production Supports

i) electricity capacity — max. 2000 V — max. 200,000 kVA

ii) water supply — max. 60 ton / day ~~kℓ per day~~ — purity

iii) steam supply — max. 20 T/hr — max. 40 Bar

iv) fuel supply — max. 10000 liter per day

v) waste treatment — Incineration / max. 100 t/d Solid / Amount
Sludge Tanks / max. 150 t/d Liquid / Amount

Initial / construction cost

i) fire service requirement on production plant — Shenzhen F.S. doc. F365

ii) geographical condition — see appendix A

iii) meteorological condition (rainfall, temp, wind, snow) — see appendix B

iv) construction tax and approval charges — brick deposit, cement pack deposit

v) land price and land use requirements — 300 RMB/m^2

vi) local construction material cost —

vii) geological condition — see appendix A

viii) site formation (road, drainage, pipes, power cable) — only power and water avil.

ix) site layout and area — m^2

x) limited plot ratio — 15:1

xi) limited landscaping ratio — 10:1

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager — Date of Approval

To:												File
Initial:												
Copy:												

Production Consumption Data

Project Title: IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision: Land procurement	Date 29Dec1997	Page 1

Initial data for operation :

Power consumption

i) Required voltage 800 V

ii) Required power 1700 kVA

Water consumption

i) Quantity 50 ton / day kℓ per day

ii) Quality Ca, Na salt - 30 ppm max. purity, mineral content

iii) Further treatment : Osmosis ❑; Distillation ❑; Others ______

Steam consumption

i) Quantity 5 T / hr

ii) Pressure 20 Bar

Fuel consumption

i) Diesel 30 m^3 per day ~~liter per day~~

ii) Heavy oil 35 liter per day

iii) Other ______

Waste generated

i) Solid / Amount milk powder dust / 500 kg

/

ii) Liquid / Amount waste water / 1 ton/day; BOD - 1000 mg/ℓ

/

iii) Gas / Amount /

/

Note : Value / Reference should be indicated in the blank space of the items

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

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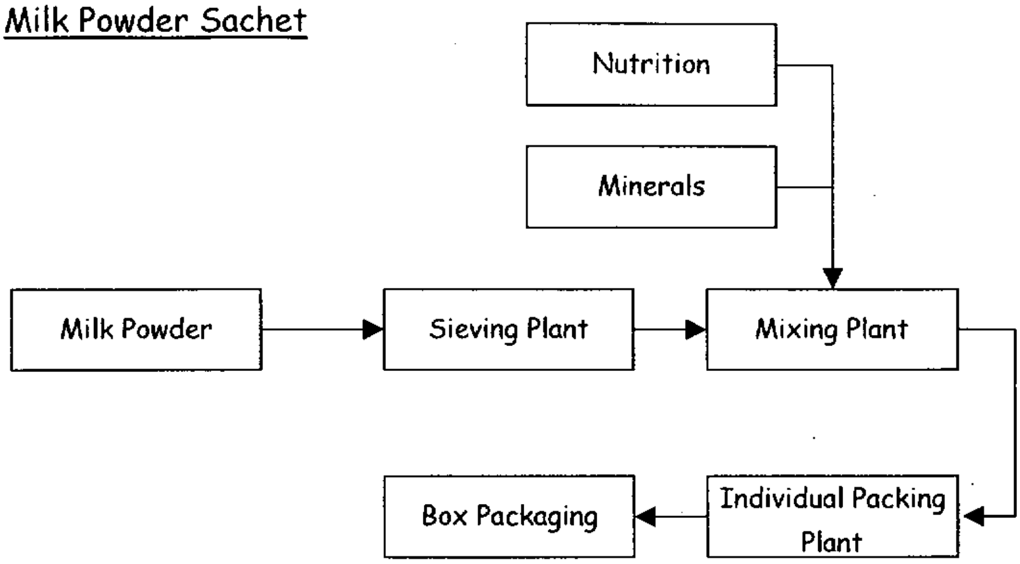
Process Flow Block Diagram

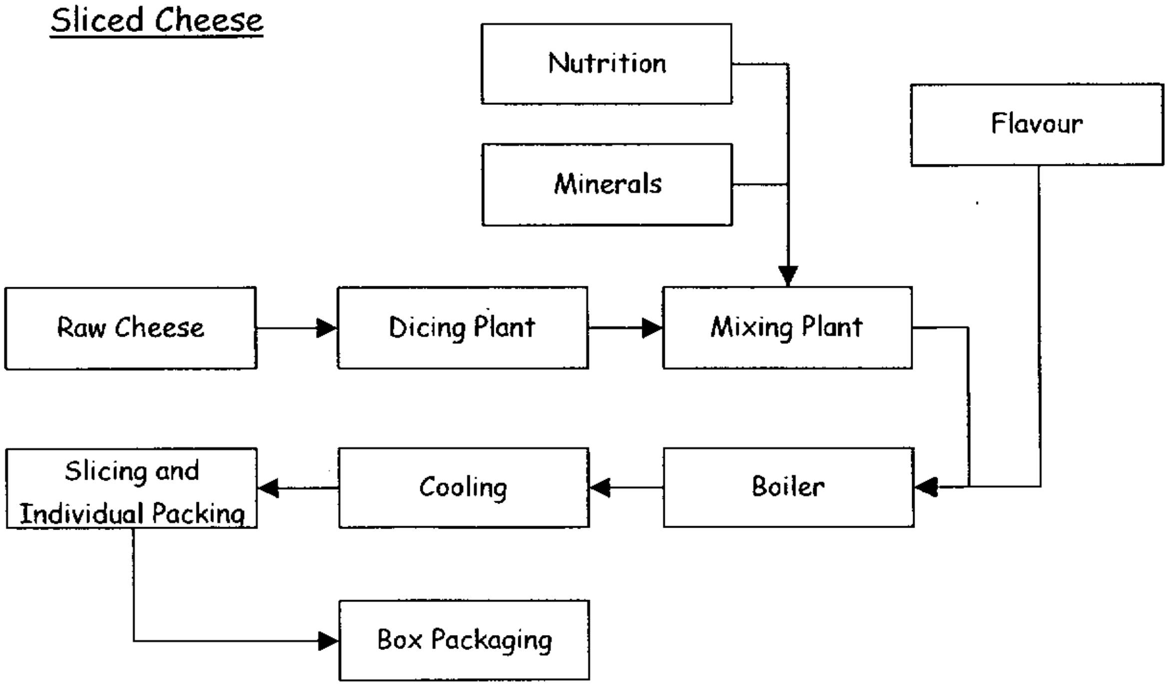
Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Schematic Design Recommendation - Land Procurement	Date 25Dec1997	Page 1

Production Process Flow :

<u>Milk Powder Sachet</u>



<u>Sliced Cheese</u>



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Signed by Project Manager / Sub-Manager

Date of Approval

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~~Land Use~~ Application Report Checklist

Project Title: IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1
Subdivision: Land Use Appplication - Land procurement		Date 18Jan1998	Page 1
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	18Jan1998						

Documents preparation / submission		S	P	Date / Remarks
i)	Project proposal / feasibility study report	☑	☐	Project Approv. Rpt. 30Dec1997
ii)	Project approval	☑	☐	06Jan1998 SZ FI No. 374
iii)	Special project details	☐	☐	N/A
iv)	Negotiation with Government for proposed site lot	☐	☑	w/ SZETDD Mgt. Committee
v)	Site ~~selection~~ report application Land use application	☐	☑	await Business Approval

Document received		R	C	Date / Remarks
i)	Gov. site selection advice	☐	☐	
ii)	Approved site location plan, boundary or coordinate	☐	☐	
iii)	Blueline diagram	☐	☐	
iv)	Reminders of works	☐	☐	

Legend : S - Submitted
P - In progress or being prepared
R - Received
C - Commented

Note : Date / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
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Annex A 3.4

Schematic Design Recommendation Checklist

Project Title: IRIX Milk Product Shenzhen					JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision: Gov. Advice on Schematic Design - Land procurement					Date 02Feb1998	Page 1	
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok					
Revision Date	A 22Jan1998	B 02Feb1998	C	D	E	F	G

Document required to be submitted: A P Approval ref # / date / remarks

		A	P	Approval ref # / date / remarks
i)	Process flow details	☑	☐	refer to process flow dig.
ii)	Project worksmanship specification	☐	☑	
iii)	Material specification	☐	☑	
iv)	Project approval documents	☑	☐	SZ FI No.374 / 06Jan1998
v)	Project engineering feasibility study	☑	☐	
vi)	Site selection advice	☑	☐	22Jan1998

Document received

		R	C	Date / Remarks
i)	schematic design requriements	☐	☑	SZ L No. 179 / 30Jan1998
	addressed area :			
a)	set back from site boundary			1m from lot boundary
b)	project operational safety requirement			separate boiler construction appl.
c)	fire protection requirement			SZ L No. 179 for details
d)	enviromenal protection requirement			air - SO_3 500ppm; CO_2 700ppm max.
e)	lanscaping requirement			limiting ratio 1:13
f)	others			
ii)	schematic design reminders	☐	☐	not available

Legend : A - Available
P - In progress or being prepared
R - Received
C - Commented

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

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EIA Report Checklist

Project Title: IRIX Milk Product Shenzhen					JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision: EIA report details - Land procurement					Date 02Feb1998		Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok					
Revision	A	B	C	D	E	F	G
Date	10Jan1998	02Feb1998					

Information required in a EIA Report :

Investment details

i) Investment parties

Foreign partner IRIX

Local partner Fuhua

ii) Arrangement of investment

Foreign partner 8 milion USD / RMB

Local partner 2 million USD / RMB

iii) Project feasibility study refer to project Approval Report dated 30Dec1997

Production details

i) Type of product and production rate

sliced cheese - 30t/d / milk powder sachet - 10t/d

ii) Process flow block diagram refer to process flow diag.

iii) Primary production machinary list classifed

iv) Extpected amount of staff and shifts 20 head/shift ; 2 shift/day

v) Details of desile fuel machinary boiler & backup power plant

vi) Height of chinmey and the diameter 20m height & 1.5m diameter

vii) Power consumption 800V at 1700kVA

viii) Major raw material / ingredient type and usage Imported cheese and milk powder

ix) Pollutants wast water, milk powder dust, CO2 and SO3 from diesel boiler

Project layout details

i) Project location plan ref. To SZL No. 179; DEG 123

ii) Buildings layout plan DWG 234

iii) Road layout plan DWG 278

Note : i) The EIA report is required to be endorsed by a local enviromental specialist. The information listed above are gathered for the peraration of the EIA report.
ii) Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
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Schematic Design Submission Checklist

Project Title:	IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Schematic Design - Land procurement			Date 14Feb1998	Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok			

Revision	A	B	C	D	E	F	G
Date	10Jan1998	14Feb1998					

Documents required for submission		A	P	Approval number / date
i)	Site selection advice	☑	☐	SZ L No.179 / 30Jan1998
ii)	Blue-line diagram	☑	☐	- ditto - /
iii)	Site survey plan	☑	☐	/
iv)	Schematic design recommendation	☑	☐	SZ DS No.305 / 18Feb1998
v)	Design statement of schematic design*	☑	☐	/
vi)	Technical and economic detail*	☑	☐	App. C /
vii)	General layout plan (1:500)*	☑	☐	App. C /
viii)	Building plans (1:100 / 1:200)*	☑	☐	App. C /
ix)	Building elevations*	☐	☑	/
x)	EIA report*	☐	☑	/
xi)	Utilities wiring / pipeline diagram	☑	☐	/
xii)	Comments from government departments	☐	☑	/
	a) planning bureau	☑	☐	
	b) water supply bureau	☑	☐	
	c) Municipal administration bureau (drainage and sewage disposal)	☑	☐	
	d) power supply bureau	☑	☐	
	e) post and communication bureau	☑	☐	
	f) enviromental protection bureau	☐	☑	
	g) fire protection bureau	☐	☑	
	h) labour bureau	☑	☐	
	i) hygiene bureau	☑	☐	

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
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Land Use Approval Submission Checklist

Project Title: IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision: Land Use Approval			Date 23Feb1998	Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok		

Revision	A	B	C	D	E	F	G
Date	10Jan1998	14Feb1998	23Feb1998				

Information required in Construction Land Use application :

Investment details

i) Investment parties

Foreign partner IRIX

Local partner Fuhua

ii) Arrangement of investment

Foreign partner 8 million USD / RMB

Local partner 2 million USD / RMB

iii) Project feasibility study ________

Reports details	A	P	Approval number / date
i) Schematic Design Approval	☑	☐	SZ L No. 179 / 30Jan1998
ii) EIA Report and Approval	☑	☐	SZ EV No.781 / 23Feb1998
iii) Site survey plan	☑	☐	/
iv) various Government approval			
Fire Service	☐	☑	/
Labour Safety	☑	☐	/
Power Supply	☑	☐	/
Water Supply	☑	☐	/
Central Sewage Trestment	☑	☐	/

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

											File
To:											
Initial:											
Copy:											

Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Detailed Works Programme - Land Procurement		Date 29Dec1997	Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok		

Revision	A	B	C	D	E	F	G
Date	29Dec1997						

WBS Code	Description / Title	Person	Time	Remark
LD	Project Land Usage			
LD.AA	Selection of site			
	Identification of sites (29Dec1997)	Dave Lok	4 days	$175/hr
	Desktop analysis	Dave Lok	5 days	
	- project production requirements			
	- general site details			
	Site visit and information gathering (06Jan1998)			
	- Shenzhen ETDD	Dave Lok	3 days	
	- Shanghai Xinghua ETDD	Lisa Man	3 days	$200/hr
	- Zhongzhan ETDD	Dave Lok	3 days	
	(Deliverables) (Works Cat.) (Works)			
LD.BB	Schematic Design			
	process flow schematic design (Delcan Process)	Leo Lai	4 days	$125/hr
	value analysis of process flow scheme	- ditto -	1 days	
	revise process flow scheme	- ditto -	1 days	
	production plant layout	- ditto -	5 days	
	value analysis of plant layout	- ditto -	1 days	
	revise plant layout	- ditto -	1 days	

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Detailed Works Programme - Land Procurement				Date 29Dec1997	Page 2
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok				
Revision / Date	A 29Dec1997	B	C	D	E	F	G

WBS Code	Description / Title	Person	Time	Remark
LD.BB	Schematic Design			
	overall site layout (PL Wong & Associate)	PL Wong	5 days	$130/hr
	value analysis of site layout	- ditto -	1 days	
	revise site layout	- ditto -	1 days	
	buildings and rooms layout (Ho & Wong)	Dick Yip	6 days	$120/hr
	value analysis of buildings and rooms layout	- ditto -	1 days	
	revise buildings and rooms layout	- ditto -	1 days	
	builidng service scheme (Yeung's)	YC Lam	5 days	$120/hr
	value analysis of B.S. schemes	- ditto -	1 days	
	revise B.S. scheme	- ditto -	1 days	
	roads and entrance layout	PL Wong	4 days	$130/hr
	value analysis of roads and entrance layout	- ditto -	1 days	
	revise roads and entrance layout	- ditto -	1 days	
	landscaping layout	- ditto -	4 days	
	value analysis of landscaping layout	- ditto -	1 days	
	revise landscaping layout	- ditto -	1 days	
LD.CC	Reports preparation and submission			
	Reports to clients	Bill Wit		
	- site selection report	- ditto -	5 days	
	- schematic design report	- ditto -	5 days	
	- land use right contract	- ditto -	7 days	
	- progress reports	- ditto -	@ 5 days	Mth_end

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Detailed Works Programme - Land Procurement	Date 29Dec1997	Page 3
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	29Dec1997						

WBS Code	Description / Title	Person	Time	Remark
LD.CC	Reports preparation and submission			
	Reports to Government			
	- land use application report		3 days	
	- schematic design recommendation report		3 days	
	- schematic design report		7 days	Clit. also
	- land use application report		3 days	
LD.DD	Reviews			
	Client	Bill Wit		
	- site selection report	- ditto -	7 days	
	- schematic design scheme and cost	- ditto -	10 days	
	- land use contract details	- ditto -	10 days	
	Government			
	- land use application report		5 days	
	- schematic design recommendation report		5 days	
	- schematic design report		10 days	
	- land use approval report		10 days	
LD.EE	Approvals and documents receive			
	From Client	Bill Wit		
	- site selection approval	- ditto -	0 days	
	- schematic design approval	- ditto -	0 days	

Note : Value / Reference should be indicated in the blank space of the items

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Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Detailed Works Programme - Land Procurement		Date 29Dec1997	Page 4
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok		

Revision	A	B	C	D	E	F	G
Date	29Dec1997						

WBS Code	Description / Title	Person	Time	Remark
LD.EE	Approvals and documents receive			
	From Government			
	- land usage advice		0 days	
	- schematic design recommendations		0 days	
	- schematic design approval		0 days	
	- land use approval		0 days	

Note : Value / Reference should be indicated in the blank space of the items

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Date of Approval

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Initial:											
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Works Coordination Plan

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Land Procurement Phase	Date 30Dec1997	Page 1
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	30Dec1997						

Description / Title	Bill White	Rich Li	Peter Roy	Lisa Man	Dave Lok	Leo Lai	Dick Yip	Rick Lam	YC Lam	LK Ho	PL Wong	France Li	Remark
Project Land Usage													
Selection of site													
Identification of sites (29Dec1997)			S,pr	S,se	S,pr								
Desktop analysis				S,se	S,pr								
- project production requirements													
- general site details													
Site visit and information gathering (06Jan1998)				S,L,Co,pr	S,L,Co,pr								
- Shenzhen ETDD													
- Zhongzhan ETDD													
- Shanghai Xinghua ETDD													
Schematic Design													
process flow schematic design (Delcan Process)													
value analysis of process flow scheme													
revise process flow scheme						E,D,A,pr							
production plant layout													
value analysis of plant layout													
revise plant layout													

Legend

Task

Coordination	Co
Development	D
Quotation	Q
Engineering	E
Study and review	S
Instrumentation	I
Purchasing	P
Estimate	R
Expediation	X
Requrest for fund	F
Inspection	L
Construction	C

Responsibility

Primary	pr
Secondary	se

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

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Annex A3.xls

Works Coordination Plan

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Land Procurement Phase	Date 30Dec1997	Page 2

Project Director	Project Manager	Sub- Manager			
Peter Roy	Lisa Man	Dave Lok			

Revision	A	B	C	D	E	F	G
Date	30Dec1997						

Description / Title	Bill White	Rich Li	Peter Roy	Lisa Man	Dave Lok	Leo Lai	Dick Yip	Rick Lam	YC Lam	LK Ho	PL Wong	France Li	Remark
Schematic Design													
overall site layout (PL Wong & Associate)													
value analysis of site layout													
revise site layout											E,D,A,se	E,D,A,pr	
buildings and rooms layout (Ho & Wong)													
value analysis of buildings and rooms layout													
revise buildings and rooms layout							E,D,A,se	E,D,A,pr					
builidng service scheme (Yeung's)													
value analysis of B.S. schemes													
revise B.S. scheme									E,D,A,se	E,D,A,pr			
roads and entrance layout (PL Wong & Associate)													
value analysis of roads and entrance layout													
revise roads and entrance layout													
landscaping layout													
value analysis of landscaping layout													
revise landscaping layout											E,D,A,se	E,D,A,pr	
Reports preparation and submission													
Reports to clients													
- site selection report													
- schematic design report													
- land use right contract													
- progress reports	S,X,se	S,X,pr											

Legend

Task

Coordination	Co
Development	D
Quotation	Q
Engineering	E
Study and review	S
Instrumentation	I
Purchasing	P
Estimate	R
Expediation	X
Requrest for fund	F
Inspection	L
Construction	C

Responsibility

Primary	pr
Secondary	se

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Date of Approval

To:												File
Initial:												
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Works Coordination Plan

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Land Procurement Phase	Date 30Dec1997	Page 3
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	30Dec1997						

Description / Title	Bill White	Rich Li	Peter Roy	Lisa Man	Dave Lok	Leo Lai	Dick Yip	Rick Lam	YC Lam	LK Ho	PL Wong	France Li	Remark
Reports preparation and submission													
Reports to Government													
- land use application report													
- schematic design recommendation report													
- schematic design report													
- land use application report				Co,X,se	Co,X,pr								
Reviews													
Client													
- site selection report													
- schematic design scheme and cost													
- land use contract details	S,X,se	S,X,pr											
Government													
- land use application report													
- schematic design recommendation report													
- schematic design report													
- land use approval report				Co,X,se	Co,X,pr								
Approvals and documents receive													
From Client													
- site selection approval													
- schematic design approval	S,X,se	S,X,pr											

Legend

Task

Coordination	Co
Development	D
Quotation	Q
Engineering	E
Study and review	S
Instrumentation	I
Purchasing	P
Estimate	R
Expediation	X
Requrest for fund	F
Inspection	L
Construction	C

Responsibility

Primary	pr
Secondary	se

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Works Coordination Plan

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Land Procurement Phase	Date 30Dec1997	Page 4
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	30Dec1997						

Description / Title	Bill White	Rich Li	Peter Roy	Lisa Man	Dave Lok	Leo Lai	Dick Yip	Rick Lam	YC Lam	LK Ho	PL Wong	France Li	Remark
Approvals and documents receive													
From Government													
- land usage advice													
- schematic design recommendations													
- schematic design approval													
- land use approval				Co,X,se	Co,X,pr								

Legend

Task
- Coordination Co
- Development D
- Quotation Q
- Engineering E
- Study and review S
- Instrumentation I
- Purchasing P
- Estimate R
- Expediation X
- Requrest for fund F
- Inspection L
- Construction C

Responsibility
- Primary pr
- Secondary se

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and updated during the progress of the project.

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Value Analysis

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision:	Detailed Works Programme - Land Procurement		Date 14Feb1998	Page 1	
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok			
Revision	A	B	C	D	E	F
Date	16Jan1998	02Feb1998	14Feb1998			

Description	Quick Completion	Competitive Procurement	Low Risk Design	Maintenance Cost	Reliability	Flexible Output	Fuel Cost	Labour Cost	Aesthetic Factor	Fume Emission	Noise Level	Total Value	Total Cost	Value / Cost
	0.090	0.060	0.150	0.100	0.150	0.750	0.125	0.050	0.060	0.080	0.060		'000	
1. Sieving Module														
MVT A237	p 8	p 5	p 7	p 6	p 6	p 4	p 8	p 6	p 9	p 6	p 5	9.19	56	16.4
BBT K235	p 5	p 7	p 6	p 7	p 9	p 6	p 7	p 3	p 6	p 7	p 7	10.7	50	21.4
GKT J654	p 6	p 7	p 6	p 7	p 7	p 7	p 5	p 7	p 5	p 8	p 9	11.3	57	19.9
2. Blending Module														
BBC GJ11	p 5	p 7	p 8	p 6	p 8	p 9	p 6	p 6	p 6	p 4	p 8	12.8	40	32.1
FGK T321	p 7	p 6	p 7	p 3	p 5	p 6	p 7	p 7	p 9	p 6	p 7	10.3	29	35.4
FOR 2319	p 7	p 6	p 5	p 7	p 6	p 5	p 8	p 7	p 7	p 7	p 5	9.72	50	19.4
3. Mixing Module														
.														
.														
10. Foundation														
Bore pile	p 8	p 5	rs 6	s	s	rs 6	s	rs 5	s	s	rs 7	7.09	97	7.31
Driven pile	p 6	p 6	rs 6	s	s	rs 5	s	rs 7	s	s	rs 5	6.2	78	7.95
Footing	p 7	p 9	rs 7	s	s	rs 8	s	rs 9	s	s	rs 9	9.21	65	14.2
11. Steel Building														
Store room														
Cold room														
Chill room														

Legend : p - primary function / need
s - secondary function / need
rs - required secondary function

Note : Value indicated are level of excellence

The above project data is periodically reviewed
and updated during the progress of the project.

