PREVALENT TENDER PREPARATION PRACTICES FOR BUILDING CONSERVATION WORKS

by

LEE QIN YIN

Thesis submitted in fulfillment of the requirements
for the degree of
Master of Science

May 2009

AMALAN LAZIM PENYEDIAAN TENDER BAGI KERJA-KERJA PEMULIHARAAN

oleh

LEE QIN YIN

Thesis yang diserahkan untuk
memenuhi keperluan bagi
Ijazah Sarjana Sains

Mei 2009

ACKNOWLEDGEMENT

I would like to thank several people who helped and inspired me in the course of my study and research for my Master's degree.

First, a very special 'Thank you' to my main supervisor, Sr Lim Yoke Mui, lecturer in Quantity Surveying, School of Housing, Building and Planning, Universiti Sains Malaysia. Her personal enthusiasm for research motivated all her advisees, including me. She was always accessible for consultation and her constant assistance made research life smooth and rewarding for me.

I would like to express my deep and sincere gratitude to my co-supervisor, Dr A. Ghafar Ahmad, Associate Professor of Interior Design, School of Housing, Building and Planning, Universiti Sains Malaysia. His extensive knowledge and understanding of building conservation work, and his encouragement and guidance helped me greatly in my research and thesis preparation.

For his valuable advice and assistance during my long thesis-writing sessions, I am grateful to Dr Khoo Boo Teik, Associate Professor, School of Social Sciences, Universiti Sains Malaysia.

My entire extended family was highly supportive. My brothers, sisters and some cousins providing a loving environment that sustained my academic endeavour.

Finally, I cannot thank my parents enough. They bore me and raised me, taught me and loved me. To them I dedicate this thesis.

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LIST OF ABBREVIATION

QS	Quantity Surveyor
BQ	Bill of Quantities
UNESCO	United Nations Educational, Scientific and Cultural Organisations
ICOMOS	International Council on Monuments and Sites
RICS	The Royal Institution of Chartered Surveyors
BSC	Building Surveyors & Consultants
HABS	Historical Architectural Building Survey
XRF	X-Ray Fluorescence
US	United States
PAM	Malaysian Institute of Architects/ Persatuan Akitek Malaysia
PWD	Public Works Department
CIDB	Construction Industry Development Board
SMM	Standard Methods of Measurement
C&S	Civil and Structure
M&E	Mechanical and Engineer
BQSM	Board of Quantity Surveying Malaysia
MPPP	Municipal Council of Penang Island/ Majlis Perbandaran Pulau Pinang
NGO	Non-Governmental Organizations
BCIS	Building Cost Information Service

AMALAN LAZIM PENYEDIAAN TENDER BAGI KERJA-KERJA PEMULIHARAAN

ABSTRAK

Projek pemuliharaan bangunan kian bertambah setelah bandar George Town dan Melaka berjaya diiktirafkan sebagai tapak warisan dunia. Banyak peluang telah diperolehi oleh pakar-pakar dalam sektor pembinaan termasuk jurukur bahan (JUB) untuk melibatkan diri dalam bidang yang jarang diterokai pada masa dahulu ini. Walau bagaimanapun, industri berpendapat bahawa JUB sering mengaplikasikan kepakaran yang dipraktikkan dalam projek pembinaan baru terhadap projek pemuliharaan bangunan dengan semata-matanya. Dengan itu, kos-kos atau item-item yang kritikal bagi projek pemuliharaan mungkin tercicir atau terlupa diambil perhatian oleh JUB. Oleh hal yang demikian, untuk mengetahui amalan praktis JUB, kajian ini bertujuan untuk mengenalpasti proses-proses penyediaan tender, isu-isu yang dihadapi dan juga faktor-faktor yang boleh menjejaskan ketepatan harga tender bagi projek pemuliharaan bangunan. Data-data dikumpul dengan menggunakan soal selidik secara pos, temuramah dan sumber-sumber sekunder. Pihak yang terlibat dalam kajian soal selidik ialah JUB dan kontraktor pembinaan yang berpengalaman dalam projek pemuliharaan. Temuramah telah dilancarkan terhadap juruukur bahan, kontraktor pembinaan, akitek dan pakar pemuliharaan yang terpilih. Penemuan-penemuan daripada tinjauan tersebut telah dianalisis bersama dengan maklum balas yang dikumpul daripada temuramah. Kajian ini menunjukkan bahawa JUB seharusnya mahir tentang kaedah pembinaan pemuliharaan, teknik-teknik pemuliharaan serta turutan kerja yang kompleks bagi projek pemuliharaan sekiranya