Date of Approval

To:										File
Initial:										
Copy:										

Project Status Record

Project Title: IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1
Subdivision: Land Procurement Phase		Date 28Feb1997	Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok	

Revision	A	B	C	D	E	F	G
Date	10Jan1998	22Jan1998	02Feb1998	15Feb1998	28Feb1998		

Project Status / Information	O/A	P	R	Further Details
i) Site selection and analysis	☑	☐	☐	Refer to Appendix A
ii) Advice on site selection (from Gov.)	☑	☐	☐	SZ L No. 179 / 30Jan1998
iii) Schematic Design Recommendation	☑	☐	☐	SZ L No. 179 / 30Jan1998
iv) EIA Report	☑	☐	☐	SZ EV No.781 / 18Feb1998
v) Scehmatic Design Report	☑	☐	☐	
vi) Approval of Schematic Design from :	☑	☐	☑	SZ DS No 305 / 23Feb1998
a) Fire Service	☐	☑	☐	resubmit Fire Service Approval
b) Labour Safety	☑	☐	☐	
c) Power Supply Company	☑	☐	☐	
d) Water Supply	☑	☐	☐	
e) Central Sewage Trestment	☑	☐	☐	

Legend : O/A - Obtained/Available
P - In progress or being prepared
R - Require input

Note : Value / Reference should be indicated in the blank space of the items

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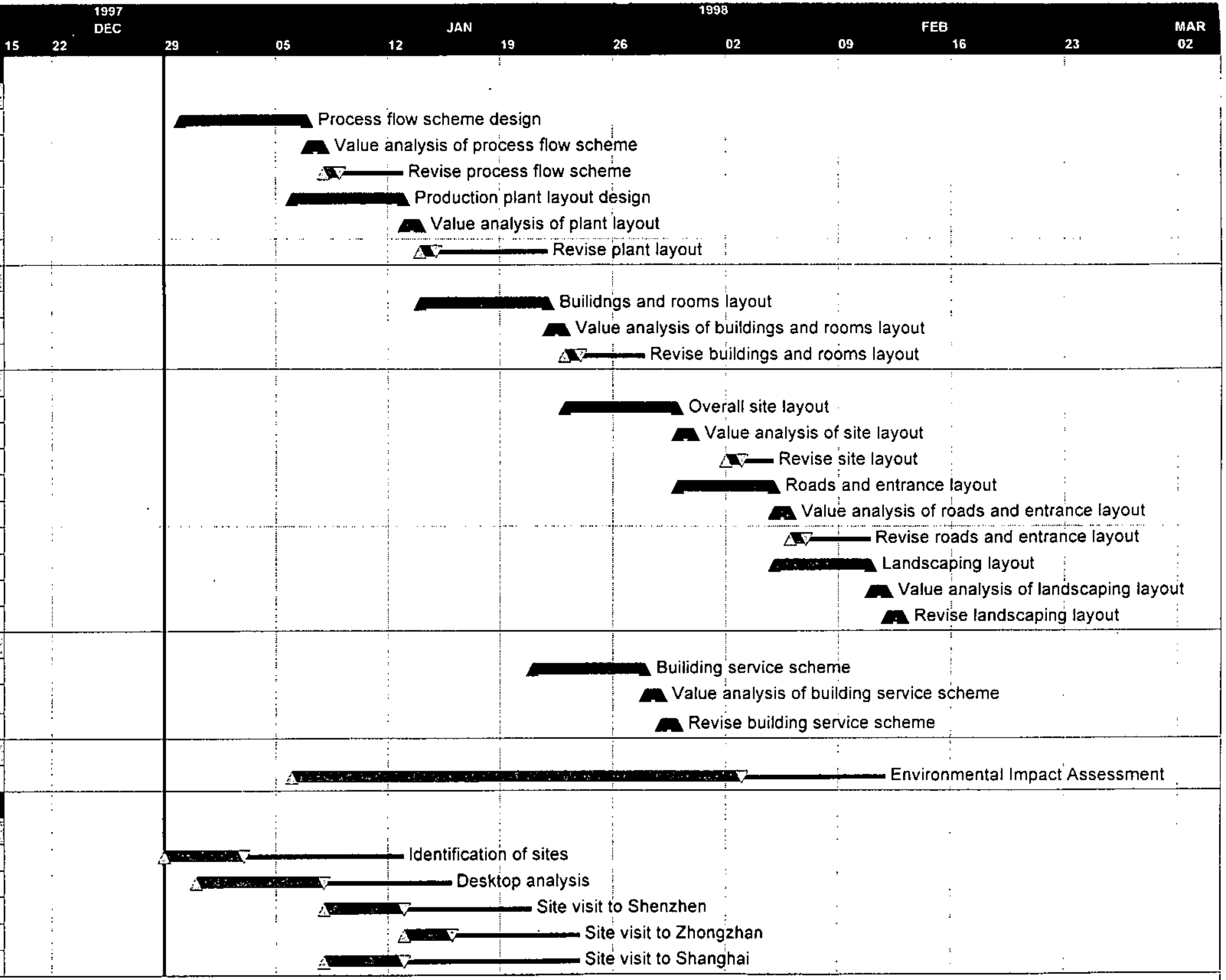
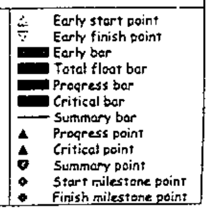
Act ID	Description
Schematic design	
Process engineer	
LD1050	Process flow scheme design
LD1060	Value analysis of process flow scheme
LD1070	Revise process flow scheme
LD1080	Production plant layout design
LD1090	Value analysis of plant layout
LD1100	Revise plant layout
Architect	
LD1140	Builidngs and rooms layout
LD1150	Value analysis of buildings and rooms layout
LD1160	Revise buildings and rooms layout
Civil engineer	
LD1110	Overall site layout
LD1120	Value analysis of site layout
LD1130	Revise site layout
LD1200	Roads and entrance layout
LD1210	Value analysis of roads and entrance layout
LD1220	Revise roads and entrance layout
LD1230	Landscaping layout
LD1240	Value analysis of landscaping layout
LD1250	Revise landscaping layout
E&M engineer	
LD1170	Builiding service scheme
LD1180	Value analysis of building service scheme
LD1190	Revise building service scheme
Design institute	
LD1260	Environmental Impact Assessment
Land procurement	
Project manager	
LD1000	Identification of sites
LD1010	Desktop analysis
LD1020	Site visit to Shenzhen
LD1030	Site visit to Zhongzhan
LD1040	Site visit to Shanghai



IRIX Milk Product Shenzhen - Project Master Programme

(Land Procurement Sub-phase)



Annex A4

Design Code Checklist

Project Title: IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision: Design Code Usage			Date 05Jan1998	Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok		

Revision	A	B	C	D	E	F	G
Date	05Jan1998						

PRC Design Standard for Preliminary ~~Desing~~ Design

	Design Code	Title	Required
i)	GBJ 1-86	Standard for Building and Structural Drawings Preparation	☑
ii)	GBJ 103-87	Standard for General Layout Plans Preparation	☑
iii)	GBJ 104-87	Standard for Building Plans Preparation	☑
iv)	GBJ 106-87	Standard for Water Supply and Drainage Drawings Preparation	☑
v)	GBJ 114-88	Standard for Air Conditioning System Drawings Preparation	☑ Off. Bld. only
vi)	JGJ 67-89	Code for Design of Office Building Layout	☑ Off. Bld. Only
vii)	GBJ 16-87	Code for Design of Fire Service System in Building Structures	☑ *Cold Store
viii)	GBJ 84-85	Code for Design of Fire Service Sprinkler System	☑ *Cold Store
ix)	GBJ 116-88	Code for Design of Fire Alarming System	☑ *Cold Store
x)	GB 50033-91	Standard for Daylight Design of Industrial Enterprise	☐
xi)	TJ 34-79	Standard for Lighting Design of Industrial Enterprise	☐
xii)	TJ 36-79	Standard for Hygiene Design of Industrial Enterprise	☐
xiii)	GBJ 57-83	Code for Design of Lightening System of Structures	☐
xiv)	GBJ 87-85	Code for Design of Noise Control of Industrial Enterprise	☐
xv)	GBJ 15-88	Code for Design of Building Water Supply and Drainage	☐
xvi)	GBJ 14-87	Code for Design of Outdoor Wastewater Engineering	☐

Note : Date / Reference should be indicated in the blank space of the items

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Date of Approval

To:											File
Initial:											
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Design Code Checklist

Project Title: IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision: Design Code Usage			Date 05Jan1998	Page 2
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok		

Revision	A	B	C	D	E	F	G
Date	05Jan1998						

PRC Design Standard for Detailed Design and Inspection

Design Code	Title	Required
GBJ 9-87	Load Code for the Design of Building Structures	❑
GBJ 7-89	Code for Design of Building Foundations	❑
GBJ 10-89	Code for Design of Reinforced Concrete Structures	❑
GBJ 11-89	Code for Design of Seismic Resisted Structures	❑
GBJ 17-88	Code for Design of Steel Structures	❑
GB 50204-92	Code for Construction and Acceptance of Concrete Structures	❑
GBJ 303-88	Standard for Quality Inspection and Assessment of Electrical Installation Works in Building	❑
GBJ 310-88	Standard for Quality Inspection and Assessment of Electrical Installation Works for Electrical Elevator	❑

Note : Date / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

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Annex A 4.1.2

Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Preliminary Design		Date 20Feb1998	Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok		

Revision	A	B	C	D	E	F	G
Date	20Feb1998						

WBS Code	Description / Title	Person	Time	Remark
PD	Detailed Preliminary Design			
PD.01	Process design			
	design statement and vlaue management session	Dick Lee	3 days	
	process preliminary design	and	15 days	
	process plants layout	Vic Tsui	7 days	
	process electrical requirements	- ditto -	5 days	
	process environment requirements	- ditto -	5 days	
	(temperature, humidity & dust)			
	power and water consumption	- ditto -	5 days	
	waste effluent treatments	- ditto -	5 days	
	preliminary design drawings	- ditto -	5 days	
	shop drawings	- ditto -	40 days	
	detailed cost estimate	- ditto -	4 days	
PD.02	Architectural design			
	design statement and vlaue management session	Rick Lam	3 days	
	buildings master layout	and	10 days	
	(building location, orientation & roads)	Pat Wong		
	building plans	- ditto -	15 days	
	(rooms layout, function, dim., access & flow)			
	rooms requirements	- ditto -	10 days	
	(elec., water, lighting, ventilation, security & F.S.)			

(Deliverables) (Works Cat.) (Works)

Note : Value / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

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Annex A 4.2.1

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Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Preliminary Design	Date 09Feb1998	Page 2
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	09Feb1998						

WBS Code	Description / Title	Person	Time	Remark
PD.02	Architectural design			
	architectural finishes	- ditto -	7 days	
	power and water consumption	- ditto -	5 days	
	design drawings	- ditto -	3 days	
	detailed cost estimate	- ditto -	5 days	
PD.03	E&M design			
	design statement and vlaue management session	LK Ho	3 days	
	electricity supply scheme	and	10 days	
	F.S. scheme	Vincent Li	10 days	
	MVAC scheme	- ditto -	10 days	
	plumping and drainage scheme	- ditto -	7 days	
	power and water consumption	- ditto -	7 days	
	preliminary design drawings	- ditto -	5 days	
	shop drawings	- ditto -	40 days	
	detailed cost estimate	- ditto -	7 days	
PD.04	Civil design			
	design statement and vlaue management session	France Li	3 days	
	roads and drainage	and	10days	
	(road layout, lighting, drainage & connections)	John Bok		
	waste treatments	- ditto -	15 days	
	landscaping	- ditto -	10 days	
	underground conduits	- ditto -	7 days	
	(sewage, drainage & electrical)			

(Deliverables) (Works Cat.) (Works)

Note : Value / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
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Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Preliminary Design	Date 09Feb1998	Page 3
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	09Feb1998						

WBS Code	Description / Title	Person	Time	Remark
PD.04	Civil design			
	preliminary design drawings	- ditto -	5 days	
	detailed cost estimate	- ditto -	5 days	
PD.05	Special (inc. design statement)			
	boiler details	Rick Kong	10 days	
	pressure vessel details (compressed gas)	LK Ho	10 days	
	cargo and passenger lift details	Tim Chan	10 days	
	clean room detail	YC Lam	10 days	
	preliminary design drawings	- ditto -	5 days	
	detailed cost estimate	Dave Lok	7 days	
PD.06	Reports Preparation			
	preliminary design report	Dave Lok	10 days	
	preliminary design cost estimate	- ditto -	7 days	
	preliminary design drawings	- ditto -	5 days	
PD.07	Reviews			
	preliminary design report review by Government		20 days	
	preliminary design report review by client		5 days	
PD.08	Approval			
	client approve preliminary design and cost		0 days	
	Government approve preliminary design		0 days	

(Deliverables) (Works Cat.) (Works)

Note : Value / Reference should be indicated in the blank space of the items

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Date of Approval

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Annex A 4.2.3

Drawing Breakdown Structure Form

Project Title: IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision: Preliminary Design		Date 25Feb1998	Page 1
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	25Feb1998						

DWG No.	Description / Title	Person	Type	Remark
	General			
G/P 001	Site location plan	Dave Lok	A1	
G/P 002	Site layout plan	- ditto -	A1	
	Building			
	General			
A/P 001	Finishes schedule	Pat Wong	A3	
	Process building and warehouse			
A/P 011	Level 1 plan	- ditto -	A1	
A/P 012	Level 2 plan	- ditto -	A1	
A/P 013	Level 3 and roof plan	- ditto -	A1	
A/P 016	Sections	- ditto -	A3	
A/P 017	Elevations	- ditto -	A1	
A/P 018	Elevations	- ditto -	A1	
	Office building			
A/P 021	Level 1 and level 2 plan	Rick Lam	A1	
A/P 022	Roof plan	- ditto -	A1	
A/P 023	Elevations	- ditto -	A1	
A/P 024	Elevations	- ditto -	A1	
A/P 025	Sections	- ditto -	A3	
	Utility Building			
A/P 031	Plan and section	- ditto -	A1	
A/P 032	Elevation	- ditto -	A1	

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
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Annex A 4.3.1

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Drawing Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Preliminary Design	Date 25Feb1998	Page 2

Project Director	Project Manager	Sub- Manager			
Peter Roy	Lisa Man	Dave Lok			

Revision	A	B	C	D	E	F	G
Date	25Feb1998						

DWG No.	Description / Title	Person	Type	Remark
	Compressed gases farm			
A/P 041	Plan and section	Pat Wong	A3	
A/P 042	Elevation	- ditto -	A3	
	Maintenance building			
A/P 051	Plan and section	- ditto -	A1	
A/P 052	Elevation	- ditto -	A1	
	Fire service pump room and water tank			
A/P 061	Level 1 and roof plan	- ditto -	A1	
A/P 062	Elevation	- ditto -	A3	
	Production			
E/M 001	Level 1 equipment layout	Dick Lee	A1	
E/M 002	Level 2 equipment layout	- ditto -	A1	
E/M 003	Level 3 equipment layout	- ditto -	A1	
E/M 004	Elevation of equipment	- ditto -	A3	
	Compressed air system			
C/G 001	Compressed air schematic	LK Ho	A1	
C/G 002	Carbon dioxide system schematic	- ditto -	A1	
C/G 003	Nitrogen system schematic	- ditto -	A1	
	Fire service			
F/S 001	Automatic fire alarm system schematic	Vincent Li	A1	

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

												File
To:												
Initial:												
Copy:												

Drawing Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen		JEN	9	7	I	2	3	6	0	7	7	1
Subdivision:	Preliminary Design		Date 25Feb1998					Page 3					

Project Director	Project Manager	Sub- Manager			
Peter Roy	Lisa Man	Dave Lok			

Revision	A	B	C	D	E	F	G
Date	25Feb1998						

DWG No.	Description / Title	Person	Type	Remark
	Fire service			
F/S 002	Fire services location plan	Vincent Li	A1	
	Plumbing and drainage			
P/D 001	Plumbing system schematic	LK Ho	A1	
P/D 002	Soil and waste water system schematic	- ditto -	A1	
P/D 003	Rain water system schematic	- ditto -	A1	
	Electicity and telecommunication			
T/C 001	HV/LV schematic diagram	LK Ho	A1	
T/C 002	Telephone schematic diagram	- ditto -	A1	
T/C 003	Power and telephone cable routing	- ditto -	A1	
T/C 004	Utility building electrical equipment layout	- ditto -	A1	
	Ventilation and air-conditioning			
M/V 001	Site plan of CO2 and liquid N2 plant	- ditto -	A1	
M/V 002	ACMV layout of Utility building	- ditto -	A1	
M/V 003	ACMV layout of Fire service pump roon and water tank	- ditto -	A1	
M/V 004	ACMV layout of Maintenance building	- ditto -	A1	
M/V 005	ACMV layout for Process building and warehouse level 1	- ditto -	A1	
M/V 006	ACMV layout for Process building and warehouse level 2	- ditto -	A1	
M/V 007	ACMV layout for Process building and warehouse level 3	- ditto -	A1	
M/V 008	Chilled water system schematic	- ditto -	A1	
M/V 009	ACMV layout for Office building	- ditto -	A1	

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

												File
To:												
Initial:												
Copy:												

Works Coordination Plan

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Preliminary Design Phase	Date 22Feb1998	Page 1

Project Director	Project Manager	Sub- Manager			
Peter Roy	Lisa Man	Dave Lok			

Revision	A	B	C	D	E	F	G
Date	22Feb1998						

Legend

Task							
Coordination	Co	Engineering	E	Purchasing	P	Requrest for fund	F
Development	D	Study and review	S	Estimate	R	Inspection	L
Quotation	Q	Instrumentation	I	Expediation	X	Construction	C

Responsibility

Primary	pr
Secondary	se

Description / Title	Bill White	Rich Li	Peter Roy	Lisa Man	Dave Lok	Leo Lai	Dick Lee	Vic Tsui	Dick Yip	Rick Lam	Pat Wong	YC Lam	LK Ho	Vincent Li	PL Wong	France Li	John Bok
Detailed Preliminary Design																	
Process design						Q,S,X,pr	E,P,D,S,I,pr	E,P,D,S,I,pr									
design statement and vlaue management session																	
process preliminary design																	
process plants layout																	
process electrical requirements																	
process environment requirements (temperature, humidity & dust)																	
power and water consumption																	
waste effluent treatments																	
preliminary design drawings																	
shop drawings																	
detailed cost estimate																	
Architectural design										E,P,D,S,I,pr	E,P,D,S,I,pr						
design statement and vlaue management session																	
buildings master layout (building location, orientation & roads)																	
building plans (rooms layout, function, dim., access & flow)																	
rooms requirements (elec., water, lighting, ventilation, security & F.S.)																	

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Works Coordination Plan

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Preliminary Design Phase	Date 22Feb1998	Page 2
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok	

Revision	A	B	C	D	E	F	G
Date	22Feb1998						

Legend

Task							
Coordination	Co	Engineering	E	Purchasing	P	Requrest for fund	F
Development	D	Study and review	S	Estimate	R	Inspection	L
Quotation	Q	Instrumentation	I	Expediation	X	Construction	C

Responsibility
- Primary pr
- Secondary se

Description / Title	Bill White	Rich Li	Peter Roy	Lisa Man	Dave Lok	Leo Lai	Dick Lee	Vic Tsui	Dick Yip	Rick Lam	Pat Wong	YC Lam	LK Ho	Vincent Li	PL Wong	France Li	John Bok
Architectural design									Q,S,X,pr	E,P,D,S,I,pr	E,P,D,S,I,pr						
architectural finishes																	
power and water consumption																	
design drawings																	
detailed cost estimate																	
E&M design												Q,S,X,pr	E,P,D,S,I,pr	E,P,D,S,I,pr			
design statement and vlaue management session																	
electricity supply scheme																	
F.S. scheme																	
MVAC scheme																	
plumping and drainage scheme																	
power and water consumption																	
preliminary design drawings																	
shop drawings																	
detailed cost estimate																	
Civil design																E,P,D,S,I,pr	E,P,D,S,I,pr
design statement and vlaue management session																	
roads and drainage																	
waste treatments																	
landscaping																	
underground conduits																	

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager   Date of Approval

												File
To:												
Initial:												
Copy:												

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Works Coordination Plan

Project Title:	IRIX Milk Product Shenzhen	JEN	9 7 I 2 3 6 0 7 7 1
Subdivision:	Preliminary Design Phase	Date 22Feb1998	Page 3
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	22Feb1998						

Legend

Task

Coordination	Co	Engineering	E	Purchasing	P	Requrest for fund	F
Development	D	Study and review	S	Estimate	R	Inspection	L
Quotation	Q	Instrumentation	I	Expediation	X	Construction	C

Responsibility

Primary pr

Secondary se

Description / Title	Bill White	Rich Li	Peter Roy	Lisa Man	Dave Lok	Leo Lai	Dick Lee	Vic Tsui	Dick Yip	Rick Lam	Pat Wong	YC Lam	LK Ho	Vincent Li	PL Wong	France Li	John Bok
Civil design															Q,S,X,pr	E,P,D,S,I,pr	E,P,D,S,I,pr
preliminary design drawings																	
detailed cost estimate																	
Special (inc. design statement)												Q,S,X,pr	E,P,D,S,I,pr	E,P,D,S,I,pr			
boiler details																	
pressure vessel details (compressed gas)																	
cargo and passenger lift details																	
clean room detail																	
preliminary design drawings																	
detailed cost estimate																	
Reports Preparation			D,R,X,pr	Co,E,P,D,pr	Co,E,P,D,pr												
preliminary design report																	
preliminary design cost estimate																	
preliminary design drawings																	
Reviews																	
preliminary design report review by Government					Co,pr												
preliminary design report review by client	X,se	X,pr															
Approval																	
client approve preliminary design and cost	X,se	X,pr		Co,pr													
Government approve preliminary design					Co,pr												

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Cost Breakdown Structure

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Preliminary Design	Date 19Apr1998	Page 1
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	05Mar1998	19Apr1998					

Cost Code			Description / Title	RMB ('000)	HKD ('000)	Total (USD) ('000)
1			Site Investigation and Site Preparation			
1	1	1	Site Investigation		128	16
1	2	1	Site Filling		1,903	244
1	3	1	Site Office, store and temporary fencing		500	64
1	4	1	Temporary power supply		100	13
1	5	1	Temporary water supply		20	3
1	6	1	Temporary telecommunication		20	3
2			Process and Office Building			
2	7	1	Pilling		8,276	1,061
2	8	1	Structure		22,074	2,830
2	8	2	Architectural works		10,355	1,328
2	9	1	Electrical	13,000		1,425
2	9	2	MVAC	8,000		877
2	9	3	Fire service	18,000		1,972
2	9	4	Plumbing and drainage	14,000		1,534
2	9	5	Telephone and telecommunication	360		39
2	10	1	Office furniture		220	28
2	11	1	Lockers	236		26
2	12	1	Laboratory and facilities	800		88
				54,396	43,596	90,088

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
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Annex A4.xls

Cost Breakdown Structure

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Preliminary Design	Date 19Apr1998	Page 2
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision	A	B	C	D	E	F	G
Date	05Mar1998	19Apr1998					

Cost Code			Description / Title	RMB ('000)	HKD ('000)	Total (USD) ('000)
3			Guest House			
3	7	1	Piling		648	83
3	8	1	Structure		1,010	129
3	8	2	Architectural works		1,341	172
3	9	1	Electrical	1,800		197
3	9	2	MVAC	3,900		427
3	9	3	Fire Service	180		20
3	9	4	Plumbing and drainage	100		11
3	9	5	Telephone and telecommunication	45		5
3	10	1	Furniture		313	40
3	13	1	Kitchen equipment	200	300	60
				6,225	3,612	8,933

Note : Value / Reference should be indicated in the blank space of the items

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

											File
To:											
Initial:											
Copy:											

Information Breakdown Structure

Project Title:	IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Preliminary Design Preparation Phase			Date 24Apr1998	Page 1
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok			

Revision	A	B	C	D	E	F	G
Date	25Nov1997	15Feb1998	24Apr1998				

Legend

a) Client
b) PM
c) Process
d) Architect
e) Civil
f) E&M
g) Storage
h) D.I.
i) S.U.
j) Contractor

1) Project Estab
2) Land Procu
3) Prelim Design
4) Detailed Design
5) Construct

Description / Title	Person	Time	Remark
Design Information			
Client's requirement			
schematic design details (master plan)	a,b,c,d,e	1,2	
process plant details	c,d,e,f,g	1,2,3,4	
architectural details	d,e,h,j	3,4,5	
road and drainage details	d,e,h,j	3,4,5	
structural details	e,h,j	3,4,5	
electrical and mechanical	d,f,h,j	3,4,5	
building service	d,f,h,j	3,4,5	
fire service	d,f,h,j	3,4,5	
waste treatment plant details	d,e,h,j	3,4,5	
Value management and Government req. revisions			
schematic design details (master plan)	a,b,c,d,e	1,2	
process plant details	c,d,e,f,g	1,2,3,4	
architectural details	d,e,h,j	3,4,5	
road and drainage details	d,e,h,j	3,4,5	
structural details	e,h,j	3,4,5	
electrical and mechanical	d,f,h,j	3,4,5	
building service	d,f,h,j	3,4,5	
fire service	d,f,h,j	3,4,5	
waste treatment plant details	d,e,h,j	3,4,5	

Note : Value / Reference should be indicated in the blank space of the items

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Date of Approval

To:												File
Initial:												
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Information Breakdown Structure

Project Title:	IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Construction Drawing Preparation Phase				Date 24Apr1998	Page 2
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok				
Revision	A	B	C	D	E	F	G
Date	25Nov1997	15Feb1998	24Apr1998				

Legend
- a) Client
- b) PM
- c) Process
- d) Architect
- e) Civil
- f) E&M
- g) Storage
- h) D.I.
- i) S.U.
- j) Contractor

1) Project Estab
2) Land Procu
3) Prelim Design
4) Detailed Design
5) Construct

Description / Title	Person	Time	Remark
Cost and Budget			
Design and management team			
project management team	a,b		
process engineer	a,b,c		
architect	a,b,d		
E&M	a,b,f	(all)	
civil	a,b,e		
special process and storage	a,b,g		
design institute	a,b,h		
supervision unit	a,b,i		
Government charges			
project approval	a,b		
JV approval	a,b		
business approval	a,b		
schematic design	a,b		
preliminary design	a,b		
construction application	a,b	(all)	
utilities connection	a,b		
construction deposits	a,b		
construction inspections	a,b		
completions inspection	a,b		
trial run inspection	a,b		

Note : Value / Reference should be indicated in the blank space of the items

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Information Breakdown Structure

Project Title:	IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Construction Drawing Preparation Phase				Date 24Apr1998	Page 3
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok				
Revision	A	B	C	D	E	F	G
Date	25Nov1997	15Feb1998	24Apr1998				

Legend
a) Client
b) PM
c) Process
d) Architect
e) Civil
f) E&M
g) Storage
h) D.I.
i) S.U.
j) Contractor

1) Project Estab
2) Land Procu
3) Prelim Design
4) Detailed Design
5) Construct

Description / Title	Person	Time	Remark
Cost and Budget			
Construction			
process	a,b,c		
buildings	a,b,d,f,g		
waste treatment facility	a,b,e,f		
roads and drainages	a,b,e	(5)	
utilities	a,b,f		
landscaping	a,b,e		
site formation	a,b,e		
site fencing	a,b,e		
Reports			
Government approval reports			
project	a,b	1	
JV	a,b	1	
business	a,b	1	
schematic design (master plan)	a,b,c,d	2	
land application	a,b,c,d	2	
preliminary design (inc. EIA, S.I., G.I.)	a - g	3	
construction design	a - h	4	
construction commencement	b,h,i	5	
fire service inspection	b,f,h,i,j	5	
completion	b - j	5	
production	b - j	5	

Note : Value / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Information Breakdown Structure

Project Title:	IRIX Milk Product Shenzhen						JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Construction Drawing Preparation Phase					Date 24Apr1998	Page 4
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok					
Revision	A	B	C	D	E	F	G
Date	25Nov1997	15Feb1998	24Apr1998				

Legend	Description / Title	Person	Time	Remark
a) Client	Reports			
b) PM	Client			
c) Process	cost status report	b	(all)	
d) Architect	interim progress status report	b	(all)	
e) Civil				
f) E&M				
g) Storage				
h) D.I.				
i) S.U.				
j) Contractor				
1) Project Estab				
2) Land Procu				
3) Prelim Design				
4) Detailed Design				
5) Construct				

Note : Value / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

												File
To:												
Initial:												
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Annex A 4.6.4

Project Status Record

Project Title:	IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision:	Reports Submission - Preliminary Design Phase				Date 19Apr1998	Page 1	
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok					
Revision	A	B	C	D	E	F	G
Date	12Mar1998	25Mar1998	19Apr1998				

Documents required for submission		A	P	Approval number / date
i)	Preliminary design statements	☑	☐	/
ii)	Blue-line diagram	☑	☐	SZ L No. 179 / 30Jan1998
iii)	Site survey plan	☑	☐	/
iv)	Schematic design recommendation	☑	☐	SZ L No. 179 / 30Jan1998
v)	Design statement of schematic design*	☑	☐	/
vi)	Technical and economic detail*	☐	☑	/
vii)	General layout plan (1:500)*	☑	☐	/
viii)	Building plans (1:100 / 1:200)*	☑	☐	/
ix)	Building elevations*	☐	☑	/
x)	EIA report*	☑	☐	SZ EV No. 781 / 18Feb1998
xi)	Utilities connection diagram	☐	☑	/
xii)	Comments from government departments			
	a) planning bureau	☑	☐	Refer Appendix A
	b) water supply bureau	☑	☐	
	c) Municipal administration bureau	☑	☐	
	(drainage and sewage disposal)	☐	☐	
	d) power supply bureau	☑	☐	
	e) post and communication bureau	☑	☐	
	f) environmental protection bureau	☐	☑	
	g) fire protection bureau	☐	☑	
	h) labour bureau	☑	☐	
	i) hygiene bureau	☑	☐	

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Annex A5

Construction Application Checklist

Project Title: IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision: Office Builidng				Date 29Apr1998		Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok				

Revision	A	B	C	D	E	F	G
Date	29Apr1998						

Details of the works

i) Element of works Foundation of Office Building

ii) Location of the works Lot 312, Eastern District of SETDD

iii) Designed by (Design Institute) Xinghua Design Institute

iv) Cost of work 600,000 RMB

v) Area coverage 50 m^2

Documents required for submission		A	P	Approval number / date
i)	Project approval	☑	☐	SZ FI No.374 / 06Jan1998
ii)	Preliminary design approval	☑	☐	SZ PM No.15 / 10May1998
iii)	Land use certificate	☑	☐	SZ LN EL 312 / 15Mar1998
iv)	Site survey plan	☑		DWG No SS 010
v)	Floor Layout plans	☑		DWG No OB 110
vi)	Elevations	☑		DWG No. OB 111
vii)	Sections	☑		DWG No. OB 112
viii)	Elements details	☑		DWG No. OB 113

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
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Annex A5.xls

Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen	JEN	9	7	I	2	3	6	0	7	7	1
Subdivision:	Construction Drawing Preparation Phase	Date 20Apr1998						Page 1				

Project Director	Project Manager	Sub- Manager			
Peter Roy	Lisa Man	Dave Lok			

Revision	A	B	C	D	E	F	G
Date	20Apr1998						

WBS Code	Description / Title	Person	Time	Remark
CD	Construction Design			
	Office Building (R.C. Structure)	Wan Hua		
	Foundation design			
	- gravity load analysis		1 day	
	- lateral load analysis		0.5 day	
	- pad footings		1 day	
	- raft footings		2 days	
	- ground beams		0.5 day	
	- pad footings drawings		2 days	
	- raft footing drawings		3 days	
	- ground beams drawings		1 days	
	Superstructure design			
	- wind frame analysis		1.5 days	
	- earthquake analysis		3 days	
	- typical floor beams		1 day	
	- typical floor slabs		1 day	
	- typical floor columns		1 day	
	- roof floor beams		1 day	
	- roof floor slab		1 day	
	- roof floor columns		1 day	
	- beams details drawing		2 days	
	- columns details drawing		1.5 days	
	- slabs details drawing		1.5 days	

(Deliverables) (Works Cat.) (Works)

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
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Work Breakdown Structure Form

Project Title: IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision: Construction Drawing Preparation Phase			Date 20Apr1998	Page 2
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok		

Revision	A	B	C	D	E	F	G
Date	20Apr1998						

WBS Code	Description / Title	Person	Time	Remark
	Storage Building (steel structure)			
	Foundation design	Zho Xin		
	- gravity load analysis		1 day	
	- wind load analysis		1.5 days	
	- holding down bolt design		1 days	
	- foundation details drawing		2 days	
	Superstructure design			
	- steel frames		4 days	
	- lateral trust		2 days	
	- roof trust		3 days	
	- corrugated sheet roof		2 days	
	- building frame drawings		3 days	
	- roof drawings		3 days	
	Design Coordination			
	Office Building	Lias Man		
	design meeting 1			
	design meeting 2	- ditto -		
	design meeting 3			
	Storage Building	Dave Lok		
	design meeting 1			
	design meeting 2	- ditto -		
	design meeting 3			

(Deliverables) (Works Cat.) (Works)

Note : Value / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Annex A 5.2.2

Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Construction Drawing Preparation Phase		Date 20Apr1998	Page 3
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok		

Revision	A	B	C	D	E	F	G
Date	20Apr1998						

WBS Code	Description / Title	Person	Time	Remark
	Construction application			
	Office Building	Wan Hua		
	construction bureau			
	environmental protection bureau	- ditto -		
	other government departments			
	Storage Building	Zho Xin		
	construction bureau			
	environmental protection bureau	- ditto -		
	other government departments			
	Value engineering			
	Office Building	Pat Wong		
	Foundation	&		
	Superstructure	Wan Hua		
	Storage Building	Pat Wong		
	Foundation	(Works) &		
	Superstructure	Zho Xin		
	Risk planning			
	Construction design	Dave Lok		
	Office building			
	Storage building			
	Construction application	Dave Lok		
	Office building			
	Storage building			

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Work Breakdown Structure Form

Project Title: IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision: Construction Drawing Preparation Phase				Date 20Apr1998		Page 4
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok				

Revision	A	B	C	D	E	F	G
Date	20Apr1998						

WBS Code	Description / Title	Person	Time	Remark
	Risk planning			
	Tender preparation	Lisa Man		
	Office building			
	Storage building			
	Tender application	Lisa Man		
	Office building			
	Storage building			

(Works)

Note : Value / Reference should be indicated in the blank space of the items

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Risk Planning Form

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Construction Drawing Preparation Phase	Date 25May1998	Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok	

Revision	A	B	C	D	E	F	G
Date	20Feb1998	15Apr1998	25May1998				

Problems (Deliverables)	Impact	Likelihood	Severity	Rank	Tracker	Action / Contingency Plan
i) Drawing is not completed before tendering stage	8	2	16	6	PKI	- close monitoring - early completion bonus
ii) Building tender documents not completed on time	7	2	14	7	LOY	- shorten the SCC - sep. sup. and sub. tender
iii) Delay of construction application	7	4	28	4	PKI	- action plan A
iv) Contractor's price much higher than expected	6	4	24	5	KOP	- contingency plan C
v) Contractor's plant failure	7	5	35	2	BHI	- action plan C
vi) Substructure work fall behind schedule	8	5	40	1	HGUI	- issue a 2nd sub. tender
vii) Material not supply on time contractor shortage of $	7	4	28	4	JGUY	- contingency plan E
viii) Superstructure works fall behind schedule	7	5	35	2	PKI	- action plan B
ix) Contractor not coordinate with one another	5	6	30	3	LOY	- prepare weekly works pro. - conduct bi-weekly meeting
x)	2	3	6	11	PKI	
xi)	2	2	4	13	BHI	
xii)	3	2	6	11	HGUI	

Note: Severity and possibility ranked from 1 to 10 with decreasing order

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Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Stage	Related	Risk	Consequence	Possible Action
Pre-design (Planning)	Client, PMers	Misunderstood and not clearly defined objectives	Outcome not satisfied, frequent revision of requirements	PMers to clarify and coordinate the project scope and objectives, define clearly the requirements and objective before project start
	Client, PMers	Bad coordination with GOV and non-GOV departments for approval and registrations	Delay in project approval and construction	PMers to arrange and coordinate
	Client, PMers	Not familiar with local conditions and legal requirements	Underestimated budget and tightened schedule	Study and know fully the PRC Government rules and regulations, Build in realistic cost, time and effort required in Master Planning,
	GOV	Time consuming tedious project and business assessment process	Delay in project approval and construction commencement	Study and know fully the PRC Government rules and regulations, allow time contingency for time control
	GOV	Stringent requirements and constraints	Delay of business license application and various applications	Study and know fully the PRC Government rules and regulations, allow for time contingency
Project Conception (Design)	Design Institute	Slow design approval stage and incompetence design institute	Delay of subsequent stages	Track progress against planned schedule and allow contingency for progress
	Client, PMers	Not fully appreciated the supporting infrastructure and utilities	Lack of traffic support, and utilities supply	Carry out thorough survey on infrastructure of the area and the utilities undertakers capacity
Tendering (Pre-Construction)	GOV	Typical government conditions of contract too simple and site supervision unit is not included in typical PRC C of C	Difficult to define liability in case of dispute, require variation to maintain quality, works are not completed accordingly on time	PMers to prepare a better C of C, required detailed explanation of the expectation of the client, may have a problem of difficult to enforce the contractor to follow completely

Stage	Related	Risk	Consequence	Possible Action
Tendering (Pre-Construction)	GOV	Specification is not part of contract, included only design specification and no workmanship specification and others	Workmanship and material quality is difficult to control or refer to a specific standard	PMers to prepare a better specification, but required detailed explanation and difficult to enforce the contractor to follow 100%
	Contractor	Too many contractors of unknown qualities interested in tender	Lengthened tender assessment and quality is difficult to guarantee	Carry out pre-qualification exercise to select qualified participants.
	Contractor	Small time contractor "borrowing" the name of established contractor to enter.	Quality is difficult to guarantee if incompetent contractor was selected	Specially prohibit "borrowing" practice in the tender specification and carry out own investigation on bidder
Construction	Contractor	Lack of coordination between trade contractors, sequential working procedure	Conflicts at interfaces	PMers to coordinate the trade contractors for various work, especially at the interfaces
	Contractor	A lot of Chinese design specifications quoted are outdated or materials are no longer available	Increase amount of V.O., adverse quality of works and delays due to V.O.	Employ a good PRC Q.S. to check on specification and control cost during the project implementation.
	Contractor, Client, PMers	Failure to coordinate with various parties included government departments and trade contractors	Delay in project approval and construction commencement approval	Need to study and know fully the PRC Government rules and regulations and track progress against planned
	Contractor	Do not prepare method statement and poor planning for details of works	Inefficient works	PMers to ensure the contractor have planned for each construction procedure, help the contractor to plan for the works if necessary
	Contractor	Late delivery of local materials	Delay in construction progress	PMers to check and follow up the material transportation, issue warning or change supplier if necessary

Stage	Related	Risk	Consequence	Possible Action
Construction	Contractor	Labours are normally non-skilled and non-trained	Bad workmanship	PMers to ensure the contractor have sufficient skilled labour for the works
	Contractor	Complex contractor organizational structure	Difficult to find the right person to tackle problems, and lengthened problem solving period	Ensure communication is made to both management level and to foreman working on site to see workable
	Contractor	Lack of safety procedure and understanding adopted by contractor; Formal safety training is not appreciated	Delay in progress due to accidents	PMer to explain, coordinate and ensure the contractor conduct safety lessons for the labours
	Contractor	There is still a large gap between PRC's perception of quality and international standard	Sub-standard quality of material and workmanship	View software transfer on quality as a long term education process, specify clearly the brand and model of material and plants.
	Contractor	Contractor is not customer oriented	Unsatisfied quality and workmanship	Developer should sell the product on the promise of a good PRC quality standard
	Bank	Un-anticipated banking hold-ups in payment of money into PRC, triangular debit problems	Delay in project payment and therefore progress is delayed	PMers to check and ensure the payment is not hold up, communicate with bank and contractor to explain the situation
	Legal System	Unlike in more developed countries, "LD" clause in PRC is unenforceable. It cannot be used as a weapon to accelerate schedule.	Resulting in bad relationship with contractor, further delay of construction	Use carrot rather than stick to ensure construction schedule, e.g. a reward of xRMB/day for early completion, which is often stated in PRC contracts but not in international contracts
	Contractor	In simple contract with trade contractor, material is expected to be supplied by the client	Client or Pmers to find and coordinate the supply suitable material	Ensure material is available locally or the contractor is able to handle the works if material is to be imported

Stage	Related	Risk	Consequence	Possible Action
Construction	GOV	Delay due to bureaucratic custom	Delay in shipping of imported material and process plants	Try as much as possible use local materials and specifications and allow for sufficient time and ensure the custom documents are ready
	Client	Contractors in PRC commence works after receives initial payment	Delay in project construction commencement	PMers to communicate and explain the practice to client
Post Construction	Contractor	Often in PRC, the taking over process is not serious enough. Government construction authorities often have good relationship with established local contractors.	Sub-standard quality works are accepted finally	Developer should have a very tough internal taking over exercise before official taking over
		During the defect liability period, rectification works may not be carried out as diligent as it should be, because the concept of defect liability is still not serious in PRC	Extra cost have to be paid for the faulty works	Ensure tough compliance to orders on rectification works, employ good and diligent PRC clerk-of-works
		Difficult to find good maintenance crew in PRC	The working life of works reduced	View software transfer on quality as a long term education process, trained up a good maintenance crew
		Developer often has to be very diligent on their own to prevent any breach of regulations especially fire regulation because the product can be used long before any breach is spotted	Penalty of violation	Developer should employ very good clerk-of-works especially M & E COW to spot any mistakes

Filing List

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Construction Drawing Preparation	Date 10Apr1998 / Page 1

Project Director	Project Manager	Sub- Manager			
Peter Roy	Lisa Man	Dave Lok			

Revision	A	B	C	D	E	F	G
Date	05Dec1997	10Apr1998					

Filing Code			Description / Title	Revised	Remarks
97I2	G		General Files		
			Professionals parties (fees and services)		
97I2	G	1	SW - PM team		
97I2	G	2	Delcan Process - Production process		
97I2	G	3	Ho & Wong - Architect		
97I2	G	4	Yeung's Associate - Building and E&M Services		
97I2	G	5	WPL - Civil Engineering		
97I2	G	6	Others		
			Project Control		
97I2	G	11	Quality Assurance		
97I2	G	12	Cost		
97I2	G	13	Organizational Structure		
			Site Office		
97I2	G	21	In coming	10Apr1998	
97I2	G	22	Out going	10Apr1998	
			Correspondence		
97I2	G	31	w/ IRIX		
97I2	G	32	w/ Delcan		
97I2	G	33	w/ Ho & wong		
97I2	G	34	w/ Yeung's		
97I2	G	35	w/ WPL		
97I2	G	36	w/ Others		

Note : Value / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
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Filing List

Project Title:	IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision:	Preliminary Design Phase				Date 10Apr1998	Page 2	
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok					
Revision / Date	A 05Dec1997	B 10Apr1998	C	D	E	F	G

Filing Code			Description / Title	Revised	Remarks
97I2			Project Files		
			Approvals / Liaisons		
97I2	AL	00	Development District Management Committee		
97I2	AL	01	Water / Power / Drainage / Utility		
97I2	AL	02	Boiler / Pressurised Vessel		
97I2	AL	03	Hygiene		
97I2	AL	04	Fire Service		
97I2	AL	05	Environmental Protection		
97I2	AL	06	Labour Safety		
			Financial		
97I2	FI	00	Deposits		
97I2	FI	01	Licenses / Customs		
97I2	FI	02	Tax		
97I2	FI	03	Insurance		
97I2	FI	04	Cost Plan		
97I2	FI	05	Long Lead Items	10Apr1998	
			Programme and Progress		
97I2	PR	00	Programmes		
97I2	PR	01	Project Reports / Status Record		
97I2	PR	02	Minutes of Meetings		
97I2	PR	03	Site Reports	10Apr1998	
97I2	PR	04	Record Photos	10Apr1998	

Note : Value / Reference should be indicated in the blank space of the items

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Filing List

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Preliminary Design Phase	Date 10Apr1998	Page 3
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok	

Revision	A	B	C	D	E	F	G
Date	05Dec1997	10Apr1998					

Filing Code			Description / Title	Revised	Remarks
			Technical		
97I2	TE	01	Schematic Design		
97I2	TE	02	Preliminary Design		
97I2	TE	03	Site Investigation		
97I2	TE	04	Environmental Protection		
97I2	TE	05	Landscaping		
97I2	TE	06	Process		
97I2	TE	07	Structures		
97I2	TE	08	Architectural Finishes		
97I2	TE	09	E&M / BS (General)	10Apr1998	
97I2	TE	10	Roads and Drainage		
			Material		
97I2	MA	01	Imported	10Apr1998	
97I2	MA	02	Local	10Apr1998	
			Document Register		
97I2	DR	01	In coming Drawing / Sketch	10Apr1998	
97I2	DR	02	Out going Drawing / Sketch	10Apr1998	
97I2	DR	03	Issue Schedule	10Apr1998	
			Utilities		
97I2	UT	01	Telephone		
97I2	UT	02	Power		
97I2	UT	03	Water		
97I2	UT	04	Drainage		

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Date of Approval

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Filing List

Project Title:	IRIX Milk Product Shenzhen			JEN	9	7	I	2	3	6	0	7	7	1
Subdivision:	Preliminary Design Phase			Date 10Apr1998					Page 4					
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok												

Revision	A	B	C	D	E	F	G
Date	05Dec1997	10Apr1998					

Filing Code			Description / Title	Revised	Remarks
			Process		
97I2	PC	01	Design / PRC Requirements		
97I2	PC	02	Utility Plan		
97I2	PC	03	HV / LV		
97I2	PC	04	Process Details		
97I2	PC	05	Shop Drawings		
			Building Service / E&M		
97I2	BS	01	Design / PRC Requirements	10Apr1998	
97I2	BS	02	Utility Plan	10Apr1998	
97I2	BS	03	HV / LV	10Apr1998	
97I2	BS	04	Plumbing and Drainage	10Apr1998	
97I2	BS	05	MVAC	10Apr1998	
97I2	BS	06	Fire Service	10Apr1998	
97I2	BS	07	Pressurised Gas Vessel	10Apr1998	
97I2	BS	08	Waste Water Treatment	10Apr1998	
97I2	BS	09	Lightening	10Apr1998	
97I2	BS	10	Shop Drawings	10Apr1998	
			Contracts		
97I2	CT	01	Site Survey		
97I2	CT	02	Geological Survey		
97I2	CT	03	EIA	10Apr1998	
97I2	CT	04	Site Fencing	10Apr1998	
97I2	CT	05	Site Office Construction	10Apr1998	

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Date of Approval

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Initial:											
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Information Transmittal Record

Project Title:	IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision:	Construction Drawing Preparation			Date 10Mar1998	Page 1	
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok				
Revision Date	A 10Mar1998	B	C	D	E	F	G

i) Request of Information / ~~Transmission of Information~~

Issued to : SW		Issued by : Delcan
Date : 06Mar1998		Reference : Fax ref. 97I2/0124
Description	**Document No.**	**Copies**
1) Process Details of Slide Cheese	DC / IX / 0923	2
2) Solid waste generated from Slide Cheese Production	DC / IX / 0721	2

ii) Drawing Incoming / Outgoing

Issued to :		Issued by :
Date :		Reference :
Description	**Document No.**	**Copies**

Note : Value / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Information Transmittal Form

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Construction Drawing Preparation	Date 12Apr1998	Page 1

Issued to : Dick Yip (Ho & Wong)	Issued by : Dave Lok (SW)
Date : 12Apr1998	Reference : TE/MB/0123

We transmit herewith the following controlled drawing / ~~design information~~ / ~~documents~~ :

Description	Document No.	Copies
1) Process Details of Slide Cheese	TE / MB / SC / 01	2
2) Slide Cheese Process Plant Layout	TE / MB / SC / 02	2
3) Control Floor Room Layout	TE / MB / SC / 03	2

Please tick as appropriate :

Issue Purpose :

- For Action ☐
- For Approval ☐
- For Comment ☐
- For Construction ☐
- For Information ☑
- Client Approval for Construction ☐
- Other ____________ ☐

SW PM Service Ltd.	
Issued By	Received By
Signature	Signature
Dave Lok	
Name & Post	Name & Post
12Apr1998	
Date	Date

Note : Value / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:													File
Initial:													
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Project Status Record

Project Title:	IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Construction Drawing Preparation Phase				Date 19Jun1998	Page 1
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok				

Revision	A	B	C	D	E	F	G
Date	24Apr1998	15May1998	19Jun1998				

		A	P
Design preparation			
i)	Process design	☑	☐
ii)	Builiding and architectural	☑	☐
iii)	Fire service	☑	☐
iv)	Electrical and mechanical	☑	☐
v)	MVAC	☑	☐
vi)	Plumbing and drainage	☐	☑
vii)	Roads and drainage	☑	☐
viii)	Utilities connections	☑	☐
ix)	Enviromental treatment	☐	☑
x)	Landscaping	☑	☐
Off-site Production			
i)	Special E&M equipments	☑	☐
ii)	Process plants	☑	☐
iii)	Structural steel building	☑	☐
Construction Application			
i)	Office and Production Builiding	☐	☐
ii)	Storage Builidng (steel structure)	☑	☐
iii)	Waste Treatment House	☑	☐
iv)	Liquid CO_2 station	☐	☑
v)	Boiler tanks	☐	☑

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
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Annex A6

Tender Document Checklist

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Office Builidng		Date 17May1998	Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok		

Revision	A	B	C	D	E	F	G
Date	29Apr1998	17May1998					

Documents required for submission

		A	P
i)	Tender preamble	☑	☐
ii)	Site survey, design principle and working drawings	☑	☐
iii)	Tendering method and pricing reference	☑	☐
iv)	Amount of pre-construction payment and the payment schedule	☑	☐
v)	Material supply and payment arrangement	☐	☑
vi)	Special requirements on works and workmanship	☐	☑
vii)	Bidder's document requirement	☑	☐
viii)	Tender opening and assessment criteria	☑	☐
ix)	Conditions of contract	☑	☐
x)	Special condition of contract	☐	☑
xi)	Tender base	☑	☐
xii)	Information of tendering and relevant parties	☑	☐

Special requirements

Special workmanship requirements	SCC 2.3.1
Details of coordinations to be carried out	SCC 3.2
Method statement	SCC 1.5
Payment terms	SCC 1.3

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
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Tender Assessment Form

Project Title:	IRIX Milk Product Shenzhen	JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Office Building	Date 20May1998	Page 1

Project Director	Project Manager	Sub- Manager			
Peter Roy	Lisa Man	Dave Lok			

Revision	A	B	C	D	E	F	G
Date	20May1998						

Tenderer : Guangzhou Engineering Construction Coperation

	Rating	Marks
Price		
1) Tender Base 21M	50	46.7
2) Tender Price 22.5M		
Capacity		
3) Average turnover of the pervious 5 consecutive years 200M	15	13
4) Current Workload		
Experience		
5) Comparable projects experience	15	6
Quality		
6) Labours status	8	4
7) Amount of professionals	12	9.6
		79.3

4) Current Workload

	No.	Total value	Total left
Contract sum larger than 25M	3	80M	40M
Contract sum from 15M to 25M	4	85M	25M
Contract sum smaller than 15M	2	25M	5M

5) Comparable projects experience

	No.
Contract sum larger than 15M	20
Contract sum smaller than 15M	30

6) Labours status

Direct employ	200
Self-employ	100
Sub-contract	100

7) Amount of professionals

Managerial	10
Technical	30
Supervisory	50
Others	10

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

											File
To:											
Initial:											
Copy:											

Tender Meeting Assessment Form

Project Title: IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision: Office Builidng				Date 20May1998	Page 1	
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok				

Revision	A	B	C	D	E	F	G
Date	20May1998						

Qutestion to be asked

ISO 9000 Certified

Description of overall project programme

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Public Utility Connect Checklist

Project Title: IRIX Milk Product Shenzhen					JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision: Office Builidng					Date 20May1998	Page 1	
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok					
Revision	A	B	C	D	E	F	G
Date	20May1998						

Documents required for submission

		A	P
i)	Project Approval	☑	☐
ii)		☑	☐
iii)		☑	☐
iv)		☑	☐
v)		☐	☑
vi)		☐	☑
vii)	Bidder's document requirement	☑	☐
viii)	Tender opening and assessment criteria	☑	☐
ix)	Conditions of contract	☑	☐
x)	Special condition of contract	☐	☑
xi)	Tender base	☑	☐
xii)	Information of tendering and relevant parties	☑	☐

Special requirements

Special workmanship requirements	SCC 2.3.1
Details of coordinations to be carried out	SCC 3.2
Method statement	SCC 1.5
Payment terms	SCC 1.3

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

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Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

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Work Execution Plan

Project Title:	IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Office Builidng			Date 20Jun1998	Page 1
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok			

Revision	A	B	C	D	E	F	G
Date	20Jun1998						

Works Item : Foundation of Office Building

Permits / Info / Consideration / Step required

i) Foudation Plan S/F 001
ii) Construction Permit WB/SZ/0015
iii) Entrance large enough for piling plants
iv) Site access for piling plants
v) Temporary Power Supply
vi) Temporary Water Supply
vii)
viii)

Government involve : Yes ☑ Quality Monitoring Station No ☐

Works required :
- Info submission ☐
- Witness ☑
- Approvals ☐
- Mat'l submissions ☑ concrete and reinforement details
- Mat'l testing ☑ concrete and reinforement
- Others ☐

Coordination with other parties required : Yes ☑ No ☐

Parties to coordinate :
- Client ☐
- Engineers ☐
- Contractors ☑ vertical drain contractor
- Others ☐