JUB ingin menyediakan tender dokumen yang lengkap bagi projek tersebut. Sementara itu, pengetahuan dalam *Historical Architectural Building Survey* (HABS), kajian dilapidasi dan laporan penyelidikan awal adalah praktis tambahan yang perlu diambil perhatian oleh JUB. Selain tu, industri berharap dapat menderafkan satu kontrak binaan yang baru dan bersesuaian dengan projek pemuliharaan. Kajian ini menyimpulkan bahawa amalan-amalan yang dipraktikkan oleh professional JUB dalam bidang pemuliharaan masih mempunyai ruang yang besar dan perlu dipertingkatkan lagi. Selain itu, JUB harus mengambil seribu langkah serta berusaha untuk membangunkan pengetahuan dan kemahiran supaya menjadi cekap dalam bidang pemuliharaan bangunan ini.

PREVALENT TENDER PREPARATION PRACTICES FOR BUILDING CONSERVATION WORKS

ABSTRACT

Due to the successful joint listing of George Town and Malacca, conservation of heritage buildings has been ever-increasing. This creates more opportunity for consultants in the built environment including Quantity Surveyor (QS) to be involved in what was previously an uncommon area of work. However, the industry opines that the QS is merely transferring his expertise in new building practices to building conservation works. This method, though prevalent, tends to overlook the costs or items of highly specialised works that are not present in new construction but are critical to conservation work. From the early stages of conservation work to the end of construction, QS's input is crucial in tendering process where QS is solely responsible in preparing the tender document that has an impact on awarded contract sum and the subsequent post contract administration. As such, to better understand the current practices of QS, this study investigates current tender preparation processes, key issues and variables that are crucial to building conservation work. The data and information for analysis were collected using a postal questionnaire survey, semi-structured interviews and secondary sources. The survey respondents were quantity surveying and contracting firms with previous experience in conservation projects. Semi-structured interviews were held with selected QSs, building contractors and conservation experts (conservation architects and building conservationists). Findings from the survey were analysed together with the feedback and comments from the interviews. This study found that in order to prepare good tender documents for conservation projects, the QS should be familiar with

conservation construction methods, restoration techniques and complex work sequences specific to conservation works. Meanwhile, better understanding towards Historical Architectural Building Survey (HABS), dilapidation survey and reconnaissance report are the additional practices that should be taken into account by QS. Also, construction industry should look forward to draft a new standard form of building contract specially for conservation works. This study concludes that the practices of professional quantity surveyors in the area of building conservation has much room for improvement and the QS should take all steps to develop the knowledge and skills needed to be proficient in this area.

CHAPTER 1

INTRODUCTION

1.1 Background

The professional quantity surveyor (QS) is today involved in many sub-fields other than construction, such as oil and gas, petro-chemical, aeronautical and civil works, mining, manufacturing, transportation, and shipping. This diversification arose as the profession of quantity surveying adapted to changes in industry requirements. Even in the field of construction, the QS encounters new responsibilities in emerging sub-sectors such as building conservation work. However, owing to the different methods and processes applied to conservation and restoration as compared to new construction, the industry is liable to find that the typical QS has little experience in building conservation projects.

From the perspective of quantity surveying, the most critical argument against conservation is "cost". The conservation of historic buildings requires additional layers of bureaucratic approval and perceived costs that constitute burdens on clients and building contractors (Dann and Wood, 2004). It is a perception that, the implementation of conservation typically demands a considerable amount of capital as it is believed that it is more costly to repair and maintain old buildings than modern buildings mainly due to the types of construction encountered, and costs of labour and materials (Brandon, 1982). In addition, a conservation project has a greater tendency to go over the budget than a non-conservation project. Yet, precisely these concerns with costs call for the QS's expert skills in budgeting and costing of conservation project.

The QS plays an important role and has great responsibilities from the early stages of conservation works until the end. From Ashworth and Hogg (2007), Abdullah and Haron (2007) and Low and Kok (1997), the basic services provided by the QS may be summarised as follows:

1. Preparation of a preliminary estimate and cost plan
2. Cost planning
3. Procurement advice
4. Measurement and quantification
5. Preparation of bills of quantities (BQ) and tender documents
6. Preparation of tender reports and contract documents
7. Negotiation with contractor
8. Cost control during construction
9. Valuation of works for interim valuations and certificates
10. Financial statements
11. Preparation of final accounts and agreement, and
12. Settlement of contractual claims

In order to prepare a good tender document, the QS must appreciate the full range of works and consider all aspects of the work, including practical construction methods, restoration techniques and work sequences. In the preparation of a tender for building conservation, the QS must carefully consider the specificity of non-standard items and demarcate the unique scope of conservation work. Involvements of QSs in conservation projects have raised many issues regarding standardisation. For example, the lack of standardisation of preliminaries bills, BQ, pricing, and method of checking is always perplexing to the QS. As such, this area of quantity surveying

deserves more research to clarify the ways by which the QS would be able to increase his knowledge, skill and professionalism in administering conservation projects. In Malaysia, this need has become urgent since Malacca and George Town were listed on 7 July 2008 as historical cities listed under UNESCO's World Heritage Sites.