Method Statment : i) Refer to C0238
ii)
iii)
iv)
v)
vi)

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Annex A 6.5

Annex A6.xls

Fire Service Inspection

Project Title:	IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Production and Storgae Builidng			Date 20Apr1999	Page 1
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok			

Revision	A	B	C	D	E	F	G
Date	20Apr1999						

General Information

1) Class of Facility — Class ~~A~~ / ~~B~~ / C Factory
2) Level / Scale of Facility — ~~Nation~~ / City / ~~Village~~ Level
3) Type of Project — New / ~~Alteration~~ / ~~Extension~~ Works
4) Investment — Joint Venture / ~~Local~~ / ~~Government~~
5) Electicity Loading — Class ~~1~~ / ~~2~~ / 3
6) Electivry usage — 3 phase 1700 kVA; power generator backed
7) Water source — Shenzhen City Water Supply Bureau
8) Size of water pipe — Shenzhen City Water Supply Bureau

9)

Building name	Structure type	Fire rating	No. of floors	Height	G.F.A.	Fire Hazard class
Process Bld	R.C.	2hrs	2	4m e.f.	2710	A / ~~B~~ / ~~C~~
Storage Bld	R.C.	2hrs	1	5m	1000	A / ~~B~~ / ~~C~~

Fire Service System

10) Sprinkler System

Building name	Sprinkler head coverage	Water Pressure	Total Coverage	Brand of Sprinkler	Model
Process Bld	5 m^2 per head	8 bar	90%	Viking	FA 023
Storage Bld	3 m^2 per head	10 bar	95%	Viking	FC 015

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Fire Service Inspection

Project Title:	IRIX Milk Product Shenzhen			JEN 97I2360771	
Subdivision:	Production and Storgae Builidng			Date 20Apr1999	Page 2
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok			

Revision	A	B	C	D	E	F	G
Date	20Apr1999						

11) Fire Alarming System

Building name	Smook detectors	Total Coverage	Brand of Sprinkler	Model
Process Bld	10 m^2 per head	90%	Fuji	DF012
Storage Bld	5 m^2 per head	95%	Fuji	DF012

12) Fire Hose Reel

Location	Number	Water Pressure	Brand of Sprinkler	Model
Process Bld	20	5 Bar	RongXing	A12
Storage Bld	30	7 Bar	RongXing	A12

13) Emergency Lighting

Location	Coverage	Brand	Model
Process Bld	20m^2 per head	RongXing	L32
Storage Bld	15m^2 per head	RongXing	L32

14) Other Fire Service System

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Project Completion Inspection Checklist

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Office Building	Date 02Aug1999	Page 1

Project Director	Project Manager	Sub- Manager			
Peter Roy	Lisa Man	Dave Lok			

Revision	A	B	C	D	E	F	G
Date	02Apr1999	22Jun1999	02Aug1999				

Engineering Works

		Yes	No
1)	Contract works completed	☑	☐
2)	Outstanding works schedule issued	☑	☐
3)	Outstanding works completed	☑	☐
4)	As-constructed drawing completed	☑	☐
5)	Maintenance contract for the project issued	☐	☑
6)	Cleaning to required standard	☐	☑
7)	Removal of unwanted materials and debris	☑	☐
8)	Commissioning of engineering service completed	☑	☐

Testing

		Yes	No
1)	Production plants tested and certificates issued	☑	☐
2)	Equipment tested and certificates issued (lifts, loading docks, shutters, others)	☐	☑
3)	Insurer's certificate issued (lifts, loading docks, others)	☑	☐
4)	Fire-fighting system tested, signed off and certificate issued	☑	☐
5)	Fire alarm system tested, signed off and certificate issued	☑	☐
6)	Fire escape route drilled	☐	☑
7)	Public utility supplies inspected and signed off	☑	☐

Regulations

		Yes	No
1)	Building regulation consent signed off	☑	☐
2)	Occupation certificate signed off	☑	☐
3)	Health and safety consent signed off	☑	☐
4)	Planning consent complied	☑	☐
5)	Controlled chemicals storage approved and permit issued	☑	☐

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

NOT TO BE COPIED WITHOUT PROJECT MANAGER'S PERMISSION

Annex A6.xls

Project Completion Inspection Checklist

Project Title:	IRIX Milk Product Shenzhen					JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision:	Office Building					Date 02Aug1999	Page 2	
Project Director: Peter Roy	Project Manager: Lisa Man		Sub- Manager: Dave Lok					
Revision	A	B	C	D	E	F	G	
Date	02Apr1999	22Jun1999	02Aug1999					

Regulations		Yes	No
6)	Dispose of controlled chemicals approved and permit issued	☑	☐
7)	Licenses to store gases	☑	☐
8)	License to use artesian well	☑	☐
9)	Adoption of highways, estate roads, and walkways by local authorities	☑	☐
10)	Consent to erect and maintain flag-poles	☐	☑
11)	Consent to erect illuminated signed	☐	☑

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Office Building				Date	Page 1
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok				
Revision / Date	A	B	C	D	E	F	G

WBS Code	Description / Title	Person	Time	Remark
	Office Building			
	Sub-structure			
	Dado pile driving		30 days	
	pile head trimming		10 days	
	excavation to soffit of pile cap		10 days	
	blinding layer		1 days	
	steel bar fixing		10 days	
	formwork fixing		10 days	
	concreteing		5 days	
	ground beam formworks		5 days	
	ground beam steel fixing		5 days	
	ground beam concreting		5 days	
	Super-structure			
	1st floor reinforcement fixing		7 days	
	1st floor formwork fixing		10 days	
	1st floor concreteing		5 days	
	2st floor reinforcement fixing		7 days	
	2 nd floor formwork fixing		10 days	
	2st floor concreteing		5 days	
	roof floor reinforcement fixing		7 days	
	roof floor formwork fixing		10 days	
	roof floor concreting		5 days	

(Deliverables) (Works Cat.) (Works)

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager — Date of Approval

To:												File
Initial:												
Copy:												

NOT TO BE COPIED WITHOUT PROJECT MANAGER'S PERMISSION

Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen			JEN 9 7 I 2 3 6 0 7 7 1	
Subdivision:	Office Building			Date 09Feb1998	Page 2
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok			

Revision	A	B	C	D	E	F	G
Date	09Feb1998						

WBS Code	Description / Title	Person	Time	Remark
	E&M works			
	1st floor E&M fitting out		30days	
	2nd floor E&M fitting out		30days	
	E&M works installation		25 days	
	HV and LV switch board installation		10 days	
	MVAC installation		30 days	
	lift installation		20 days	
	plumbing and drainage installation		45 days	
	MCCB installation		10 days	
	Fire service			
	fire alarming system installation		30 days	
	fire sprinkler system installation		30 days	
	fire hose reel installation		20 days	
	fire doors installation		35 days	
	Architectural finishes installation			
	wall finishes		30 days	
	false ceiling		30 days	
	partitions		40 days	
	floor finishes		15 days	
	windows		45 days	
	doors		45 days	
	furniture		30 days	

(Deliverables) (Works Cat.) (Works)

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

NOT TO BE COPIED WITHOUT PROJECT MANAGER'S PERMISSION

Work Breakdown Structure Form

Project Title:	IRIX Milk Product Shenzhen		JEN 9 7 I 2 3 6 0 7 7 1
Subdivision:	Office Building	Date	Page 3
Project Director: Peter Roy	Project Manager: Lisa Man	Sub- Manager: Dave Lok	

Revision / Date	A	B	C	D	E	F	G

WBS Code	Description / Title	Person	Time	Remark
	Testing and commissioning			
	E&M works		10 days	
	Fire services		10 days	
	Special			
	temporary power supply		10 days	
	temporary water supply		10 days	
	Reports			
	works commencement report		5 days	
	testing and commissioing report		5 days	
	as-constructed drawings		30 days	
	Quality Inspection			
	piling commencement		1 day	
	piling completion		1 day	
	reinforcement		3 days	
	concrete		3 days	
	formwork		2 days	
	E&M installation		2 days	
	fire service installation		2 days	

(Deliverables) (Works Cat.) (Works)

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Project Status Record

Project Title:	IRIX Milk Product Shenzhen				JEN 9 7 I 2 3 6 0 7 7 1		
Subdivision:	Tendering and Construction Phase				Date 19Jun1998	Page 1	
Project Director Peter Roy	Project Manager Lisa Man	Sub- Manager Dave Lok					
Revision	A	B	C	D	E	F	G
Date	24Apr1998	15May1998	19Jun1998				

		A	P	
Tendering				
i)	Tender Documents	☑	☐	
ii)	Tender Approval	☑	☐	
iii)	Tender Assessment	☑	☐	
iv)	Electrical and mechanical	☑	☐	
v)	MVAC	☑	☐	
vi)	Plumbing and drainage	☐	☑	
vii)	Roads and drainage	☑	☐	
viii)	Utilities connections	☑	☐	
ix)	Enviromental treatment	☐	☑	
x)	Landscaping	☑	☐	
Off-site Production				
i)	Special E&M equipments	☑	☐	
ii)	Process plants	☑	☐	
iii)	Structural steel building	☑	☐	
Construction Application				
i)	Office and Production Builiding	☐	☐	
ii)	Storage Builidng (steel structure)	☑	☐	
iii)	Waste Treatment House	☑	☐	
iv)	Liquid CO_2 station	☐	☑	
v)	Boiler tanks	☐	☑	

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager — Date of Approval

To:											File
Initial:											
Copy:											

Annex B1

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Annex B2

Content of Project Approval / Feasibility Study Report*

I. General description

- details of the Joint-Venture company
- financial status

II. Brief market and production details

- demand of products

III. Detail analysis of market and production demand

- market details
- financial feasibility

IV. Financial and market forecast

- detailed market forecast
- detailed financial forecast

V. Technical details of production

- source and raw material used
- type of machinery and equipment used
- consumption of water, power and steam, etc.
- type, quality and quantity of waste generated
- required site area
- staffing and management details
- technology transfer and training

* Project Approval / Feasibility Study Report shall at least include the listed items for Government (Local planning commission or State Planning Committee) project approval.

广　　　州
经济技术开发区 管理委员会 ①

穗开管企[1996] 26号

关于中外合[redacted]（广州）有限公司 ②
合同、章程的批复

广州经济技术开发区宜通招商有限公司：

你公司《关于成立中外合资企业安佳乳品（广州）有限公司的请示》收悉。经研究，批复如下：

一、同意成立由广州经济技术开发区宜通招商有限公司（甲方）和奶品集团（东南亚）私人有限公司（新加坡）（乙方）合资兴办的中外合资企业安佳乳品（广州）有限公司，批准该公司合同、章程生效。

二、该公司投资总额为800万美元，注册资本为400万美元，其中甲方占5%，乙方占95%。投资各方应按公司合同规定的出资方式和期限出资完毕。 ③

三、该公司的经营范围是：生产、加工乳制品，销售本公司产品及提供产品售后服务。产品外销占总产值20%，内销占总产值80%。企业外汇应自行平衡。

<u>Project and Joint Venture (JV) Approval</u> (sheet 1)

<u>Key</u>

1. Approving authority (GETDD Management Committee)
2. Subject of approval (Contract and JV approval)
3. Details of project and JV approval

四、该公司的经营期限为60年。

五、该公司的所有活动应维护社会公共利益、严格遵守中国的法律法规。

接文后，请到有关部门办理有关手续。

此 复

附件：1、公司合同、章程 5

2、公司征地证明

3、进口设备清单

4、有关资信材料

（附件发有关单位）

4

一九九六年三月十九日

主题词：外资企业 合同 章程 批复

抄送：市计委、市经委、市外经贸委、市外汇管理局、黄埔海关、市工商局、市工商局开发区分局、驻区内各金融机构

发：区党委、管委会办公室、经济发展局、规划建设管理局、社会事业管理局、财税局、投资服务中心、人才交流服务中心

广州开发区管委会办公室秘书处 1996年3月20日印发

校对人：陈秀霞 （印发份数：60份）

Project and Joint Venture (JV) Approval (sheet 2)

Key

4. Chop of approving authority (GETDD Management Committee)

5. Enclosed documents including the company details and approved import material

№ 0298331

企业名称	中文	[redacted]（广州）有限公司 1
	英文	[redacted] PRODUCTS (GUANGZHOU) LIMITED
企业地址		广州经济技术开发区 2
企业类型		合资企业　经营年限 50年
投资总额		800 万美元 3
注册资本		400 万美元

投资者名称（中、英文）	注册地	出资额
广州经济技术开发区[illegible]招商有限公司 [illegible]（东南亚）私人有限公司	中国 新加坡	20万美元占5% 380万美元占95%

经营范围	生产、加工乳制品；销售本公司产品及提供产品售后服务。 4

Approved Project Details

Key

1. Name of company (AnChia Milk Products)
2. Address of project (GETDD)
3. Investment details (USD 8M)
4. Scope of business (Cheese & milk powder sachet production)

广州市外商投资企业统一编码通知书 ①

广州经济技术开发区管理委员会：

报来[redacted]（广州）有限公司

编码申请表及有关材料函，经审核，准予该企业纳入全市

外商投资企业统一编码，编码号为：011773-6007

②

一九九六年三月二十二日

抄送：申报编码企业

广州市对外经济贸易委员会制

Foreign Investment Enterprise Licence Number

Key

1. Subject (Guangzhou Foreign Investment Enterprise Licenced Number)
2. Approving authority (GETDD Management Committee)

中华人民共和国外商投资企业

批准证书 ①

批准号　外经贸[illegible]字〔1996〕8004 号

批准日期　一九九六年三月二十二日

②

一九九六年 [illegible] 月 [illegible] 日

Foreign Investment Certificate

Key

1. Subject (Foreign investment certificate)
2. Approving authority (Guangzhou City Government)

中华人民共和国

企业法人

营 业 执 照 1

（副本）

2

注册号：企合粤穗总副字第100253号

该企业经核准登记注册，具有法人资格，准予开业。

<u>Business License</u> (sheet 1)

<u>Key</u>

1. Subject (Business license)
2. Business licence number

编号：№ 0262065

企业名称（中文）[redacted]（广州）有限公司 ③

（外文）[redacted] PRODUCTS (GUANGZHOU) LIMITED.

住　　所 广州经济技术开发区

企业类别 中外合资经营 ④

经营范围 生产、加工乳制品，销售本公司产品及提供产品售后服务。

注册资本 [redacted]美元

董 事 长 [redacted] ⑤

副董事长

总 经 理 ROBERT MAJOR

副总经理

分支机构

经 营 期 限 自一九九六年三月二十六日 至 一九九六年六月二十六日

执照正本有效期限 自一九九六年三月二十六日 至 年 月 日

中华人民共和国 ⑥
国家工商行政管理局 局长

⑦

一九九六年 月 日

本副本有效期至 一九九六年 六 月二十六日

Business License (sheet 2)

Key

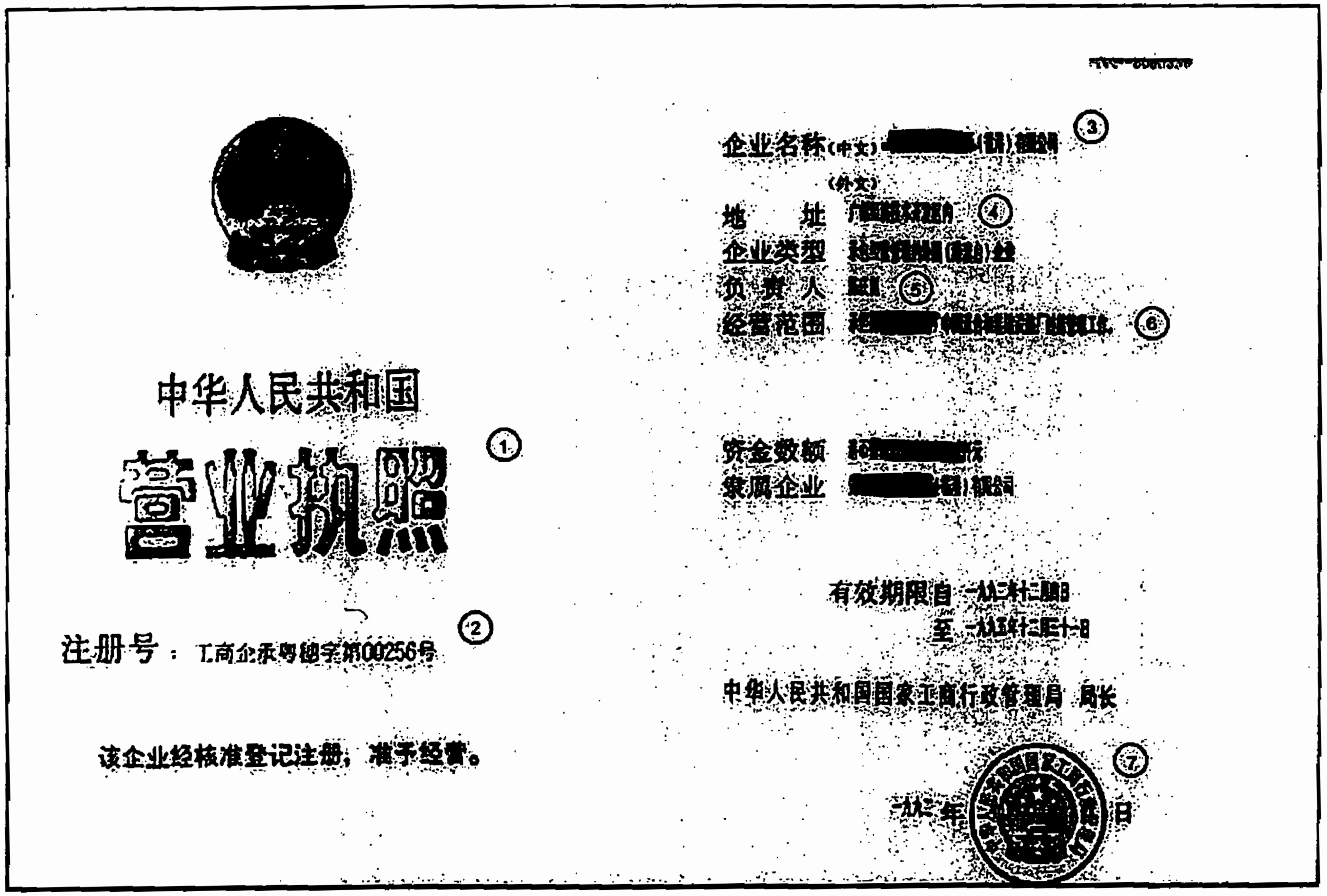
3. Name of company (AnChia Milk Pdt.)

4. Scope of business (Production of milk products)

5. Person-in-charge

6. Approving authority (State Administration of Industry and Commerce, PRC)

7. Chop of approving authority



Key

1. Subject (Business License)
2. Business license number
3. Name of company
4. Address of company
5. Person-in-charge
6. Scope of business
7. Chop of approving authority (State Administration of Industry and Commerce, PRC)

Business License of Consultant

进口物资清单 ①

单位：

名称	型号规格	生产国别	数量	价格		审批进口		海关放行		备注
				单价	合计	日期	数量			
一、生产设备										
合计										
二、交通工具										
合计										
三、办公用品										
合计										
总计										

注：若是二手设备，需注明出厂日期

List of Import Material

Key

1. Details of imported material

Annex B3

项目用地选址报告表 ①

（正 本）

填表日期： 年 月 日

项目名称	[redacted]（广州）有限公司				
主办单位	广州[redacted]招商有限公司		联系人	[redacted]	
联系地址	广州开发区管委会大楼B座316号		联系电话	82222268	
② 项目概况 — 建设依据（批文）	穗开管函[1996]26号		投资规模	[redacted]美元	
主要产品品种	奶酪、奶粉		主要原材料消耗	[illegible]、黄油等	
用电负荷	1300KVA	用水量（吨/日）	40吨/日	用汽量（吨/时）	[illegible]
运输量（吨/日）	80	运输方式	□水运□铁路□汽车□其他		
职工人数（人）	45	车辆配备（辆）	3	[illegible]	[illegible]
可能产生"三废"、噪音和震动情况及其处理方法	日废污水20吨，BOD为1000～1500mg/l，经处理后达三级标准（污水管道接纳标准）				
易燃、易爆、有毒物质情况及安全措施	柴油10m³				
③ 建设计划 — 项目建设内容	生产及加工乳制品				
总建筑面积（m²）	4000	其中首期建筑面积（m²）	4000	主体建筑层数	单层
建设分期实施计划	分期	实施时间	建设内容	建筑面积	
	一期	96年10月	生产厂房及仓库	4000m²	
	二期	视市场需求		2000m²	
	三期			400m²	
④ 用地要求 — 申请用地面积（m²）	16,000	项目可否进标准厂房	□可以□不可以	如不可，请在下一栏说明	
用地单位对用地选址的要求和意见	· 周围环境须清洁，以免影响产品的质量 · 场地内的800mm直径水管须于10月底前迁移 · 场地须平整 · 周围道路及绿化须于试产前完成				

Land Use Application Report Form

Key

1. Subject (site selection report)
2. Project details (project approval number, production consumption, etc.)
3. Design details of facility (production details, construction phases, etc.)
4. Special requirement on site

选址意见书 ①

编号：XZ(96)12号

[redacted]有限公司：

关于[redacted](广州)有限公司项目选址申请，经我局研究，初步同意安排 东区北区 地块作为该项目用地选址，有关问题和初步设计要点如下：

一、初步用地面积为16000 m²，用地范围见红线图。本图供项目前期工作之用，并非正式用地图，我局可根据实际情况予以变更。

二、从本通知书发出之日起计，开发区将为本项目保留该地块用地三个月，期满后原则上不予延长且无须通知，如需申请延长保留期，请在保留期结束前另行申请，我局根据实际情况处理。

三、在收到本通知十天内，迅速到房地产局办理有关用地事宜，并于半年内动工，否则该地块不再保留。

四、在接到本通知后，尽快委托勘察单位对本地块进行包括有四至情况、地面标高的测量（测量范围：红线外十米以内的范围），成果作为总平面图附件报我局。

五、请通知为本项目所聘请的勘察、设计单位先到我局办理注册登记手续，获得审查同意后，勘察、设计单位方能开展工作，否则我局不予审查方案。

六、规划设计要点审核及方案报批手续请有关专业人员到我局规划环保处办理。（有关要点申领、方案报批等手续可事先向我局咨询）

七、在本项目可行性研究报告/设计任务通知书获得批准后，可办理建设用地规划许可手续，请在办理时补充：

项目可行性报告批文或批准的设计任务书。

环境影响评价及审批意见。

用地总平面布置方案。（该项请向我局确认办理手续）

消防部门对方案审查的意见。

其它部门对方案审查的意见。

建筑效果图（模型）。（该项请向我局确认）

②

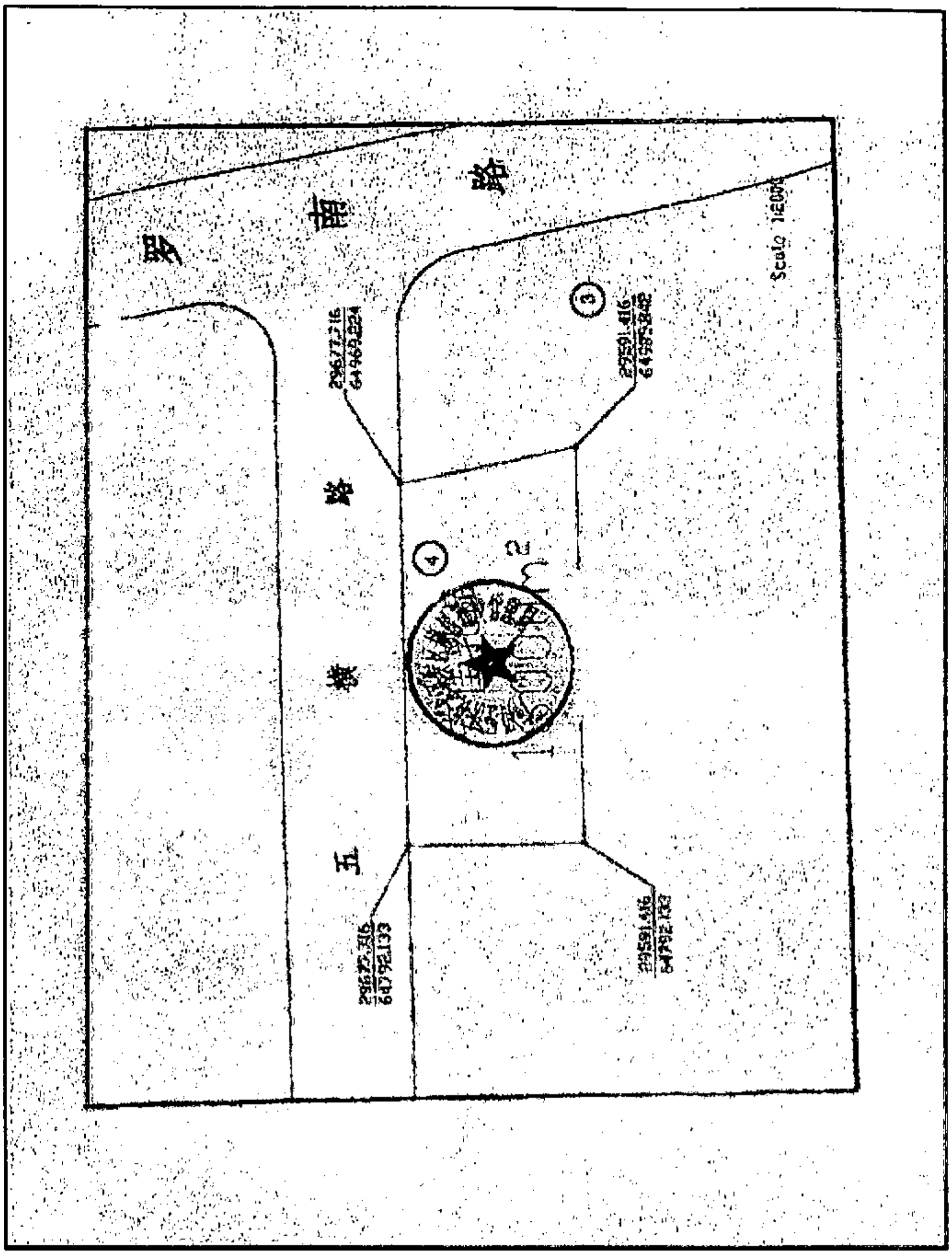
九九六年八月二十八日

附件：用地红线图

Government's Advice on Selected Site

Key

1. Details of approval and advices
2. Approving authority (GETDD Planning and Construction Administration Bureau)



Blue Line Diagram (Attached in Government's advice)

Key

3. Coordinate of the approved site
4. Chop of approving authority (GETDD Planning and Construction Administration Bureau)

规划设计要点申领表 ①

表3

② 项目名称 [illegible]　申请地点、面积 [illegible]，16000㎡

建设单位 [redacted]（广州）有限公司　联系人、地址、电话

项目类型 [illegible]

③ 建设要求及现场条件：

[illegible]

④ 附件

1. 选址意见书 [illegible]
2. 实测图 [illegible]
3. 提供用地意向图件，指标或同类型项目略图 [illegible]
4. 其它要求附件 [illegible]

申领单位（盖章）

Schematic Design Recommendation Application

Key

1. Subject (schematic design recommendation application)
2. Project details
3. Design requirements
4. Attachments (Government's advice on selected site, site survey plan, layout plans, etc.)

广州经济技术开发区

[redacted]（广州）有限公司地块规划设计要点 1

一、土地规划用途：二类工业用地；
二、建筑密度：30～50%；
三、建筑容积率：<1.5；
四、建筑层数：<8层；
五、建筑物退缩用地红线：临街河道及要道路退缩10以上，其它方向5米以上；
六、建筑要求：建筑物体量、色彩应与周围环境协调；
七、园林绿化比率：>20%；
八、室外地台标高：设计时确定；
九、汽车出入口：南、北可各设一个；
十、汽车泊位：按每1000m²建筑面积设一车位计，并应有合理数量的货车/停车位。
十一、其他：

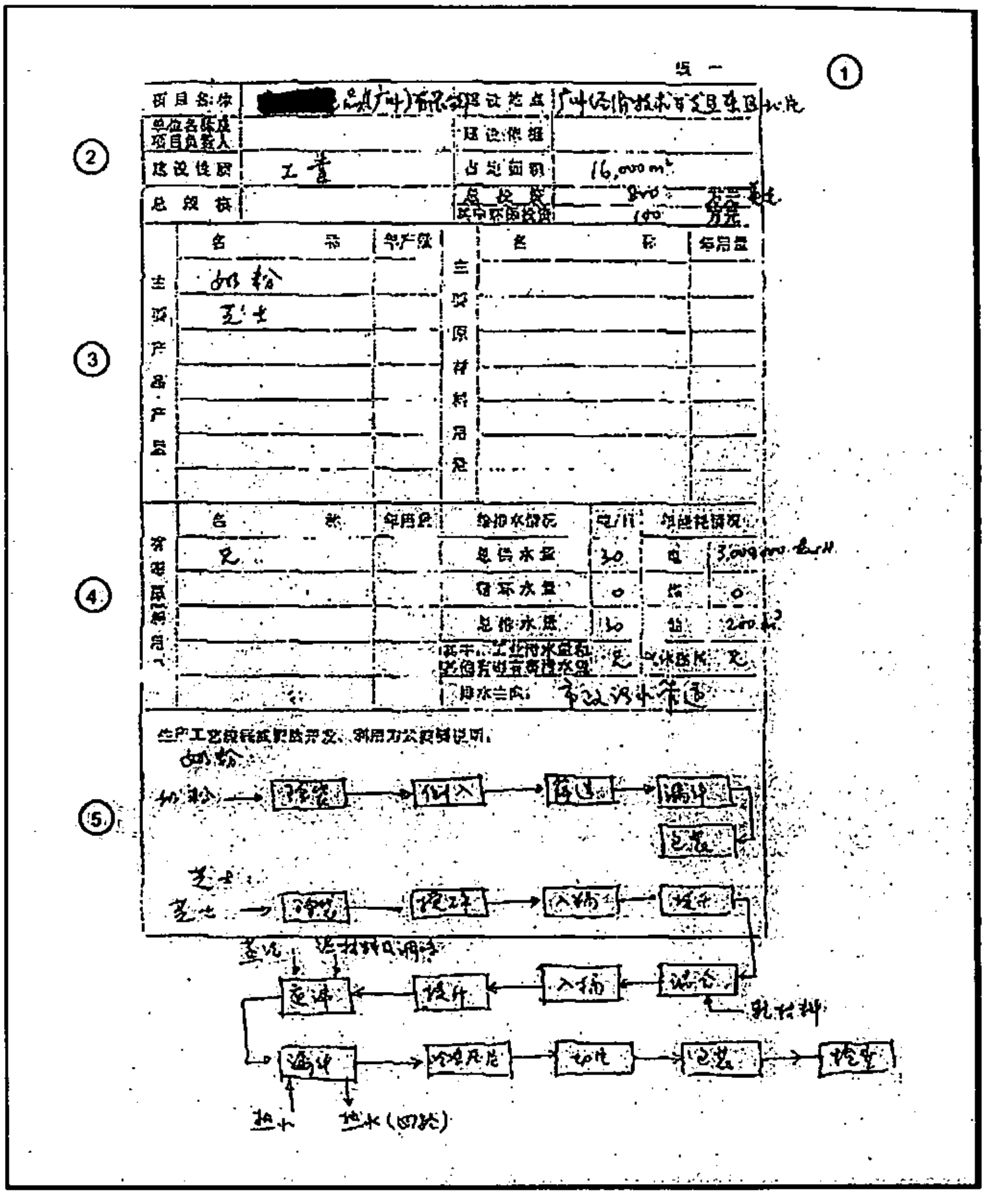
2

3

Schematic Design Recommendation (from Government)

Key

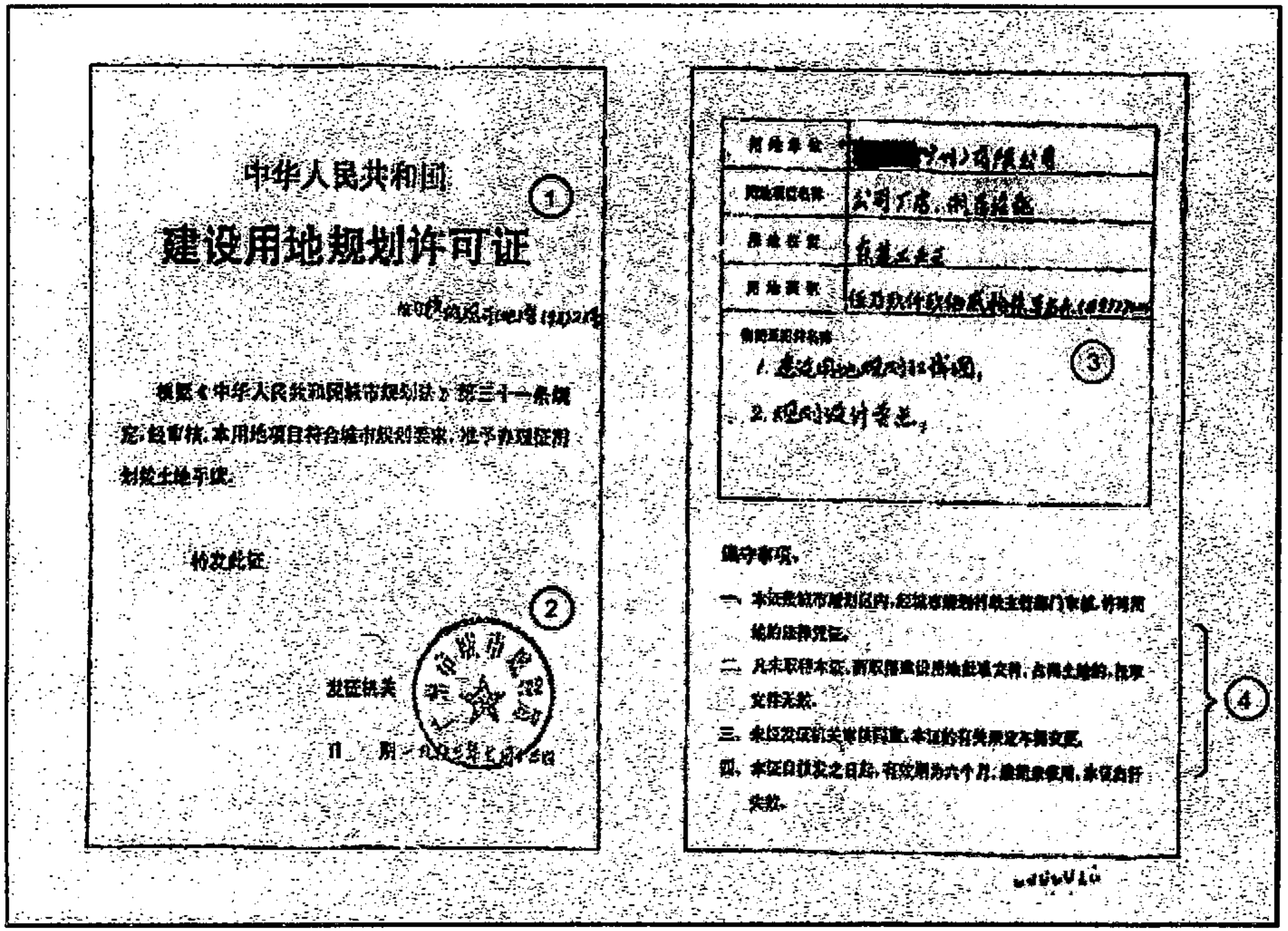
1. Subject (schematic design recommendation)
2. Details of recommendation
3. Approving authority (GETDD construction management committee)



Environmental Impact Assessment (EIA) Report Form

Key

1. Subject (EIA report)
2. Project general details
3. Production details
4. Use of raw material and waste produced
5. Process block diagram



Construction Land Use Certificate

Key

1. Subject (Construction land use certificate)
2. Chop of approving authority (Guangzhou City Government Planning Bureau)
3. Details of project
4. Approval details

方案审查报送资料一览表 ①

表4-2

建设单位			建设位置			项目名称		
联系人			地址			电话		
序号	文件编号	责任者	文件材料名称	是否齐全	限补齐日期	责任人	补齐日期及签收人	备注
			选址意见书					
			勘测图					
			实测图					
			规划设计要点					
			方案说明					
			技术经济指标					
			总平面图1:500					
			平面图1:100/1:200					
			立面图					
			管网综合总平面图					
			专业管理部门的意见					
			其中:道路					
			供水					
			排水					
			排污					
			电力					
			电讯					
			环保					
			消防					
			人防					
			劳动安全					
			卫生防疫					

Schematic Design Submission Form

Key

1. Details to be included

Annex B4

Content of Preliminary Design Report*

1. Introduction
    1.1 Design Statement
    1.2 Details of Design
    1.3 Type of Production and Investment Details
    1.4 Major Raw Material and Importation
    1.5 Process Flow
    1.6 Production Management (Staffs and Shift)

2. Construction and Production Description
    2.1 Products
    2.2 Consumption of Raw Material
    2.3 Total Investment
    2.4 Construction Details

3. Site Selection and Schematic Design
    3.1 Location of Site and Selection
    3.2 Geographical Condition
    3.3 Schematic Design and General Layout
    3.4 Schematic Road and Drainage Layout
    3.5 Landscaping and Plot Ratio

4. Production details
    4.1 Production and Packaging Flow Details

5. Civil Engineering Details
    5.1 Design Statement
    5.2 Site Geological Details
    5.3 Details of Structures
    5.4 Architectural Finishes

5.5 Drawings

6. Plumbing and Drainage

6.1 Plumbing Design Details

6.2 Source of Water and Connection Point

6.3 Consumption

6.4 Foul Sewer Design Details

6.5 Stormwater Drainage Design Details

7. Fire Service

7.1 Design Statement

7.2 Fire Service System and Design Details

7.3 Alarming and Sprinkler System Design Details

7.4 Fire Service Tank Details and Size

8. Power Supply

8.1 Design Statement

8.2 Requirement of Power Supply

8.3 Power Consumption

8.4 Power Supply and Distribution System Design

8.5 Transformer System Design

8.6 Lighting System

8.7 Lightening System

8.8 Power Consumption Calculation

9. Communication System

9.1 Internal and External Telecommunication System Design

10. Air Conditioning and Mechanical Ventilation

10.1 Design Statement

10.2 Design Requirements

10.3 Power Consumption

10.4 Air-conditioning Design

10.5 Mechanical Ventilation System Design

11. Compressed Air System (if required)

    11.1 Compressed Air System Design

12. Liquid CO_2 and N_2 System (if required)

    12.1 Liquid CO_2 System Design

    12.2 Liquid N_2 System Design

13. Environmental Protection Facility

    13.1 Pollutants and Treatments Design

    13.2 Noise and Protection Design

14. Labour and Production Safety

    14.1 Production Safety Measures

    14.2 Arrangement of Safety Protection Facilities

    14.3 Hygiene Facilities

15. Preliminary cost Estimate

16. Preliminary Design Drawings

* Preliminary Design Report shall at least included the listed items for Preliminary Design Approval.

Notes of Meeting

Project	:	IRIX - Milk Production Plant Shenzhen	Reference	:	97236/03/019
Meeting place	:	Shenzhen site office	Date	:	09 March 1998
Date of meeting	:	05 March 1998			
Subject	:	3rd Coordination Meeting (Monthly)			
Present	:	Ir Bill White Ir Richi Li Ir Peter Roy Ir Lisa Man Ir Leo Lai	} } } } }	IRIX (Client) SW (PM) Delcan Process (Process Design)	

Mtg. No.	Item No.		Details	Action By	Date
	1.0		**Previous Minutes - Outstanding / On-going issues**		
12	3.0	9	Preliminary equipment list tabled but not issued - to be confirmed by the client.	PR	06/01
	3.0	10	The stand-by generator would be sized for the cool room and running out the milk cooker thus minimising the generator size.	LL	-
		12	Documents and design brief to be issued next week for review.	LL/ PR	06/01
	2		**Authorities**		
			Nil	-	-
	3		**Design**		
3		1	Design meetings will be held at 10:00am on every Monday in SW Lai King office. (Except 13/4)	Note	-
		2	PPG meeting will be held in Shenzhen site office.	LM	06/01
		3	SW will commission the EIA study. OH&S statement and noise / pollution info req for input.	LM	02/02
		4	Stage 2 design brief to identify submission of Detailed Preliminary Design Approval drawings and specifications to Zone Planning Authority.	BW	06/01

Mtg. No.	Item No.		Details	Action By	Date
	4		**Construction**		
			Nil		
	5		**Contractual**		
			Nil		
	6		**Financial**		
			Nil		
	7		**A.O.B.**		
			Nil		
	8		**Next Meeting**		
			Monday 2nd April 1998 at 10:00 am SW Lai King Office	Note	

Signed :   Date :

cc PW, LL (Fax No 27123653),JL (Fax No 23645287), PK, BL

广州经济技术开发区

穗开管函[1993]12号

[redacted]有限公司"中国混合和装罐设施"工程初步设计的批复

[illegible](广州)有限公司：

广东省石油化工设计院设计完成"中国混合和装罐设施"工程初步设计文件，经一九九三年八月六日会同有关单位进行审查，[illegible]

一、[illegible]

二、[illegible]

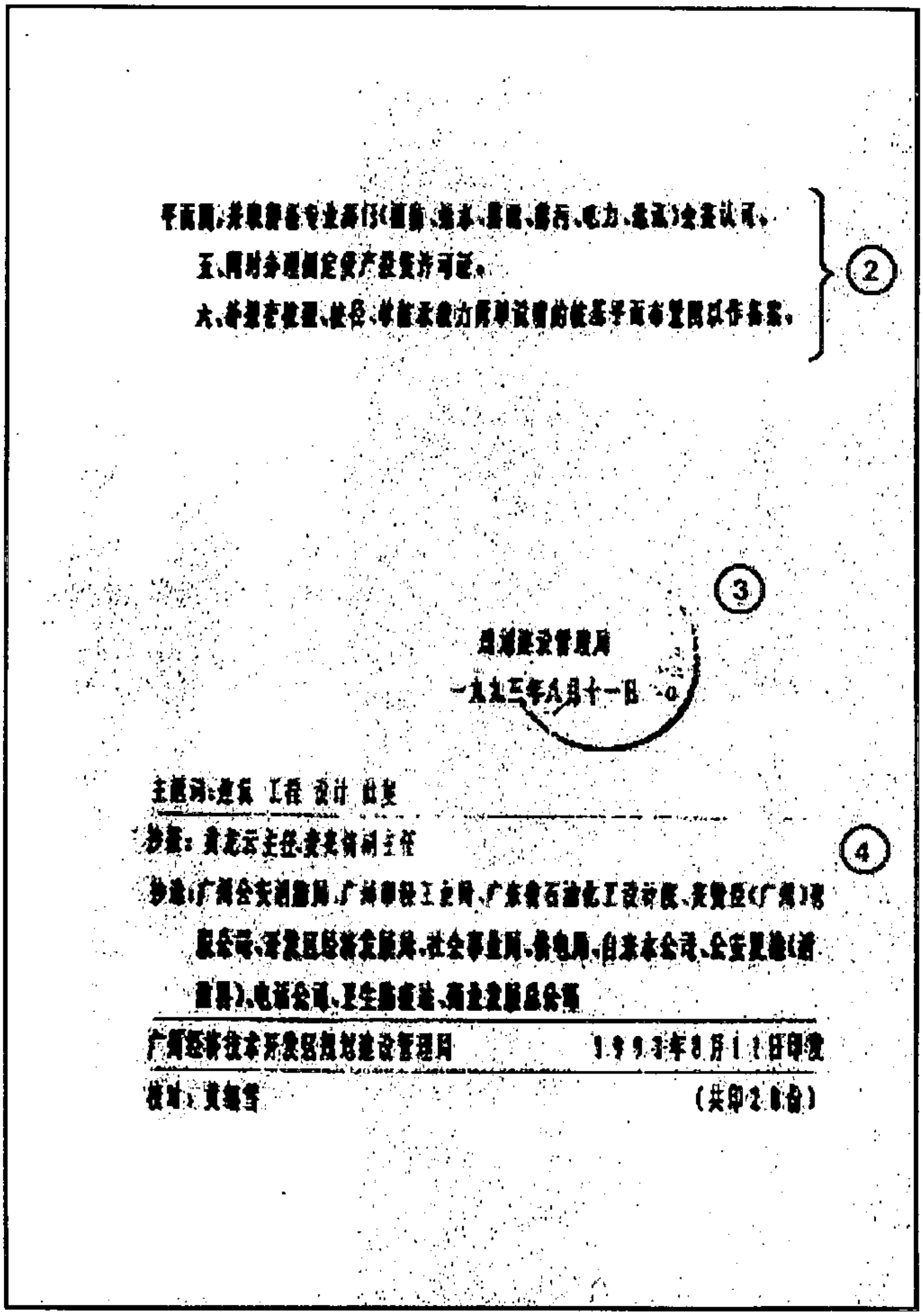
三、[illegible]

四、[illegible]

Project Preliminary Design Approval (sheet 1)

Key

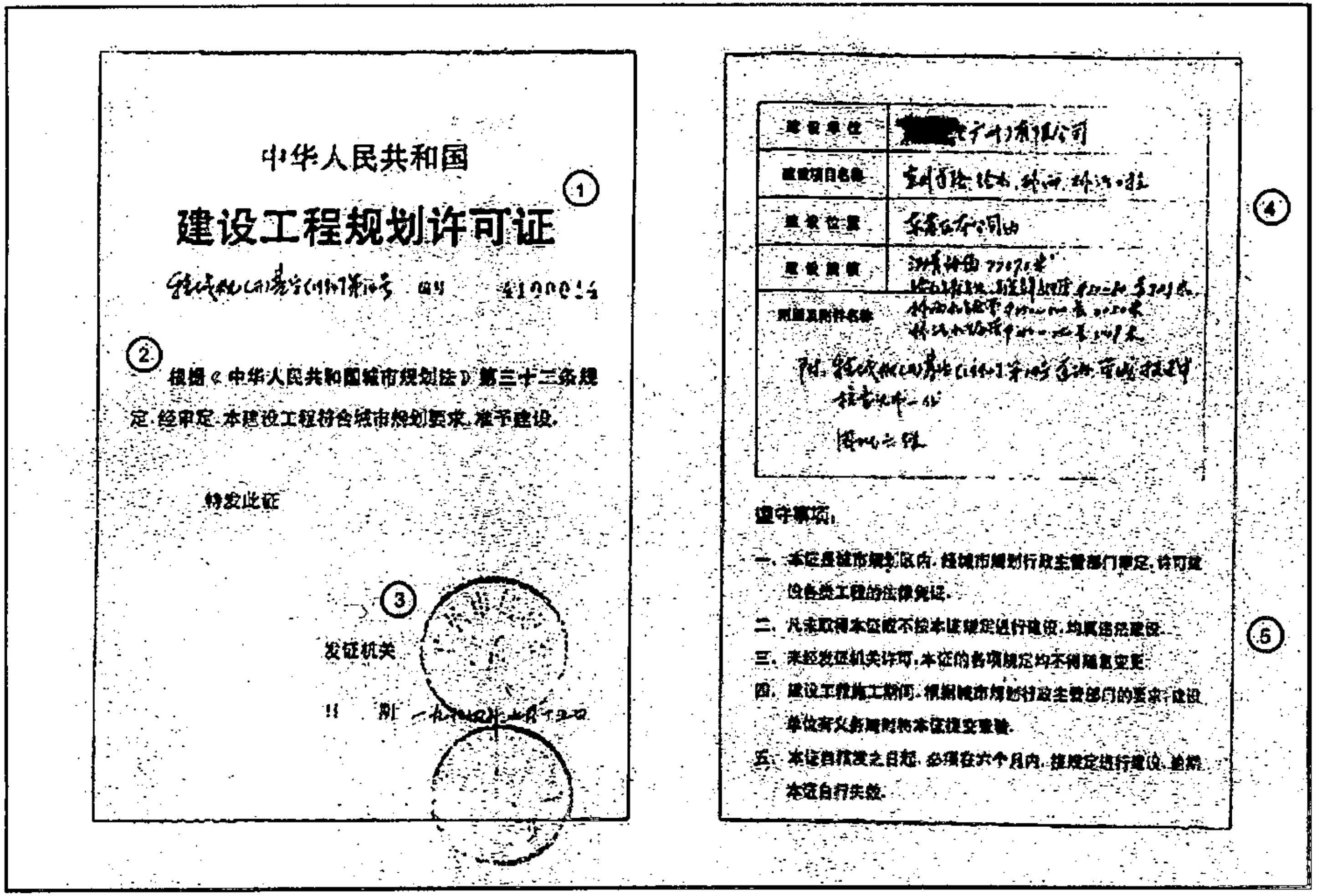
1. Subject (Project preliminary design approval)
2. Approval details



Project Preliminary Design Approval (sheet 2)

Key

2. Approval details
3. Chop of approving authority (GETDD Project Administration and Construction Planning Bureau)
4. Other authorities copied


中华人民共和国

建设工程规划许可证

1

2

根据《中华人民共和国城市规划法》第三十二条规定，经审定，本建设工程符合城市规划要求，准予建设。

特发此证

3

发证机关

日 期

4

建设单位	[redacted] [illegible]有限公司
建设项目名称	[illegible]
建设位置	[illegible]
建设规模	[illegible]
附图及附件名称	[illegible]

5

遵守事项：

一、本证是城市规划区内，经城市规划行政主管部门审定，许可建设各类工程的法律凭证。

二、凡未取得本证或不按本证规定进行建设，均属违法建设。

三、未经发证机关许可，本证的各项规定均不得随意变更。

四、建设工程施工期间，根据城市规划行政主管部门的要求，建设单位有义务随时将本证提交查验。

五、本证自核发之日起，必须在六个月内，按规定进行建设，逾期本证自行失效。

Construction Development Permit

Key

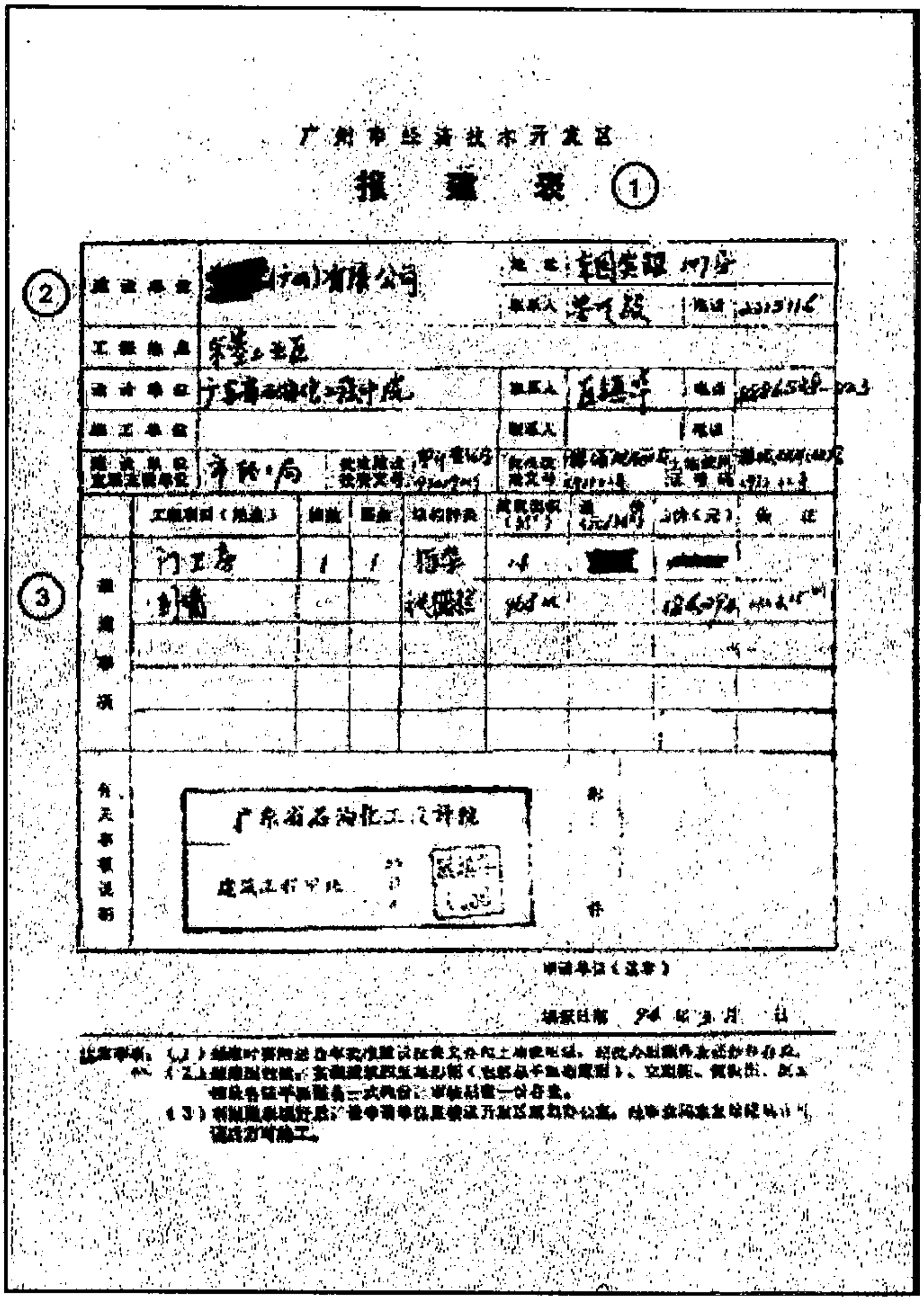
1. Subject (construction development permit)
2. Approval clause
3. Chop of approving authority (a. Guangzhou City Planning Bureau, b. GETDD Planning and Construction Administration Bureau)
4. Details of project
5. Details of approval

Content of Interim Progress Report*

1. Details of Progress
    1.1 Design
    1.2 Drawing Production
    1.3 Off-site Production
2. Programme Update
    2.1 Monthly Programme Update
    2.2 Activity Report
    2.3 Programme Status
    2.4 Activity Variance Analysis
3. Planning and Co-ordination
    3.1 General Activity
    3.2 Schedule of Submission and Consents / Approvals Obtained / Outstanding
    3.3 Organisation
4. Procurement Report
    4.1 Major Imported Material
    4.2 Major Local Material
5. Financial
    5.1 Schedule of Variations with Expenditure Forecast
    5.2 Budget Meeting
6. Milestone Status
    6.1 Milestone achieved
    6.2 Forecast of achievement of missed Milestones
    6.3 Milestone due to be achieved
7. Three Month Rolling Programme

* Interim Progress Report shall at least included the listed items.