1.2 Research problems and statement

According to the research conducted by Bridger (1996), pricing conservation work is the most critical task the QS should perform. Not only would the QS face difficulties in ensuring the accuracy of pricing, conservation work is also perceived to be significantly riskier than new building work (Mansfield and Reyers, 2000). The pricing expertise of QS is required to manage a successful conservation project because such a project typically demands a non-standard scope of work and a different approach to management (Ahuja and Campbell, 1988). Despite conservation scope of work being non-standard, the industry opines that the QS is merely transferring his expertise in new building practices to building conservation work. This view, though prevalent, tends to overlook the costs or items of highly specialized works that are not present in new construction but are critical to conservation work. In addition, it is insufficient for the QS to prepare tender documents for conservation works merely by using the standard documents for new building work that do not reflect actual needs and special processes in conservation work. Anecdotal evidence (viewpoint gained from preliminary discussion with building conservationist and QS) indicates that this is currently happening in Malaysia's industry with the result that ill-prepared documents have caused cost overruns and contractual disputes during post-contract stages. By evaluating the

merits of the methods used by Malaysian QSs, this study raises a fundamental research question: “What are the industry practices concerning the preparation of tender document and pricing for building conservation work?”

1.3 Research aim and objectives

Following from the research question, this thesis aims to investigate the existing practices in the tender preparation stage for building conservation works and to achieve this, two objectives are laid out as follows:

1. To indicate QS’s role and responsibilities in tender preparation practices for building conservation works.
2. To identify the existing tender preparation processes for building conservation works.
3. To determine the pricing variables and issues in pricing tenders for building conservation works.

1.4 Outline of research methodology

With a focus on the methods used by the QS in preparing tender document and pricing for conservation work, the research for this study was principally organised to collect data through a combination of a questionnaire survey and semi-structured interviews. At the onset, the researcher held informal discussions with industry experts to gain a general view of conservation work. These discussions were useful since there is a lack of research and information in this area. Two interviewees consist of well-experienced building conservationist and QS were invited to informal interview session.

After the survey questionnaire had been designed, a pilot study was conducted to test its suitability. Guided by the feedback received from industry participants, the questionnaire was amended and copies of it were posted to consultant quantity surveying firms and contracting firms. Both QSs and building contractors were targeted as they participated actively in tendering practices. To obtain an in-depth understanding of the current practices, first phase semi-structured interviews were held with five (5) consultant QSs and five (5) building contractors, all of whom had participated in the postal questionnaire phase of this study. Following that, feedback on tender preparation skills was also obtained during the second phase semi-structured interviews with five (5) conservation experts (among them, conservation architects and building conservationists).

1.5 Implication and limitation of findings

Previous research mostly studied restoration processes, scientific tests and technical knowledge for building conservation works. Within the construction industry, however, there have rarely been studies of tender preparation practices in building conservation works. Hence, this study hopes to provide a better understanding of the current practices, its strong points and weaknesses to provide a base to enhance the expertise and skill of the QS in tender preparation and pricing for conservation work.

Nevertheless, there are limitations to the research findings because of the following factors:

i. The postal questionnaire survey had a low response rate, maybe due to a lack of industry concern with research development.

ii. The quantity of data is limited among consultant quantity surveying firms and contracting firms because the majority are not engaged in conservation projects.

iii. There is a limited range of literature and published material on the QS's practices and pricing issues in building conservation work.

1.6 Contribution to knowledge

Thus far, this is the first study carried out to document the specific area of QS's role and responsibilities in tender preparation practices for building conservation works. The insights obtained from this study, helps to identify the requisite skills needed by QS to prepare tenders for conservation works with the hope that this could improve the completeness and accuracy of tenders. This study also provides a guide to the professional QS on the skills that they needed to improve and enhance for the betterment of the profession. Additionally, the QS fraternity could also utilise the findings as a guide in developing competency for conservation works with is a relatively untapped area of work.