Annex B5

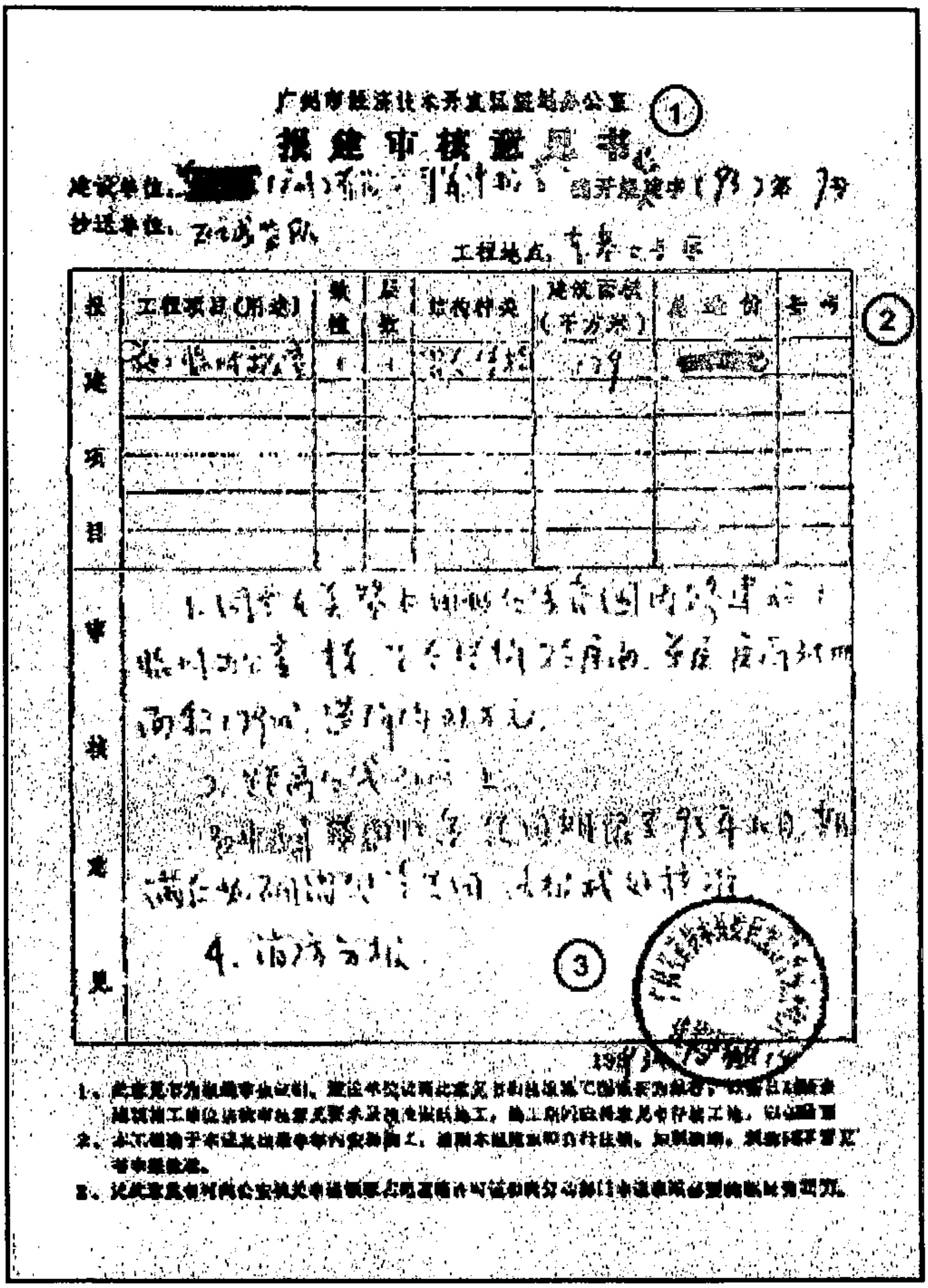

广州市经济技术开发区

报建表 ①

Construction Application

Key

1. Subject (construction application)
2. Details of the project
3. Works applying for consent and Design Institute prepared the detailed design and construction drawings



Construction Application Consent

Key

1. Subject (construction application consent advice)
2. Works submitted for consent
3. Details of consent advices and consenting authority (GETDD Planning and Construction Administration Bureau)

Construction Permit

Key

1. Subject (construction permit)
2. Permit number
3. Chop of approving authority (GETDD Planning and Construction Administration Bureau)

Annex B6

穗开基招字(1997)（ 044 ）号

广州经济技术开发区

建筑安装工程招标申报书 ①

PROJECT OFFICE

建设单位 [redacted] (广州)有限公司 [illegible] (公章) ②

负 责 人 [redacted] (签名)

经 办 人 [redacted]

工程名称 [redacted] [illegible] ③

单位驻地 广州市 [illegible]

建设地址 广州开发区 [illegible]

广州经济技术开发区基建规划办公室制

Construction Tendering Application (sheet 1)

Key

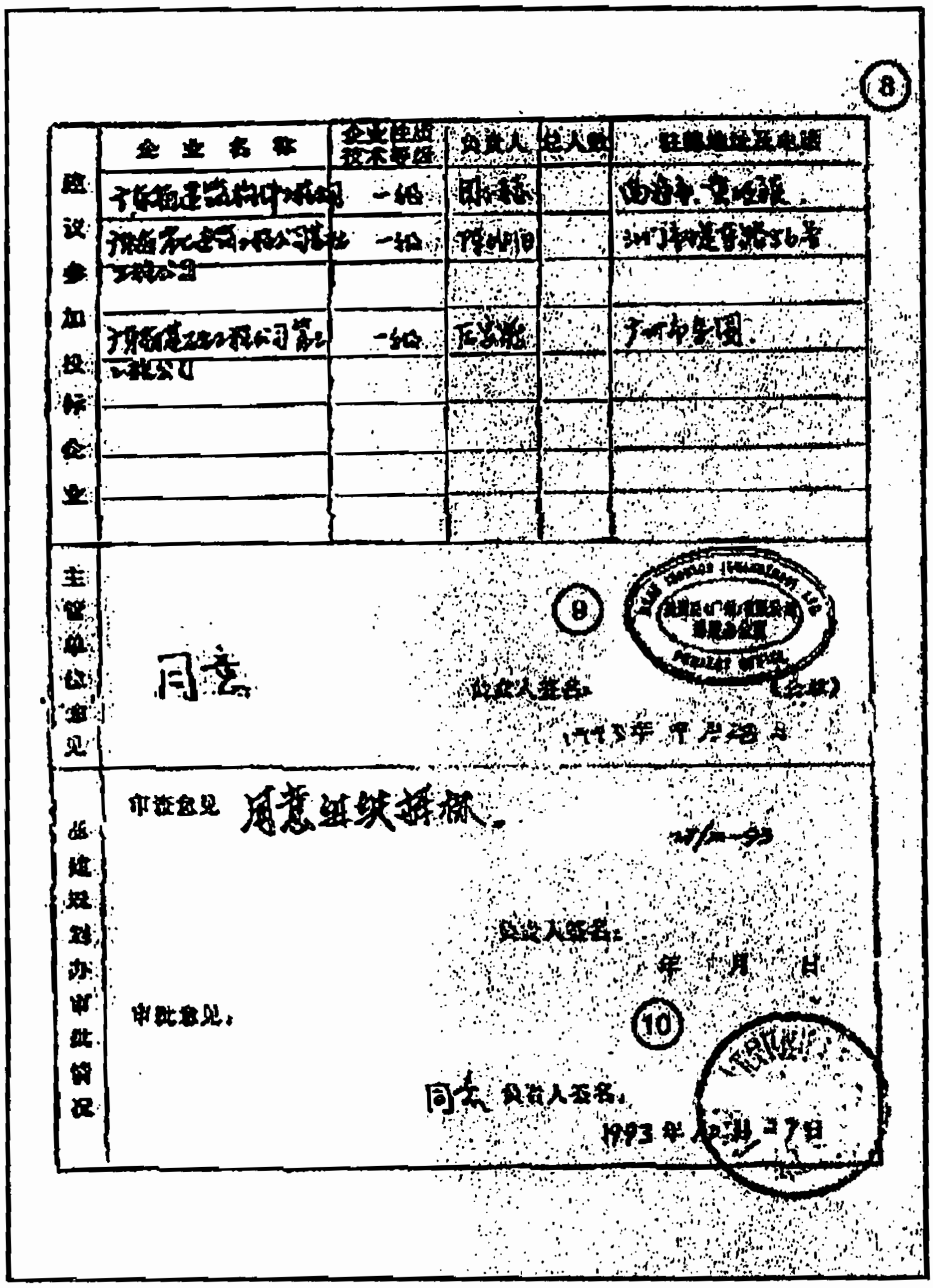
1. Subject (tendering application)
2. Person-in-charge
3. Name and address of project

4	工程简况	建设单位	[redacted](广州)有限公司[illegible]	电话	[illegible]
		设计单位	广东省[illegible]设计院	电话	[illegible]
		招标项目名称	基础打桩工程		
		总包管理单位	[redacted]有限公司	结构（层数/栋数）	[illegible]
		建设总投资（万元）	[redacted]万美元	招标项目总投资（万元）	[redacted]万元
		建设总面积（m²）	14550 M²	招标项目面积（m²）	[illegible]
		计划文号	[illegible]	建筑许可证号	
		工期要求（日历天）	[illegible]天	计划开工日期	93. 10. [illegible]
		资金落实情况	已落实	经办银行	
5	准备情况	1. 设计阶段：打桩施工图已完成 4. [illegible] 2. 场地条件：[illegible] 108.5m 5. [illegible] 3. 设备订货： 6. [illegible] 7. [illegible]			
6	招标工程内容	[illegible]			
7	申请单位意见	1. 招标方式：公开的，不是协议标。 2. 招标时间：1993年9月 3. 推荐意见：[illegible] 1993 年 [illegible] 月 [illegible] 日 4. 联系人：[illegible] （公章）			

Construction Tendering Application (sheet 2)

Key

4. Project details
5. Site condition and drawings prepared
6. Works for tender
7. Tendering method, tender result announcement date and special requirements



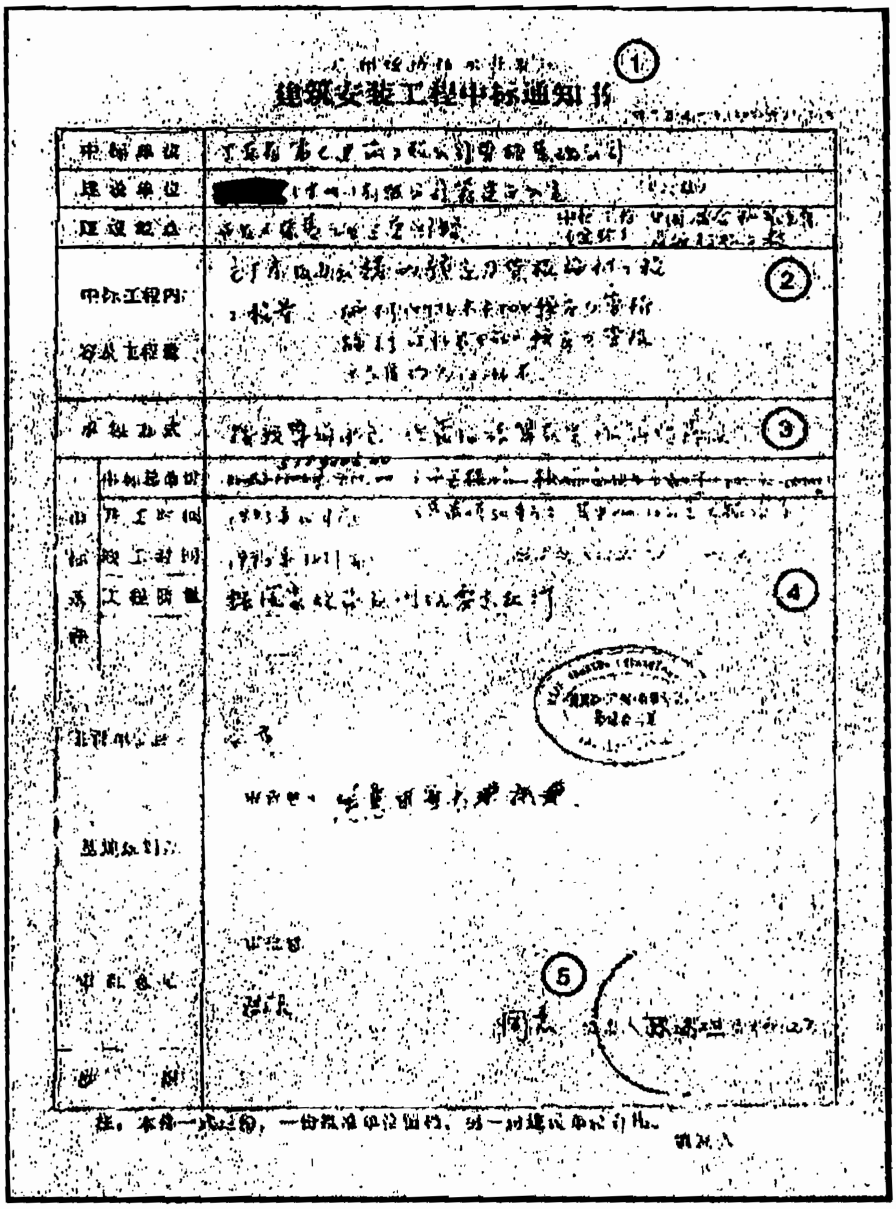
Construction Tendering Application (sheet 3)

Key

8. Contractors invited to bid the contract

9. Chop of project construction office

10. Chop of approving authority (GETDD Planning and Construction Administration Office)

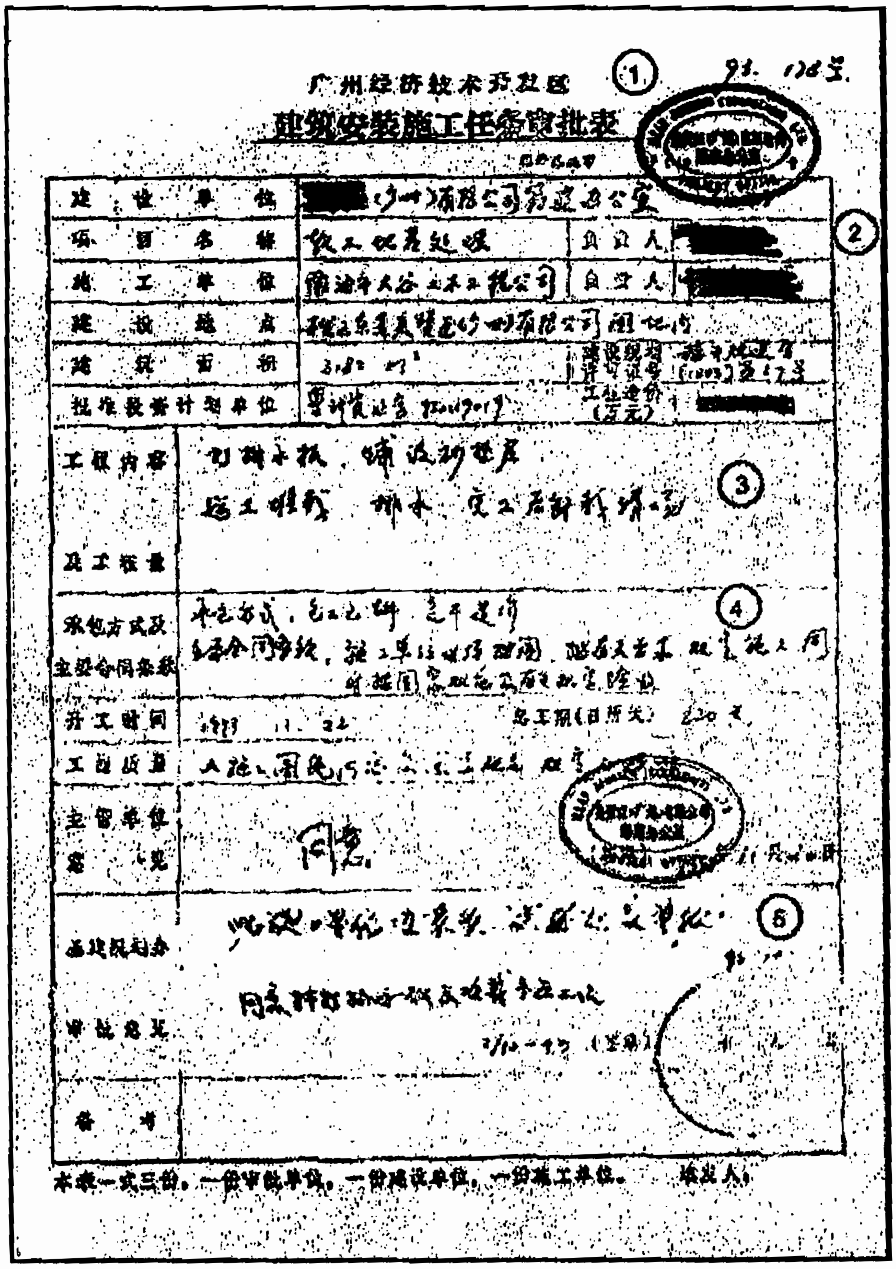


建筑安装工程中标通知书

Tender Acceptance Approval

Key

1. Subject (tender acceptance)
2. Details of works
3. Measurement method
4. Tender price, works commencement date and scheduled working period
5. Chop of approving authority (GETDD Planning and Construction Administration Office)



广州经济技术开发区

建筑安装施工任务审批表

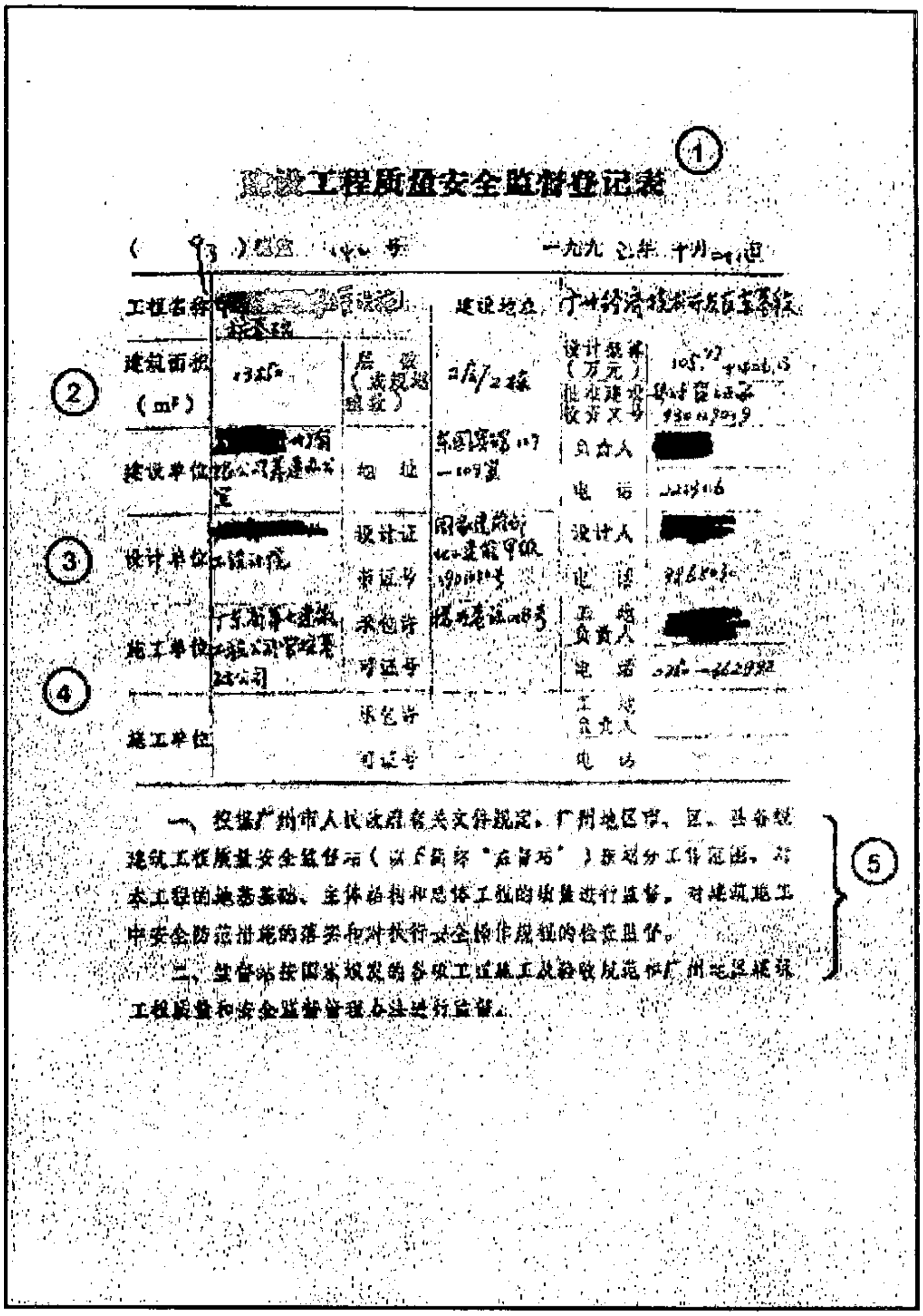
建设单位	[redacted](广州)有限公司筹建办公室		
项目名称	[illegible]	负责人	[redacted]
施工单位	[illegible]	负责人	[redacted]
建设地点	[illegible]		
建筑面积	[illegible]	建设规划许可证号	[illegible]
批准投资计划单位	[illegible]	工程造价(万元)	[redacted]
工程内容及工程量	[illegible]		
承包方式及主要合同条款	[illegible]		
开工时间	[illegible]	总工期(日历天)	[illegible]
工程质量	[illegible]		
主管单位意见	同意。		
基建规划办审批意见	[illegible]		
备考			

本表一式三份，一份审批单位，一份建设单位，一份施工单位。 签发人：

Nominated Tender Acceptance Approval

Key

1. Subject (nominated contractor application)
2. Project general details
3. Scope of works
4. Details of contract and works commencement date
5. Chop of approving authority (GETDD Planning and Construction Administration Office)



建设工程质量安全监督登记表

（ ）监督 号　　一九九 年 月 日

工程名称	[redacted]		建设地点		
建筑面积（m²）		层数（或规划组数）		设计概算（万元）批准建设投资文号	
建设单位	[redacted]	地址		负责人	[redacted]
				电话	
设计单位	[redacted]	设计证书证号		设计人	[redacted]
				电话	
施工单位		承包许可证号		工地负责人	[redacted]
				电话	
施工单位		承包许可证号		工地负责人	
				电话	