1.7 Outline of thesis

Chapter 1 outlines the introduction, background and objectives of the research conducted for this study. By means of a review of important literature, Chapter 2 provides an understanding of the nature and characteristics of building conservation works. The methods and processes of performing tender preparation and tender pricing works in the construction industry are explained and discussed in Chapter 3. Chapter 4 gives a detailed discussion of the overall research design, data collection and types of analyses while Chapter 5 presents analyses and findings based on the

survey and interviews responses of respondent QSs, building contractors, architects, and building conservationists. The concluding Chapter 6 highlights the outcome of the research.

CHAPTER 2

UNDERSTANDING CONSERVATION IN THE CONSTRUCTION INDUSTRY

2.1 Introduction

This chapter discusses the key requirements for enhancing the QS's expertise in conservation work. It is suggested that the QS needs to know the importance of conservation work which provides visible evidence of a community's links between its past, present and future. Prior to construction work itself, the QS should understand the general principles of conservation approaches and the relevance of preliminary works specific to conservation projects, including reconnaissance survey, dilapidation survey, the use of a system of recording and documentation, scientific studies, and laboratory test. These activities supply the extra knowledge and information, different from the demands of new building works, which the QS should have in order to conduct tender pricing and prepare tender documents to a high degree of accuracy.

2.2 Definition of heritage conservation works

Heritage is a global concern (Hooi, 2002). For any community, heritage historic and heritage-rich places provide a sense of identity, and connections to its past and the nation (Australian Government Producing Commission, 2006). To "conserve", as defined by the Merriam-Webster Online Dictionary (2009), is to "keep in a safe or sound state, especially, to avoid wasteful or destructive use". Expanding on this, conservation may encompass processes of looking after or keeping historic buildings so as to retain, safeguard, reveal and reinforce its architectural, historical,

environmental or cultural significance and upgrade it for a better heritage value (English Heritage, 2006; Government of Karnataka, 2004; Australia ICOMOS, 1999; Low and Wong, 1997 and New Zealand ICOMOS, 1995). It is common now to advocate a conservation aim of maximizing the retention of cultural significance, guided by a principle of minimum intervention, or, to "do as much as necessary, as little as possible" (Dann and Wood, 2004).

A conservation process carried out according to sound principles of conservation is likely to result in the highest economic or social benefits. Such a process leads to the prolongation of the life of cultural property and its utilization (Ahmad, 2004a). Yet, conservation should not be undertaken unless adequate resources are available to ensure that the building fabric is not left in a vulnerable state or the cultural significance of the place impaired (Hamid, 2008). The average practitioner should strive for good conservation practice guided by the following six tenets (RICS, 2008):

i. minimum intervention
ii. conserving as found
iii. using like for like materials
iv. honest intervention
v. sympathetic repairing, and
vi. reversible alterations.

2.3 The importance of conservation work

In a way, the conservation of heritage building is vital to the preservation of human civilization. Like an old photo in a family album, such buildings are monuments that evoke a sense of nostalgia linked to a different community in a different era (Hooi,

2002). By itself, conservation work is generally not attractive enough for private investors in contrast to new construction which offers a higher degree of profitability and fewer risks (Pickard and Pickerill, 2002). However, buildings cannot last forever, but with good conservation they can survive as long as possible, suffer the least alteration, and able to enrich the society (RICS, 2008). The purpose of conserving an old building is to preserve an area of interest (Low and Wong, 1997) and care for places of cultural heritage value, their structures, materials and cultural meaning (New Zealand ICOMOS, 1995).

With conservation, a city can keep in touch with its past and yet stay in tune with the future. There is a need to carry out conservation work because of reasons of history, architecture, social stability, tourism, and economic and public benefits (Australian Government Productivity Commission, 2006; Worthing and Dann, 2000; Low and Wong, 1997; New Zealand ICOMOS, 1995; Ahmad, 1994a and Yakub, 1993). There is often economic viability to conservation because the costs of demolishing old buildings may outweigh the costs of conserving them (Bullen, 2007). Further cost will also be included when a new building is required to fulfil its function, once it is demolish. Prior to an involvement in building conservation work, the QS has to understand carefully its importance, appreciate the special efforts made to carry out conservation projects, and gain an interest in building conservation work itself. The many aspects of the importance of conservation work, some peculiar to Malaysia, are summarised in Table 2.1.