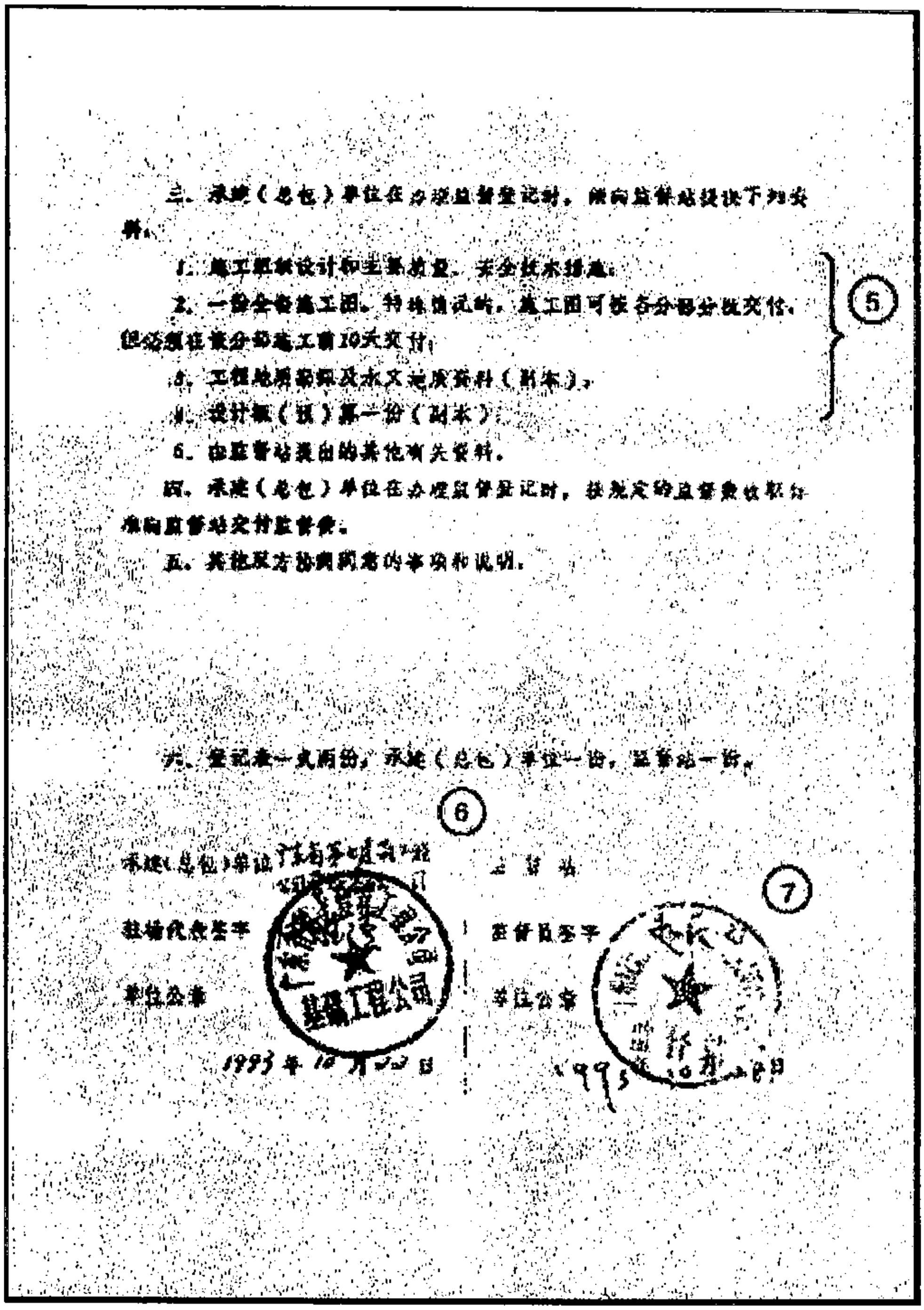
一、根据广州市人民政府有关文件规定，广州地区市、区、县各级建筑工程质量安全监督站（以下简称"监督站"）按划分工作范围，对本工程的地基基础、主体结构和总体工程的质量进行监督，对建筑施工中安全防范措施的落实和执行安全操作规程的检查监督。

二、监督站按国家规定的各项工程施工及验收规范和广州地区建筑工程质量和安全监督管理办法进行监督。

Construction Quality Inspection Record (sheet 1)

Key

1. Subject (construction quality inspection record)
2. Details of works and project
3. Design institute
4. Contractor
5. Requirements of quality and inspection details



三、承建（总包）单位在办理监督登记时，须向监督站提供下列资料：

1、施工组织设计和主要质量、安全技术措施；

2、一份全套施工图。特殊情况时，施工图可按各分部分批交付，但必须在该分部施工前10天交付；

3、工程地质勘探及水文地质资料（副本）；

4、设计概（预）算一份（副本）；

5、由监督站提出的其他有关资料。

四、承建（总包）单位在办理监督登记时，按规定的监督费收取标准向监督站交付监督费。

五、其他双方协商同意的事项和说明。

六、登记表一式两份，承建（总包）单位一份，监督站一份。

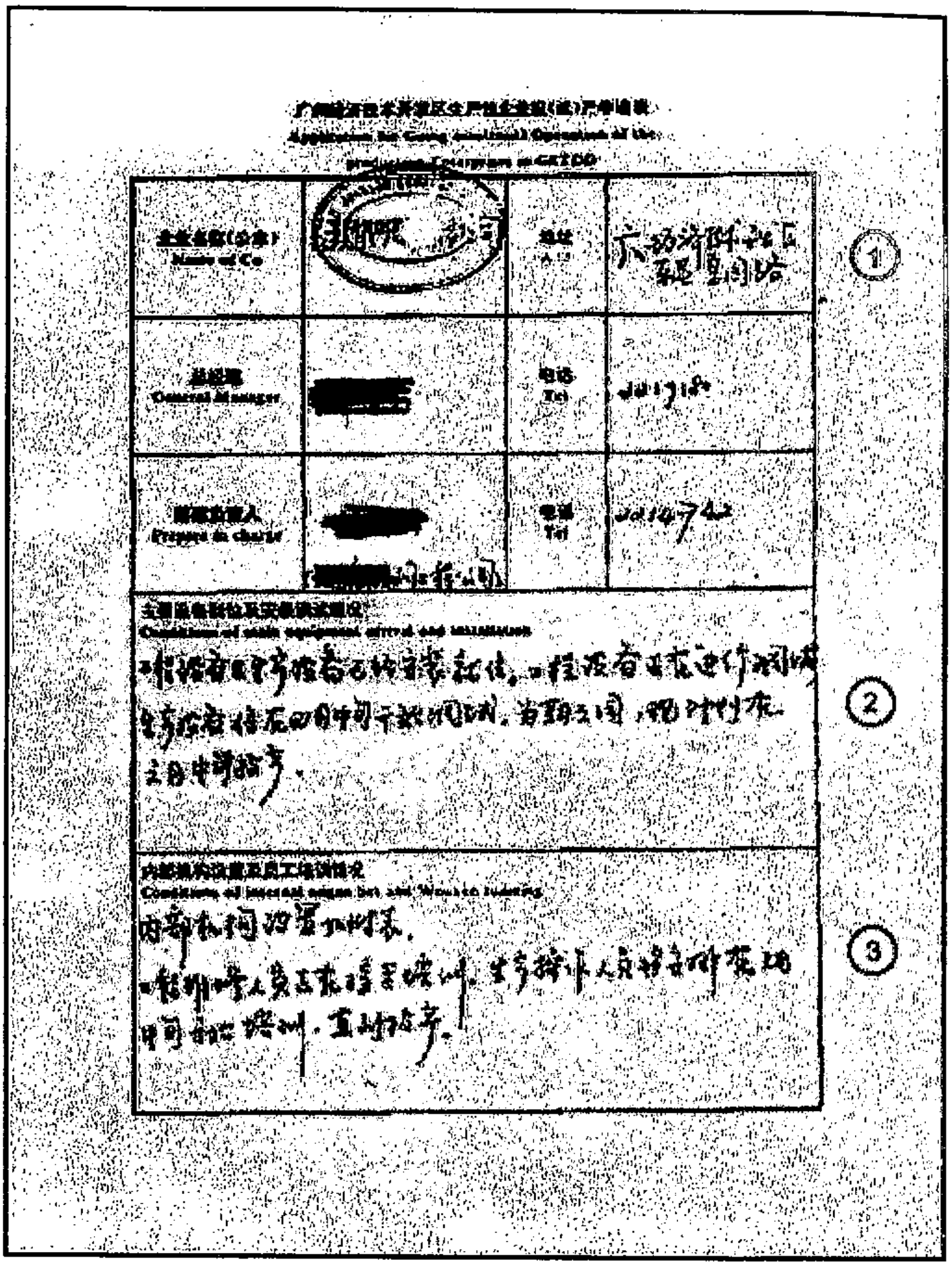
6

承建（总包）单位 广东省第四建筑工程公司	监督站 7
驻场代表签字	监督员签字
单位公章	单位公章
1995年10月22日	1995年10月 日

Construction Quality Inspection Record (sheet 2)

Key

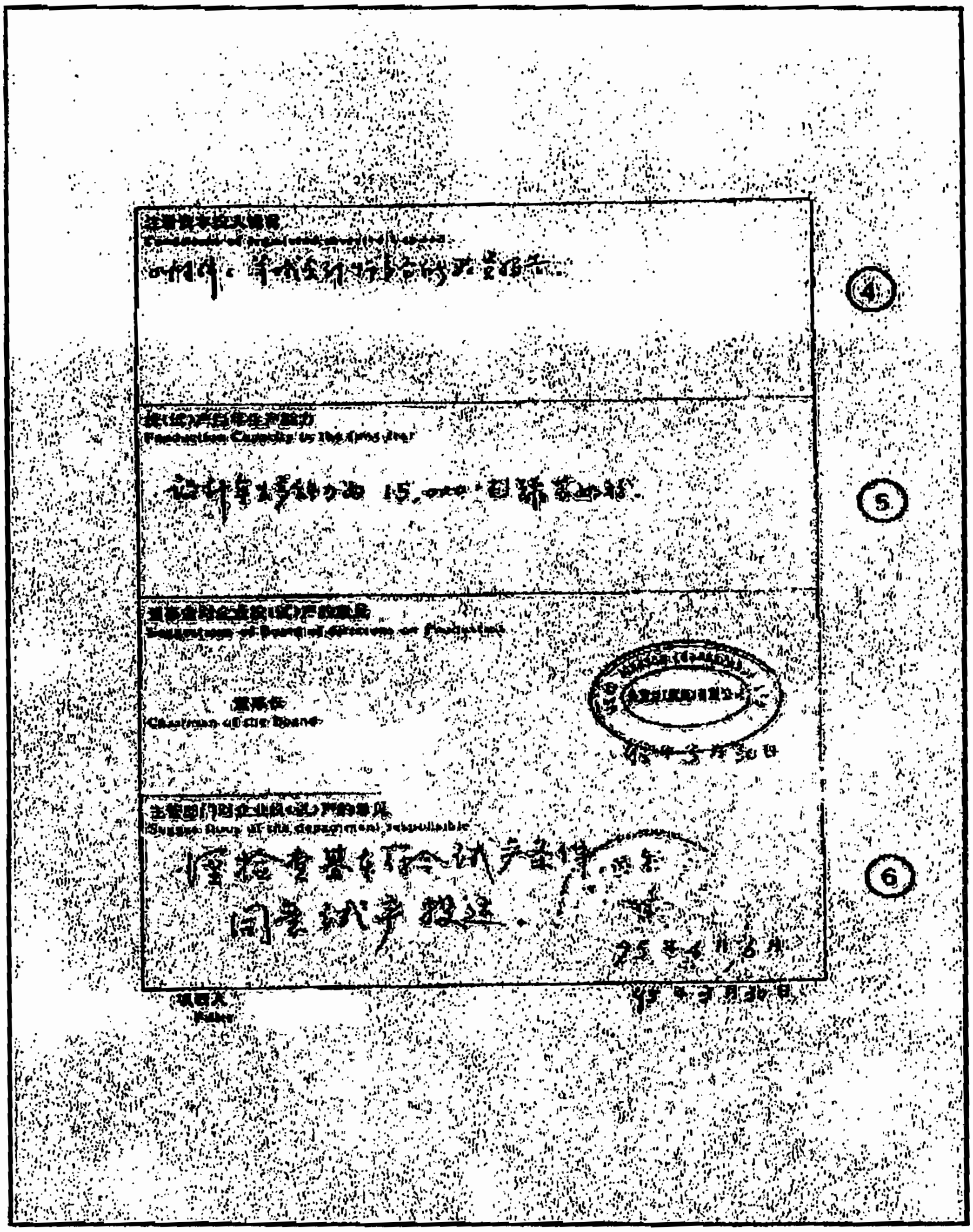
5. Requirements of quality and inspection details
6. Chop of contractor
7. Chop of quality inspection and approving authority (GETDD Construction Quality Inspection Station)



Joint Process Trial Run Record (sheet 1)

Key

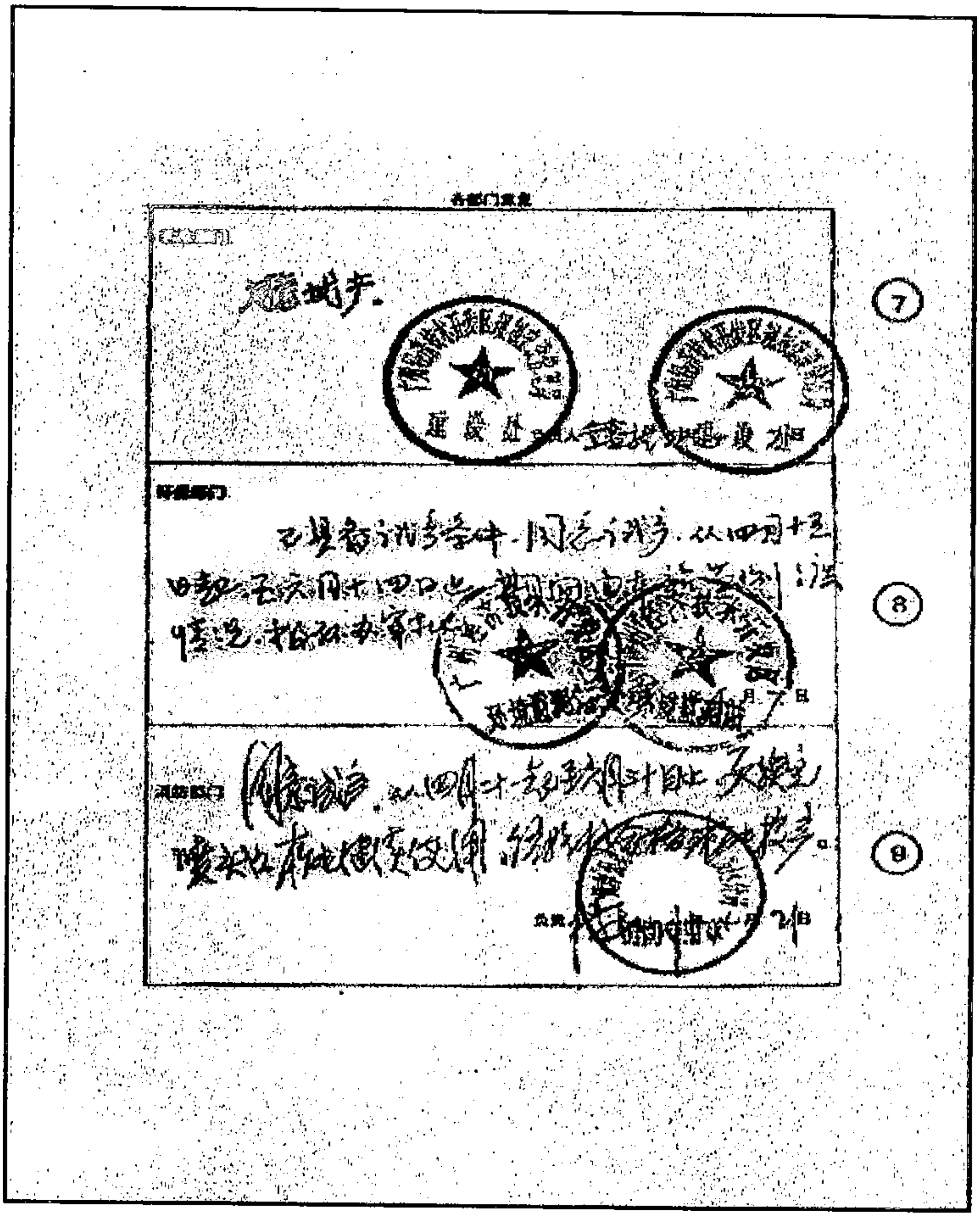
1. Project general details
2. Status of process plants installation
3. Status of production team training



<u>Joint Process Trial Run Record (sheet 2)</u>

Key

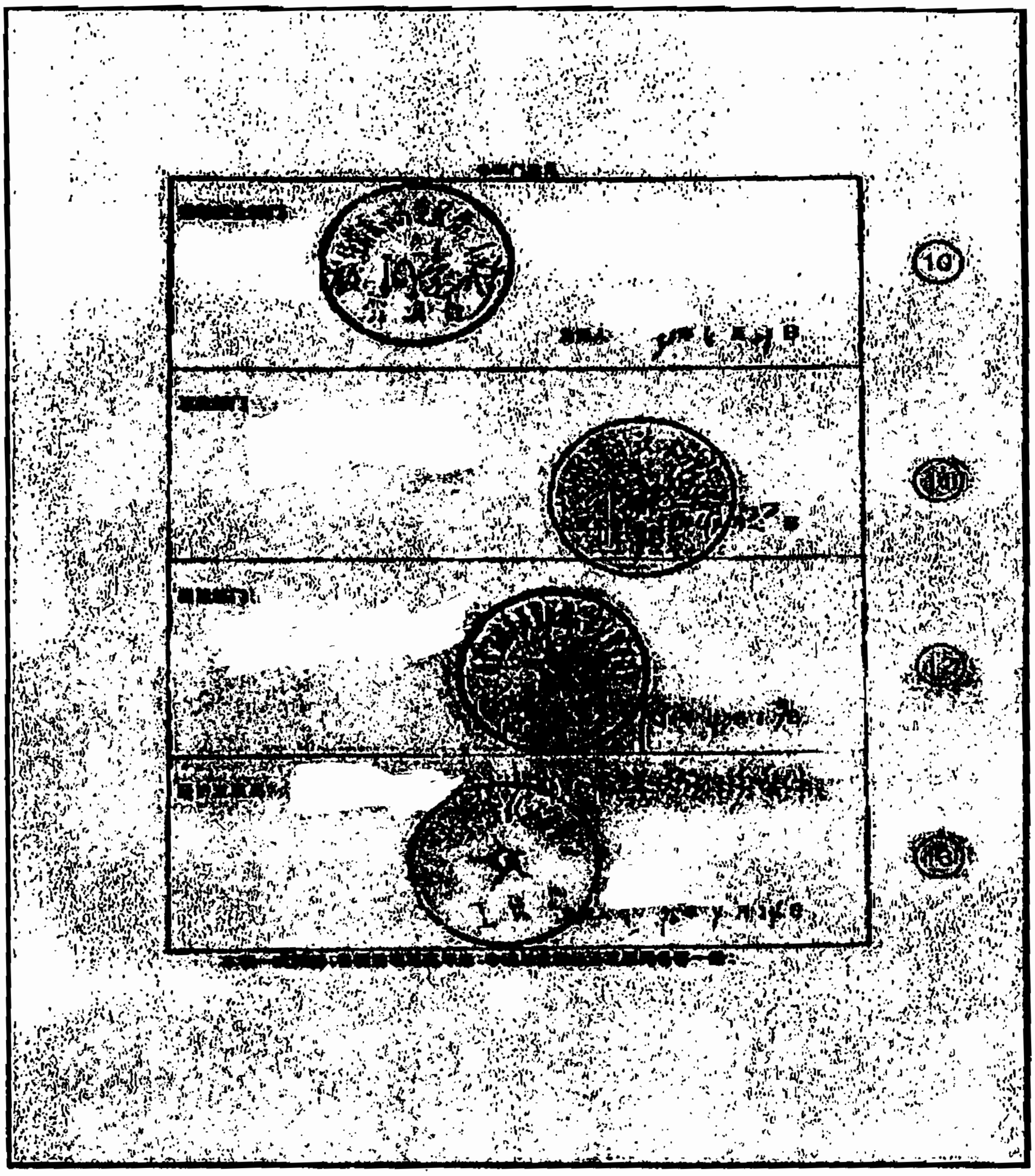
3. Financial status
4. Trial run capacity
6. Chop of industry administration authority (Guangzhou City Light Industry Bureau)



Process Trial Run Record (sheet 3)

Key

7. Chop of construction administration authority (GETDD Planning and Construction Administration Bureau)
8. Chop of environmental protection authority (GETDD Environmental Protection Station)
9. Chop of fire service authority (GETDD Social Security Bureau)



Process Trial Run Record (sheet 4)

Key

10. Chop of labour security administration authority (GETDD Labour Security Bureau)
11. Chop of hygiene administration authority (GETDD Public Hygiene Monitoring Station)
12. Chop of municipal authority (GETDD Municipal Bureau)
13. Chop of local economic commission (GETDD Economic Commission Bureau)

Annex C1

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Annex C2

List of Imported Material

Project Title:	JEN
Subdivision:	Date / Page

Type	Model and Specification	Country of Origin	Nos.	Price (' 000) Unit Price	Price (' 000) Sub - Total	Import Apprv. Date	Import Apprv. Nos.	Custom		Remarks
1) Production Plant										
2) Vehicle										
3) Office Equipment										

Note : Production date should be specified for second hand facilities

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Value Planning Form

Project Title:				JEN										
Subdivision:				Date				Page						
Project Director	Project Manager	Sub- Manager												

Revision	A	B	C	D	E	F	G
Date							

Primary Design Criteria	Weighting of Criteria	Detailed Design Criteria	Weighting of Criteria	Total Weighting of Criteria	Remarks

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Work Breakdown Structure Form

Project Title:				JEN		
Subdivision:				Date		Page
Project Director	Project Manager	Sub- Manager				

Revision / Date	A	B	C	D	E	F	G

WBS Code	Description / Title	Person	Time	Remark
	(Deliverables) (Works Cat.) (Works)			

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Activity Code Scheduleing Form

Project Title:				JEN										
Subdivision:				Date		Page 1								
Project Director	Project Manager	Sub- Manager												

Revision Date	A	B	C	D	E	F	G

ACT Code	Description / Title	Order	Length	Remark
(Code) (Sub-code)	Phase			
	Steps			
	Responsibility			
	Type			
	Activity Sub-ID			

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Project Status Form

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision / Date	A	B	C	D	E	F	G

Project Status / Information	O/A	P	R	Further Details
i) Process details	☐	☐	☐	
process design	☐	☐	☐	
plants layout	☐	☐	☐	
ii) Expected investment sum (investment details)				
iii) Expected operation (labour/shift, shift/day)				
iv) Project approval	☐	☐	☐	
project proposal report	☐	☐	☐	
general project information	☐	☐	☐	
(JV parties, investment sum)				
market analysis	☐	☐	☐	
economical and financial forecast	☐	☐	☐	
production details	☐	☐	☐	
process details	☐	☐	☐	
environmental impacts	☐	☐	☐	
preliminatry schematic layout	☐	☐	☐	
list of plants/material to be import	☐	☐	☐	
v) JV approval	☐	☐	☐	
JV contract/agreement details	☐	☐	☐	
vi) Business approval	☐	☐	☐	

Legend : O/A - Obtained/Available
P - In progress or being prepared
R - Require further input

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

												File
To:												
Initial:												
Copy:												

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Annex C3

Proposed Site Information

Project Title:	JEN
Subdivision:	Date / Page

Proposed site ______________________

Long term cost

- i) foreign investment privileges ______________________
- ii) fuel cost (coal, heavy oil) ______________________
- iii) profit taxation and government charges ______________________
- iv) transportation cost (road, railway, river, airport) ______________________
- v) waste treatment cost ______________________
- vi) local labour supply (quality and quantities) ______________________
- vii) supporting facilities cost (power, water, gas, telephone) ______________________
- viii) import and export charges and procedures ______________________

Production Supports

- i) electricity capacity ______________ V ______________ kVA
- ii) water supply ______________ kℓ per day ______________ purity
- iii) steam supply ______________ T/hr ______________ Bar
- iv) fuel supply ______________ liter per day
- v) waste treatment ______ / ______ Solid / Amount
  ______ / ______ Liquid / Amount

Initial / construction cost

- i) fire service requirement on production plant ______________________
- ii) geographical condition ______________________
- iii) meteorological condition (rainfall, temp, wind, snow) ______________________
- iv) construction tax and approval charges ______________________
- v) land price and land use requirements ______________________ RMB/m^2
- vi) local construction material cost ______________________
- vii) geological condition ______________________
- viii) site formation (road, drainage, pipes, power cable) ______________________
- ix) site layout and area ______________________ m^2
- x) limited plot ratio ______________________
- xi) limited landscaping ratio ______________________

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Production Consumption Data

Project Title:	JEN										
Subdivision:	Date						Page				

Initial data for operation :

Power consumption

i) Required voltage ______ V

ii) Required power ______ kVA

Water consumption

i) Quantity ______ kℓ per day

ii) Quality ______ purity, mineral content

iii) Further treatment : Osmosis ❑; Distillation ❑; Others ______

Steam consumption

i) Quantity ______ T / hr

ii) Pressure ______ Bar

Fuel consumption

i) Diesel ______ liter per day

ii) Heavy oil ______ liter per day

iii) Other ______

Waste generated

i) Solid / Amount ______ / ______

______ / ______

ii) Liquid / Amount ______ / ______

______ / ______

iii) Gas / Amount ______ / ______

______ / ______

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Process Flow Block Diagram

Project Title:	JEN										
Subdivision:	Date					Page					

Production Process Flow :

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Land Usa Application Report Checklist

Project Title:				JEN										
Subdivision:				Date				Page						
Project Director	Project Manager	Sub- Manager												

Revision	A	B	C	D	E	F	G
Date							

Documents preparation / submission S P Date / Remarks

		S	P	Date / Remarks
i)	Project proposal / feasibility study report	❑	❑	
ii)	Project approval	❑	❑	
iii)	Special project details	❑	❑	
iv)	Negotiation with Government for proposed site lot	❑	❑	
v)	Site selection report application	❑	❑	