Table 2.1: The importance of conservation work

Aspects	Reasons
Historical	• To retain a connection with roots and identity. • To teach us about the past and our culture.
Architectural	• Represent the development of a particular period of the past. • A place to record the technological capabilities for the evolution of the building environment. • To retain intrinsic artistic value.
Stability	• To maintain continuity and stability of physical surroundings within a conservation area in scale and proportion. • To ensure all buildings treated in the conservation area are protected collectively against any sort of demolition. • To ensure any future alterations or additions are carried out sensitively.
Social	• To provide the context for community identity and reflect the way people lived and the cultural identities, e.g. early immigrants from China, India and West, respectively. • Society is able to maintain the difference and uniqueness of physical heritage due to the advances in technology, development and increasing cultural homogeneity.
Tourism	• To attract tourists to the buildings which have historical value or architectural distinction. • Rehabilitation or adaptive reuse of old buildings for appropriate new uses such as shops, museums, restaurants and entertainment centre may help to promote tourism.
Economic	• Adaptive reuse of existing buildings can conserve scarce resources, maintain quality, and allow for the design of very rich internal space. • Creates proportionately more jobs than new construction, provides better local expenditure retention. • Assists economic diversification in regional areas and reduces landfill waste through the recycling of buildings.
Public Benefits	• Benefits of educational research and spiritual values. • The knowledge of heritage asset can be endowed to future generations.

Adopted and modified from: Alauddin and Isa, 2007; Australian Government Productivity Commission, 2006; Worthing and Dann, 2000; Ahmad, 1998, 1994a; Low and Wong, 1997; New Zealand ICOMOS, 1995 and Yakub, 1993

2.4 Categories of heritage buildings

In Malaysia, many buildings of heritage value can still be found in various parts of the country, especially in George Town and Malacca. According to Ahmad (1994b), there are more than 37,000 historic buildings, built between 1800 and 1948

throughout the country, which are worthy of preservation and conservation. Areas in historic cities may be divided into core zones and buffer zones. Preserving and conserving heritage buildings in core and buffer zones should follow different principles and guidelines. Historic buildings fall into two (2) categories as shown in Table 2.2. The differences between these two (2) categories lie in the eligibility of different heritage buildings to be demolished, altered, extended, renovated, and adaptively re-used.

Table 2.2: Categories of heritage buildings

Categories	**Description**
Category 1	Buildings of high architectural and historical value which are not allowed to be demolished, altered and extended except restored.
Category 2	Buildings of architectural value which are allowed to be renovated for adaptive re-use.

Source: Majlis Perbandaran Pulau Pinang, 2008

Moreover, heritage buildings in Malaysia may be categorized according to four (4) styles, namely, traditional architecture, shop houses of unique architectural styles, colonial influence, and religious buildings. Examples of these heritage buildings are listed in Table 2.3 and shown in Plates 2.1 to 2.4. Some of these buildings remain intact to this day and maintain their original character while others have been repainted several times or have undergone additions to the buildings. Unfortunately, some have been abandoned or demolished to make way to modern development (Ahmad, 1998).

Table 2.3: Different styles of heritage building in Malaysia

Building Styles	Example
Traditional architecture	Traditional Malay timber house
Shop houses of unique architectural styles	Early Permanent, Straits Eclectic style or Art deco styles
Colonial influence	Railway stations, old government buildings, mansions and courthouses
Religious buildings	Traditional and Moorish-influenced mosques, churches and temples

Source: Ahmad, 1998

Plate 2.1 Traditional Malay House, Kampung Morton
[*Courtesy of Ahamd (n.d.): http://www.hbp.usm.my/conservation/*]

Plate 2.2 Shop houses, Melaka
Photo taken on 19 August 2008

Plate 2.3 Town Hall, Penang
[*Courtesy of Ahmad (2004): http://www.hbp.usm.my/conservation/*]

Plate 2.4 Cheng Hoon Teng Temple, Melaka
Photo Taken on 19 August 2008

2.5 Conservation approaches in industry

Conservation is not just preservation, refurbishment, rehabilitation, maintenance, restoration, reconstruction, repair or adaptation (RICS, 2008; Australian Government Productivity Commission, 2006; Reyers, 2003; Mandal, 2002; Australia ICOMOS, 1999 and New Zealand ICOMOS, 1995) although most conservation projects include one or more elements of these allied approaches depending on circumstances and may be applicable to many kinds of historic works and sites (RICS, 2008). Eight (8) conservation approaches are frequently adopted in the construction industry (Table 2.4). However, the application must complement the surroundings of buildings in their architectural design and heritage zone. Thus, it is necessary to appreciate the proper meaning of conservation approaches in order to carry out good conservation practices.