Document received

		R	C	
i)	Gov. site selection advice	❑	❑	
ii)	Approved site location plan, boundary or coordinate	❑	❑	
iii)	Blueline diagram	❑	❑	
iv)	Reminders of works	❑	❑	

Legend : S - Submitted
P - In progress or being prepared
R - Received
C - Commented

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager Date of Approval

To:												File
Initial:												
Copy:												

Schematic Design Recommendation Checklist

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision / Date	A	B	C	D	E	F	G

Document required to be submitted: A P Approval ref # / date / remarks

		A	P	Approval ref # / date / remarks
i)	Process flow details	❑	❑	
ii)	Project worksmanship specification	❑	❑	
iii)	Material specification	❑	❑	
iv)	Project approval documents	❑	❑	
v)	Project engineering feasibility study	❑	❑	
vi)	Site selection advice	❑	❑	

Document received R C Date / Remarks

		R	C	Date / Remarks
i)	schematic design requriements	❑	❑	
	addressed area :			
	a) set back from site boundary			
	b) project operational safety requirement			
	c) fire protection requirement			
	d) enviromenal protection requirement			
	e) lanscaping requirement			
	f) others			
ii)	schematic design reminders	❑	❑	

Legend : A - Available
P - In progress or being prepared
R - Received
C - Commented

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

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EIA Report Checklist

Project Title:			JEN										
Subdivision:			Date				Page						
Project Director	Project Manager	Sub- Manager											

Revision / Date	A	B	C	D	E	F	G

Information required in a EIA Report :

Investment details

- i) Investment parties
  - Foreign partner ____________________
  - Local partner ____________________
- ii) Arrangement of investment
  - Foreign partner ______ USD / ______ RMB
  - Local partner ______ USD / ______ RMB
- iii) Project feasibility study ____________________

Production details

- i) Type of product and production rate
  - ______ / ______
- ii) Process flow block diagram ____________________
- iii) Primary production machinary list ____________________
- iv) Extpected amount of staff and shifts ____________________
- v) Details of desile fuel machinary ____________________
- vi) Height of chinmey and the diameter ____________________
- vii) Power consumption ____________________
- viii) Major raw material / ingredient type and usage ____________________
- ix) Pollutants ____________________

Project layout details

- i) Project location plan ____________________
- ii) Buildings layout plan ____________________
- iii) Road layout plan ____________________

Note : i) The EIA report is required to be endorsed by a local enviromental specialist. The information listed above are gathered for the peraration of the EIA report.
ii) Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

											File
To:											
Initial:											
Copy:											

Schematic Design Submission Checklist

Project Title:					JEN	
Subdivision:					Date	Page
Project Director	Project Manager	Sub- Manager				

Revision	A	B	C	D	E	F	G
Date							

Documents required for submission		A	P	Approval number / date
i)	Site selection advice	☐	☐	/
ii)	Blue-line diagram	☐	☐	/
iii)	Site survey plan	☐	☐	/
iv)	Schematic design recommendation	☐	☐	/
v)	Design statement of schematic design*	☐	☐	/
vi)	Technical and economic detail*	☐	☐	/
vii)	General layout plan (1:500)*	☐	☐	/
viii)	Building plans (1:100 / 1:200)*	☐	☐	/
ix)	Building elevations*	☐	☐	/
x)	EIA report*	☐	☐	/
xi)	Utilities wiring / pipeline diagram	☐	☐	/
xii)	Comments from government departments	☐	☐	/
	a) planning bureau	☐	☐	
	b) water supply bureau	☐	☐	
	c) Municipal administration bureau (drainage and sewage disposal)	☐	☐	
	d) power supply bureau	☐	☐	
	e) post and communication bureau	☐	☐	
	f) enviromental protection bureau	☐	☐	
	g) fire protection bureau	☐	☐	
	h) labour bureau	☐	☐	
	i) hygiene bureau	☐	☐	

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Land Use Approval Submission Checklist

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision / Date	A	B	C	D	E	F	G

Information required in Construction Land Use application :

Investment details

i) Investment parties

Foreign partner __________

Local partner __________

ii) Arrangement of investment

Foreign partner USD / RMB

Local partner USD / RMB

iii) Project feasibility study __________

Reports details	A	P	Approval number / date
i) Schematic Design Approval	❑	❑	/
ii) EIA Report and Approval	❑	❑	/
iii) Site survey plan	❑	❑	/
iv) various Government approval			
Fire Service	❑	❑	/
Labour Safety	❑	❑	/
Power Supply	❑	❑	/
Water Supply	❑	❑	/
Central Sewage Trestment	❑	❑	/

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Works Coordination Plan

Project Title:		JEN
Subdivision:	Date	Page

Project Director	Project Manager	Sub- Manager			

Revision	A	B	C	D	E	F	G
Date							

Description / Title													Remark

Legend

Task

Coordination	Co
Development	D
Quotation	Q
Engineering	E
Study and review	S
Instrumentation	I
Purchasing	P
Estimate	R
Expediation	X
Requrest for fund	F
Inspection	L
Construction	C

Responsibility

Primary	pr
Secondary	se

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

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Value Analysis

Project Title:		JEN		
Subdivision:		Date	Page	
Project Director	Project Manager	Sub- Manager		

Revision / Date	A	B	C	D	E	F

Description	Quick Completion	Competitive Procurement	Low Risk Design	Maintenance Cost	Reliability	Flexible Output	Fuel Cost	Labour Cost	Aesthetic Factor	Fume Emission	Noise Level	Total Value	Total Cost	Value / Cost
	0.090	0.060	0.150	0.100	0.150	0.750	0.125	0.050	0.060	0.080	0.060		'000	
1.														
2.														
3.														

Legend : p - primary function / need
s - secondary function / need
rs - required secondary function

Note : Value indicated are level of excellence

The above project data is periodically reviewed

and updated during the progress of the project.

Date of Approval

												File
To:												
Initial:												
Copy:												

Project Status Record

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision / Date	A	B	C	D	E	F	G

Project Status / Information	O/A	P	R	Further Details
i) Site selection and analysis	☐	☐	☐	
ii) Advice on site selection (from Gov.)	☐	☐	☐	
iii) Schematic Design Recommendation	☐	☐	☐	
iv) EIA Report	☐	☐	☐	
v) Scehmatic Design Report	☐	☐	☐	
vi) Approval of Schematic Design from :	☐	☐	☐	
a) Fire Service	☐	☐	☐	
b) Labour Safety	☐	☐	☐	
c) Power Supply Company	☐	☐	☐	
d) Water Supply	☐	☐	☐	
e) Central Sewage Trestment	☐	☐	☐	

Legend : O/A - Obtained/Available
P - In progress or being prepared
R - Require input

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

												File
To:												
Initial:												
Copy:												

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Annex C4

Design Code Checklist

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision / Date	A	B	C	D	E	F	G

PRC Design Standard for Preliminary Desing

	Design Code	Title	Required
i)	GBJ 1-86	Standard for Building and Structural Drawings Preparation	☐ ______
ii)	GBJ 103-87	Standard for General Layout Plans Preparation	☐ ______
iii)	GBJ 104-87	Standard for Building Plans Preparation	☐ ______
iv)	GBJ 106-87	Standard for Water Supply and Drainage Drawings Preparation	☐ ______
v)	GBJ 114-88	Standard for Air Conditioning System Drawings Preparation	☐ ______
vi)	JGJ 67-89	Code for Design of Office Building Layout	☐ ______
vii)	GBJ 16-87	Code for Design of Fire Service System in Building Structures	☐ ______
viii)	GBJ 84-85	Code for Design of Fire Service Sprinkler System	☐ ______
ix)	GBJ 116-88	Code for Design of Fire Alarming System	☐ ______
x)	GB 50033-91	Standard for Daylight Design of Industrial Enterprise	☐ ______
xi)	TJ 34-79	Standard for Lighting Design of Industrial Enterprise	☐ ______
xii)	TJ 36-79	Standard for Hygiene Design of Industrial Enterprise	☐ ______
xiii)	GBJ 57-83	Code for Design of Lightening System of Structures	☐ ______
xiv)	GBJ 87-85	Code for Design of Noise Control of Industrial Enterprise	☐ ______
xv)	GBJ 15-88	Code for Design of Building Water Supply and Drainage	☐ ______
xvi)	GBJ 14-87	Code for Design of Outdoor Wastewater Engineering	☐ ______

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Design Code Checklist

Project Title:				JEN
Subdivision:			Date	Page
Project Director	Project Manager	Sub- Manager		

Revision / Date	A	B	C	D	E	F	G

PRC Design Standard for Detailed Design and Inspection

Design Code	Title	Required
GBJ 9-87	Load Code for the Design of Building Structures	❑ ________
GBJ 7-89	Code for Design of Building Foundations	❑ ________
GBJ 10-89	Code for Design of Reinforced Concrete Structures	❑ ________
GBJ 11-89	Code for Design of Seismic Resisted Structures	❑ ________
GBJ 17-88	Code for Design of Steel Structures	❑ ________
GB 50204-92	Code for Construction and Acceptance of Concrete Structures	❑ ________
GBJ 303-88	Standard for Quality Inspection and Assessment of Electrical Installation Works in Building	❑ ________
GBJ 310-88	Standard for Quality Inspection and Assessment of Electrical Installation Works for Electrical Elevator	❑ ________

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager | Date of Approval

To:											File
Initial:											
Copy:											

Drawing Breakdown Structure Form

Project Title:				JEN
Subdivision:				Date / Page
Project Director	Project Manager	Sub- Manager		

Revision / Date	A	B	C	D	E	F	G

DWG No.	Description / Title	Person	Type	Remark

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

												File
To:												
Initial:												
Copy:												

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Annex C 4.3.4

Works Coordination Plan

Project Title:				JEN		
Subdivision:				Date		Page
Project Director	Project Manager	Sub- Manager				

Revision	A	B	C	D	E	F	G
Date							

Legend

Task

Coordination	Co	Engineering	E	Purchasing	P	Requrest for fund	F
Development	D	Study and review	S	Estimate	R	Inspection	L
Quotation	Q	Instrumentation	I	Expediation	X	Construction	C

Responsibility

Primary pr

Secondary se

Description / Title

(Person)

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Cost Breakdown Structure

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision Date	A	B	C	D	E	F	G

Cost Code	Description / Title	RMB ('000)	HKD ('000)	Total (USD) ('000)

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Information Breakdown Structure

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision Date	A	B	C	D	E	F	G

	Description / Title	Person	Time	Remark
Legend a) Client b) PM c) Process d) Architect e) Civil f) E&M g) Storage h) D.I. i) S.U. j) Contractor 1) Project Estab 2) Land Procu 3) Prelim Design 4) Detailed Design 5) Construct				

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
Copy:											

Project Status Record

Project Title:				JEN		
Subdivision:				Date		Page
Project Director	Project Manager	Sub- Manager				

Revision / Date	A	B	C	D	E	F	G

Documents required for submission		A	P	Approval number / date
i)	Preliminary design statements	❑	❑	/
ii)	Blue-line diagram	❑	❑	/
iii)	Site survey plan	❑	❑	/
iv)	Schematic design recommendation	❑	❑	/
v)	Design statement of schematic design*	❑	❑	/
vi)	Technical and economic detail*	❑	❑	/
vii)	General layout plan (1:500)*	❑	❑	/
viii)	Building plans (1:100 / 1:200)*	❑	❑	/
ix)	Building elevations*	❑	❑	/
x)	EIA report*	❑	❑	/
xi)	Utilities connection diagram	❑	❑	/
xii)	Comments from government departments			
	a) planning bureau	❑	❑	
	b) water supply bureau	❑	❑	
	c) Municipal administration bureau	❑	❑	
	(drainage and sewage disposal)	❑	❑	
	d) power supply bureau	❑	❑	
	e) post and communication bureau	❑	❑	
	f) environmental protection bureau	❑	❑	
	g) fire protection bureau	❑	❑	
	h) labour bureau	❑	❑	
	i) hygiene bureau	❑	❑	

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a O.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

												File
To:												
Initial:												
Copy:												

NOT TO BE COPIED WITHOUT PROJECT MANAGER'S PERMISSION

Change Order Form

Project Title:					JEN		
Subdivision:					Date		Page
Project Director		Project Manager	Sub- Manager				
Revision Date	A	B	C	D	E	F	G

i) Request of Change :

Requested by :	Reviewed by :
Date :	Reference :
Description	Reason

ii) Cost and time consequence

Prepared by :	Reviewed by :
Date :	Reference :

Recommended action :

Draw from contingency : ________________

Transfer to contingency : ________________ Project manager : ____________

Client authorisation : Date :

Note : Value / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

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Annex C4.xls

Annex C5

Construction Application Checklist

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision / Date	A	B	C	D	E	F	G

Details of the works

i) Element of works ______________________

ii) Location of the works ______________________

iii) Designed by (Design Institute) ______________________

iv) Cost of work ______________________ RMB

v) Area coverage ______________________ m^2

Documents required for submission	A	P	Approval number / date
i) Project approval	❑	❑	/
ii) Preliminary design approval	❑	❑	/
iii) Land use certificate	❑	❑	/
iv) Site survey plan	❑		
v) Floor Layout plans	❑		
vi) Elevations	❑		
vii) Sections	❑		
viii) Elements details	❑		

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager   Date of Approval

To:											File
Initial:											
Copy:											

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Annex C5.xls

Annex C 5.1

Risk Planning Form

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision Date	A	B	C	D	E	F	G

Problems (Deliverables)	Impact	Likelihood	Severity	Rank	Tracker	Action / Contingency Plan

Note: Severity and possibility ranked from 1 to 10 with decreasing order

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Filing List

Project Title:				JEN										
Subdivision:				Date				Page						
Project Director	Project Manager	Sub- Manager												

Revision Date	A	B	C	D	E	F	G

Filing Code	Description / Title	Revised	Remarks

Note : Value / Reference should be indicated in the blank space of the items

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Annex C5.xls

Information Transmittal Record

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision / Date	A	B	C	D	E	F	G

i) Request of Information / Transmission of Information

Issued to :	Issued by :	
Date :	Reference :	
Description	Document No.	Copies

ii) Drawing Incoming / Outgoing

Issued to :	Issued by :	
Date :	Reference :	
Description	Document No.	Copies

Note : Value / Reference should be indicated in the blank space of the items

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Information Transmittal Form

Project Title:	JEN										
Subdivision:	Date					Page					

Issued to :	Issued by :	
Date :	Reference :	
We transmit herewith the following controlled drawing / design information / documents :		
Description	Document No.	Copies

Please tick as appropriate :

Issue Purpose :

- For Action ☐
- For Approval ☐
- For Comment ☐
- For Construction ☐
- For Information ☐
- Client Approval for Construction ☐
- Other ____________________ ☐

Issued By	Received By
Signature	Signature
Name & Post	Name & Post
Date	Date

Note : Value / Reference should be indicated in the blank space of the items

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:											File
Initial:											
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Project Status Record

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision / Date	A	B	C	D	E	F	G

Design preparation — A P

		A	P	
i)	Process design	☐	☐	
ii)	Builiding and architectural	☐	☐	
iii)	Fire service	☐	☐	
iv)	Electrical and mechanical	☐	☐	
v)	MVAC	☐	☐	
vi)	Plumbing and drainage	☐	☐	
vii)	Roads and drainage	☐	☐	
viii)	Utilities connections	☐	☐	
ix)	Enviromental treatment	☐	☐	
x)	Landscaping	☐	☐	

Off-site Production

		A	P	
i)	Special E&M equipments	☐	☐	
ii)	Process plants	☐	☐	
iii)	Structural steel building	☐	☐	

Construction Application

		A	P	
i)	Office and Production Builiding	☐	☐	
ii)	Storage Builidng (steel structure)	☐	☐	
iii)	Waste Treatment House	☐	☐	
iv)	Liquid CO_2 station	☐	☐	
v)	Boiler tanks	☐	☐	

Legend : A - Available
P - In progress or being prepared
* - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

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and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
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Annex C6

Tender Document Checklist

Project Title:						JEN
Subdivision:					Date	Page
Project Director	Project Manager	Sub- Manager				

Revision / Date	A	B	C	D	E	F	G

Documents required for submission

		A	P
i)	Tender preamble	☑	☐
ii)	Site survey, design principle and working drawings •	☐	☐
iii)	Tendering method and pricing reference	☐	☐
iv)	Amount of pre-construction payment and the payment schedule	☐	☐
v)	Material supply and payment arrangement	☐	☐
vi)	Special requirements on works and workmanship	☐	☐
vii)	Bidder's document requirement	☐	☐
viii)	Tender opening and assessment criteria	☐	☐
ix)	Conditions of contract	☐	☐
x)	Special condition of contract	☐	☐
xi)	Tender base	☐	☐
xii)	Information of tendering and relevant parties	☐	☐

Special requirements

Special workmanship requirements ____________

Details of coordinations to be carried out ____________

Method statement ____________

Payment terms ____________

Legend : A - Available
P - In progress or being prepared
• - Document endorsement by a D.I. or local specialist

Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager ____________ Date of Approval ____________

											File
To:											
Initial:											
Copy:											

Tender Assessment Form

Project Title:				JEN	
Subdivision:				Date	Page
Project Director	Project Manager	Sub- Manager			

Revision	A	B	C	D	E	F	G
Date							

Tenderer : | Rating | Marks

Price

1) Tender Base ________

2) Tender Price ________

Capacity

3) Average turnover of the pervious 5 consecutive years

4) Current Workload

	No.	Total value	Total left
Contract sum larger than ________			
Contract sum from ________ to ________			
Contract sum smaller than ________			

Experience

5) Comparable projects experience — No.

Contract sum larger than ________

Contract sum smaller than ________

Quality

6) Labours status

Direct employ ________

Self-employ ________

Sub-contract ________

7) Amount of professionals

Managerial ________

Technical ________

Supervisory ________

Others ________

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

											File
To:											
Initial:											
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Annex C6.xls

Tender Meeting Assessment Form

Project Title:				JEN										
Subdivision:				Date				Page						
Project Director	Project Manager	Sub- Manager												

Revision Date	A	B	C	D	E	F	G

Question to be asked

1. Is the company ISO 9000 Certified ?
2. What is the planning details of the Project Programme ?
3. What is the planning details of the Site Organization and Site Management?
4. What is the procedure for setting out and dimensional control?
5. Quality Management Planning
6. Health and Safety
7. Works Planning

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Public Utility Connect Checklist

Project Title:				JEN									
Subdivision:				Date			Page						
Project Director	Project Manager	Sub- Manager											

Revision / Date	A	B	C	D	E	F	G

General Project Info

		A	P
i)	Project Approval	☐	☐
ii)		☐	☐
iii)		☐	☐
iv)		☐	☐
v)		☐	☐
vi)		☐	☐
vii)	Bidder's document requirement	☐	☐
viii)	Tender opening and assessment criteria	☐	☐
ix)	Conditions of contract	☐	☐
x)	Special condition of contract	☐	☐
xi)	Tender base	☐	☐
xii)	Information of tendering and relevant parties	☐	☐

Special requirements

Special workmanship requirements ____________

Details of coordinations to be carried out ____________

Method statement ____________

Payment terms ____________

Legend : A - Available
P - In progress or being prepared
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Note : Date / Reference should be indicated in the blank space of the items

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager ____________ Date of Approval ____________

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Annex C 6.4

Work Execution Plan

Project Title:				JEN										
Subdivision:				Date				Page						
Project Director	Project Manager	Sub- Manager												

Revision / Date	A	B	C	D	E	F	G

Works Item : ______________________

Permits / Info / Consideration / Step required

i) ______________________ v) ______________________

ii) ______________________ vi) ______________________

iii) ______________________ vii) ______________________

iv) ______________________ viii) ______________________

Government involve : Yes ❑ ______________ No ❑

Works required :
- Info submission ❑ ______________
- Witness ❑ ______________
- Approvals ❑ ______________
- Mat'l submissions ❑ ______________
- Mat'l testing ❑ ______________
- Others ❑ ______________

Coordination with other parties required : Yes ❑ No ❑

Parties to coordinate :
- Client ❑
- Engineers ❑ ______________
- Contractors ❑ ______________
- Others ❑ ______________

Method Statment :
i) ______________________ iv) ______________________

ii) ______________________ v) ______________________

iii) ______________________ vi) ______________________

The above project data is periodically reviewed

and updated during the progress of the project.

Signed by Project Manager / Sub-Manager ______________ Date of Approval ______________

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Fire Service Inspection

Project Title:				JEN
Subdivision:			Date	Page
Project Director	Project Manager	Sub- Manager		

Revision / Date	A	B	C	D	E	F	G

General Information

1) Class of Facility — Class A / B / C Factory
2) Level / Scale of Facility — Nation / City / Village Level
3) Type of Project — New / Alteration / Extension Works
4) Investment — Joint Venture / Local / Government
5) Electicity Loading — Class 1 / 2 / 3
6) Electivry usage — ______
7) Water source — ______
8) Size of water pipe — ______
9)

Building name	Structure type	Fire rating	No. of floors	Height	G.F.A.	Fire Hazard class
						A / B / C
						A / B / C

Fire Service System

10) Sprinkler System

Building name	Sprinkler head coverage	Water Pressure	Total Coverage	Brand of Sprinkler	Model

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager — Date of Approval

To:											File
Initial:											
Copy:											

Fire Service Inspection

Project Title:				JEN
Subdivision:			Date	Page
Project Director	Project Manager	Sub- Manager		

Revision Date	A	B	C	D	E	F	G

11) Fire Alarming System

Building name	Smook detectors	Total Coverage	Brand of Sprinkler	Model

12) Fire Hose Reel

Location	Number	Water Pressure	Brand of Sprinkler	Model

13) Emergency Lighting

Location	Coverage	Brand	Model

14) Other Fire Service System

The above project data is periodically reviewed
and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

To:												File
Initial:												
Copy:												

Project Completion Inspection Checklist

Project Title:				JEN		
Subdivision:				Date	Page 1	
Project Director	Project Manager	Sub- Manager				

Revision / Date	A	B	C	D	E	F	G

Engineering Works

		Yes	No
1)	Contract works completed	❑	❑
2)	Outstanding works schedule issued	❑	❑
3)	Outstanding works completed	❑	❑
4)	As-constructed drawing completed	❑	❑
5)	Maintenance contract for the project issued	❑	❑
6)	Cleaning to required standard	❑	❑
7)	Removal of unwanted materials and debris	❑	❑
8)	Commissioning of engineering service completed	❑	❑

Testing

1)	Production plants tested and certificates issued	❑	❑
2)	Equipment tested and certificates issued (lifts, loading docks, shutters, others)	❑	❑
3)	Insurer's certificate issued (lifts, loading docks, others)	❑	❑
4)	Fire-fighting system tested, signed off and certificate issued	❑	❑
5)	Fire alarm system tested, signed off and certificate issued	❑	❑
6)	Fire escape route drilled	❑	❑
7)	Public utility supplies inspected and signed off	❑	❑

Regulations

1)	Building regulation consent signed off	❑	❑
2)	Occupation certificate signed off	❑	❑
3)	Health and safety consent signed off	❑	❑
4)	Planning consent complied	❑	❑
5)	Controlled chemicals storage approved and permit issued	❑	❑

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Date of Approval

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Initial:											
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Project Completion Inspection Checklist

Project Title:				JEN										
Subdivision:				Date				Page 2						
Project Director	Project Manager	Sub- Manager												

Revision Date	A	B	C	D	E	F	G

<u>Regulations</u>

		Yes	No
6)	Dispose of controlled chemicals approved and permit issued	☐	☐
7)	Licenses to store gases	☐	☐
8)	License to use artesian well	☐	☐
9)	Adoption of highways, estate roads, and walkways by local authorities	☐	☐
10)	Consent to erect and maintain flag-poles	☐	☐
11)	Consent to erect illuminated signed	☐	☐

The above project data is periodically reviewed and updated during the progress of the project.

Signed by Project Manager / Sub-Manager

Date of Approval

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Initial:											
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Earned Value Analysis

Project Title:				JEN										
Subdivision:				Date				Page						
Project Director	Project Manager	Sub- Manager												

Revision Date	A	B	C	D	E	F	G

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Project Status Record

Project Title:				JEN									
Subdivision:				Date				Page					
Project Director	Project Manager	Sub- Manager											

Revision / Date	A	B	C	D	E	F	G

	A	P	
Tendering			
i) Tender Documents	❑	❑	
ii) Tender Approval	❑	❑	
iii) Tender Assessment	❑	❑	
iv) Electrical and mechanical	❑	* ❑	
v) MVAC	❑	❑	
vi) Plumbing and drainage	❑	❑	
vii) Roads and drainage	❑	❑	
viii) Utilities connections	❑	❑	
ix) Enviromental treatment	❑	❑	
x) Landscaping	❑	❑	
Off-site Production			
i) Special E&M equipments	❑	❑	
ii) Process plants	❑	❑	
iii) Structural steel building	❑	❑	
Construction Application			
i) Office and Production Builiding	❑	❑	
ii) Storage Builidng (steel structure)	❑	❑	
iii) Waste Treatment House	❑	❑	
iv) Liquid CO_2 station	❑	❑	
v) Boiler tanks	❑	❑	

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Date of Approval

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Project Cost Status Report

Project Title:					JEN										
Subdivision:					Date					Page					
Project Director	Project Manager	Sub- Manager													

Revision / Date	A	B	C	D	E	F	G

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Signed by Project Manager / Sub-Manager

Date of Approval

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Annex A 6.11t

Annex C 6.11

Performance Trend Analysis Form

Project Title:				JEN										
Subdivision:				Date				Page						

Project Director	Project Manager	Sub- Manager			

Revision Date	A	B	C	D	E	F	G

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Site Instruction Form

Project Title:				JEN										
Subdivision:				Date				Page						
Project Director	Project Manager	Sub- Manager												

Revision	A	B	C	D	E	F	G
Date							

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Variation Order Form

Project Title:		JEN										
Subdivision:		Date	Page

Project Director	Project Manager	Sub- Manager			

Revision / Date	A	B	C	D	E	F	G

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