Table 2.4: Conservation approaches applied in construction industry

Conservation Approach	Description
Preservation	Maintaining the *fabric* of a *place* in its existing state to prevent or to retard deterioration.
Refurbishment	Renew or to restore to a new condition and/or appearance.
Rehabilitation	Returning a historic building or quarter to a state of utility, for a sympathetic or compatible use, in consonance with the original function, with or without adaptive alterations.
Maintenance	Continuous protective care of the *fabric*, content or setting of a *place*; it is to be distinguished from repair.
Restoration	Returning the existing *fabric* of a *place* to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.
Reconstruction	Returning a *place* to a known earlier state and is distinguished from *restoration* by the introduction of new material into the *fabric.*

Table 2.4 – Continued

Conservation Approaches	Description
Repair	Repair of material or site with original or similar materials to prolong the life of element/component. Where replacement is necessary, new materials should be compatible with historic material in appearance, texture, colour and form, and yet be distinguishable from the historic fabric.
Adaptive re-use	Modifying a *place* to suit the existing use or a proposed use. A process that retains as much as possible of the original building while upgrading the performance to suit modern standards and changing user requirements.

Adopted and modified from: Bullen, 2007; Dann and Wood, 2004; Government of Karnataka, 2004; City of Vancouver, 2003; Mandal, 2002; Australia ICOMOS, 1999 and New Zealand ICOMOS, 1995

2.6 Special framework for building conservation

To a large extent, the scope of construction work will be similar for both new buildings and conservation work. Nevertheless, there is still a need for the QS to be a specialist with an in-depth knowledge of heritage buildings, special restoration techniques and requirements, and the related technical specifications. For example, special preliminary tests may have to be conducted to obtain information on the usage and details of original materials prior to the commencement of construction. Such tests are not required in new building works so that even an experienced QS may not know when and how to include these tests in the conservation work tender documents.

In fact, the process of conservation should ideally be preceded by multidisciplinary studies, including archaeology, which address relevant factors such as the need for excavation, or the potential disturbance of the building fabric, and aspects of history, architecture, building and engineering techniques, sociology and economics (Hamid, 2008). However, the ideal can only be realized if a project employs conservation

consultants as part of the construction team. In Malaysia, many private owners carry out improper conservation practices because of the absence of standard specifications in repairing historical buildings (Ahmad, 1998). Indeed, identifying problems from appraisal reports and building survey inspection in reconnaissance survey is firstly required for building conservation. The process should continue with the identification of building defects from a dilapidation survey, the documentation of all works using the Historical Architectural Building Survey (HABS) and further scientific studies and laboratory tests (Ahmad and Rahman, 2005; Ahmad, 2001 and Zuraini, n.d.).

2.6.1 Reconnaissance survey

A reconnaissance survey, to be conducted before a dilapidation survey, involves a general investigation of the building interior and exterior to gauge the nature and extent of building problems (Ahmad and Rahman, 2005). It would save much time and field work to study significant historical resources, extant building plans and photographs as part of a reconnaissance survey.

2.6.2 Dilapidation survey

A dilapidation survey consists of an inspection of the existing structural conditions of buildings (BSC, 2005) to develop an in-depth analysis of building defects, their probable causes, and the proposed methods and techniques of building conservation (Ahmad, 2001 and 2004a). In a dilapidation survey, building floor plans are divided into several zones (listed in alphabetical order) for cross-referencing and a systematic pictorial documentation of building conditions and defects (Ahmad, 2004b).

Table 2.5 lists building defects that are commonly found in historic buildings in Malaysia. All such building defects may be recorded systematically in pictorial documentation, plans and elevations (Ahmad, 2001) which the QS may use to perform the quantity take-off for a BQ.

Table 2.5: Common heritage building defects in Malaysia

Item	Types of Building Defects
1	Leaking roof
2	Termite attack
3	Water or dampness penetration through walls
4	Fungal stains and harmful growths
5	Unstable foundations
6	Rising damp and salt contamination
7	Broken floorboards
8	Crumbing plasters
9	Erosion of mortar joints
10	Peeling paint
11	Poor drainage system and defective rainwater goods
12	Structural and wall cracks
13	Cracks in walls and leaning walls
14	Poor installation of air-conditioning units
15	Broken ornamental elements and balustrade

Adopted and modified from: Ahmad, 2004a, 2004b, 1998, 1994b, 1994c; UNESCO Bangkok, 2002, 2000a, 2000b; Harun and Ahmad, n.d. and Zuraini, n.d.

Plate 2.5 Peeling Paint
[*Courtesy of Building Surveyors & Consultants (BSC, 2005): http://www.bscbuildingsurveyor.com/Dilapidation-survey.htm*]

Plate 2.6 Wall Crack
[*Courtesy of Building Surveyors & Consultants (BSC, 2005): http://www.bscbuildingsurveyor.com/Dilapidation-survey.htm*]

Plate 2.7 Termite Infestation of the Ceiling Joist
[*Courtesy of Ahmad (2004): http://www.hbp.usm.my/conservation/*]

Plate 2.8 Dampness
[*Courtesy of Ahmad (2004): http://www.hbp.usm.my/conservation/*]

2.6.3 System of recording and documentation

The Historical Architectural Building Survey (HABS) is a systematic method of recording and documentation introduced by the Museum and Antiquity Department of Malaysia. The HABS, which has three major stages, is conducted throughout the project duration to record, photograph and document the conditions of the heritage building before, during and after conservation (Ahmad, 2001). The production of record drawings is dependent on careful preparation and selection of the basic survey requirements (Wood, 1994). It is necessary to record all pertinent information on building conditions, conservation techniques, grid locations and photographs in a standard and systematic format before storing the information in a database for future reference and final documentation. Such a database will be of great help during tender preparation (Ahmad and Rahman, 2005) process as the QS can use it to determine the types of work involved hence there will be a clearer, detailed specifications and better descriptions in the tender documents.

2.6.4 Scientific studies and laboratory tests

Ahmad and Rahman (2005) express a view that conservation work requires in-depth knowledge and expertise related to building structures and materials as well their defects and causes. A series of scientific studies and laboratory tests may be necessary to identify building defects and discover the best ways and the most appropriate techniques, methods and materials to rectify the defects. The results from the scientific studies (Table 2.6) should serve as inputs in decision-making, particularly to clarify the causes of deterioration, propose ways to control them, select building materials, and determine appropriate methods and techniques of repair (House and Lords, 2006; Ahmad and Rahman, 2005 and Ahmad, 2004b).

Table 2.6: Scientific studies for conservation work

Types of Scientific Studies	**Work Descriptions**
Archaeological Excavation	• To rescue and salvage any archaeological materials found on site. • To identify any remnants of the original building materials. • To analyse the different types of materials used in building in terms of their thickness, length, width, texture, and colour.
Local Temperature and Relative Humidity	• To identify problems of harmful growth and microbiological attacks on existing wall structures because of local temperature and the level of outdoor moisture content throughout the years.
Timber Species and Strength Group	• To confirm the different types of timber used in the building. • To ensure the new timber installed is of the same species and of similar strength.
Paint Colour Scheme	• To verify the original building colours and the type of paint used. • To identify the original building colours and determine the use of new paintwork including the colours and types of paint.

Adopted and modified from: Ahmad & Rahman (2005) and Ahmad (2004b)

Apart from the scientific studies, laboratory tests may also be performed on building materials to determine the levels of salt content, the components of building materials, the compressive strength of new wall plaster, etc (Ahmad and Rahman, 2005 and Ahmad 2004b) as shown in Table 2.7. Using reports of scientific studies and laboratory tests, the QS will know the types of materials to be used and can accordingly prepare the relevant specifications and to obtain (tender pricing) quotations from suppliers.

Table 2.7: Types of laboratory tests applied to conservation work

Laboratory Test	Work Descriptions
Level of Salt Content	• To investigate the level of salt content accumulated in the heritage building over the years. • To indicate the extent of building problems, and the types of treatment for salt contamination in all brick walls particularly before the treatment of rising damp.
Component Elements of Building Materials	• To identify the actual compositions or closest possible proportions of existing building materials including mortar joints, plasterwork on walls and ornamental elements through the X-Ray Fluorescence (XRF) test. • Information is essential particularly when repairing, replacing or re-plastering the existing building materials.
Schmidt Hammer Rebound Test	• To select the appropriate sample mixture proportion for the re-plastering works depending on other factors including smoothness, texture and crack resilience.

Adopted and modified from: Ahmad & Rahman (2005) and Ahmad (2004b)

Building conservation practices which incorporated the specific works mentioned above lie outside the scope of work for new building construction. Yet, those practices are needed to preserve the authentic structure and fabric of the building, thus safeguarding its historical and architectural significance and preparing it for future cyclical maintenance programmes. These special practices of building conservation, as noted by Ahmad and Rahman (2005), offer major guidelines and basic references to the QS in the preparation of project briefs, building specifications, BQ and tender documents.

An inadequate grasp of the extent and nature of conservation building works would not only lead to an inappropriate approach and inaccurate scope of repair work but also result in substantial cost implications when the QS performs pricing work. To prepare an accurate project budget, therefore, the QS should understand and allow for all special scope of conservation works.

2.7 Summary

Chapter 2 focuses on the need to understand conservation works by a QS. A QS intending to be involved in conservation works should develop an in-depth knowledge pertaining to the special scope of conservation works which consist of reconnaissance survey, dilapidation survey, system recording and documentation, scientific studies and laboratory test and applies all of these preliminary tests into the preparation of tender documents as well as pricing works. Also, the sequence of conservation work (starts from top-down instead of bottom-up) and also various construction techniques in conservation works will bring about higher cost in conserving a heritage building. Hence, a QS needs to explore and broaden his knowledge which have been mentioned above to ensure a proper tender documentation and pricing in conservation works.

CHAPTER 3

TENDER PREPARATION PRACTICES IN BUILDING CONSERVATION WORK

3.1 Introduction

This chapter reviews the literature on building conservation works which mainly discusses strategies of tender document preparation and the tender pricing process that necessitate the QS's involvement. The most important section of the tender document is its BQ and a tender document of high quality must have accurate quantity take-offs, complete descriptions and well written specifications. It is also important to review the tender pricing issues given the significant differences between building conservation work and new building work.

3.2 Parties in conservation works

The parties who are involved in the tender preparation practices for building conservation works are various and from different background. The Client (referring to private or government sector), is the person or party who has a heritage building and has the intention to conserve it. A team of consultants including architect, QS, engineering consultant and building conservationist are the consultants who are appointed by the client to assist and monitor the conservation project. A building conservationist may be appointed by the client or building contractor to provide expert advice on specific methods and techniques employed during the conservation project. They usually produces reports assessing and advising on restoration for the present condition of historic fabric (Reyers, 2003). On the other hand, the building contractor who will carry out construction work will be selected through the open tender process, generally referred as the contractor after award for the job. In short,

the relationship between client, consultant team and building contractor is shown as Figure 3.1 below.

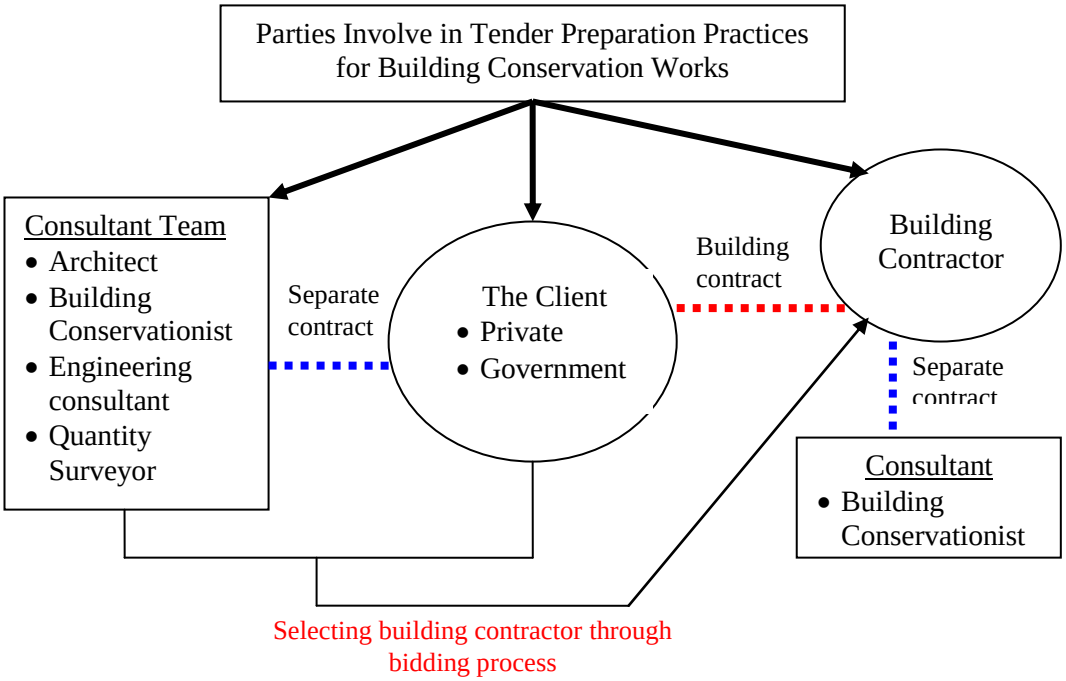

Figure 3.1: Relationship between parties in conservation works

At the preliminary stage of conservation works, the client's requirement and necessities will determine the outline on how to conserve a heritage building. There is a contract between the client and the consultant team where the consultant team are charged with many duties as agents of the client. Co-ordination and feedback between client and consultant team are important in discussing the general concept and issue of conservation that are crucial prior to any restoration works. In addition, technical interaction between building conservationist, architect and engineer is needed in order to achieve the co-ordination required among the different technical issues such as building defects diagnoses and structural analyses, required by the project (Please refer to Section 2.6, Page 25 for detail discussion). After that, a