

# **THE DESIGN MANAGEMENT PROCESS IN THE UK**

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I dedicate this thesis to:  
My Parents, Eduardo e Maria de Fátima Ferreira,  
for all the support.

*“A Scientist investigates that which already is;  
Engineers create that which has never been”*

*Albert Einstein*



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**ABSTRACT**

This dissertation examines the process of designing construction projects in the UK in order to help to understand the process in a better way. There is no single prescription that will suit every project. This work provides illustrations and guidance based on the current level of understanding of the design process.

The main goal of this work is to show how a project develops from the start in the UK construction industry.

In this project work, it will be mentioned the types of agreements available in UK between the client and consultant in design management, the hierarchy and relationship between all parts involved in a construction project, relevant legislation and institutions involved in the process and there is an approach to how the fees are calculated for the Architect and for the Consultant engineer.

The Design and Construction Management process in UK proved to be successful through times. In a period where the construction industry is going through tough times, due to the Credit crunch, it's important to compare our design management systems with a possible, more efficient, foreign approach to this matter in order to achieve success in the present and future status, when the market starts to pick up.

Obviously, it is the responsibility of everyone concerned with a project to be aware of the issues, managerial needs, and required practice.

**KEYWORDS:** Design Management, Construction Management, UK Construction Industry



## **RESUMO**

Esta dissertação pretende examinar o processo de Gestão de Projectos de Construção no Reino Unido, de forma a ajudar a entender o mesmo de melhor forma. Não existe um modelo único que define todos os projectos. Este trabalho é um guia baseado na interpretação actual do tema de Gestão de Projecto em Inglaterra.

O objectivo principal deste trabalho é mostrar como um Projecto se desenvolve no sector da construção britânico.

Nesta dissertação são mencionados os diferentes tipos de contractos existentes no Reino Unido, entre o Cliente e o Projectista, a hierarquia e o relacionamento entre as diferentes partes envolvidas num Projecto de construção, a legislação e instituições envolvidas no processo e, também, uma abordagem à forma como as remunerações são calculadas do ponto de vista do Arquitecto e do Engenheiro consultor.

Baseado em experiência profissional, o processo de Gestão de Projectos em Construção no Reino Unido mostrou ter bastante sucesso no passado. Num período onde o sector da construção está a passar tempos difíceis, devido à crise económica financeira mundial, uma abordagem a um sistema de gestão de projectos estrangeiro, tal como, o britânico, que demonstrou sucesso no passado, seria uma boa forma de atingir um melhor desempenho do sistema nacional no presente e no futuro.

Obviamente, que é da responsabilidade de todas as partes envolvidas num projecto de construção terem noção das necessidades de gestão e melhoria continua dos processos de gestão utilizados

**PALAVRAS-CHAVE:** Gestão de Projecto, Gestão da Construção, Indústria da Construção no Reino Unido



**MAIN INDEX**

**ACKNOWLEDGEMENTS** ..... i

**ABSTRACT** ..... iii

**RESUMO** ..... v

**1. INTRODUCTION** ..... 1

**2. ORGANIZATION OF THE CONSTRUCTION INDUSTRY IN THE UK** ..... 3

**2.1. PROFESSIONAL PROFILES** ..... 3

2.1.1. CLIENTS ..... 3

2.1.2. DESIGN CONSULTANTS ..... 4

2.1.3. QUANTITY SURVEYORS ..... 5

2.1.4. CONTRACTORS AND SUB-CONTRACTORS ..... 6

**2.2. PRESENT SITUATION OF THE CONSTRUCTION INDUSTRY IN THE UK** ..... 7

2.2.1. GENERAL REMARKS ..... 7

2.2.2. THE CREDIT CRUNCH ..... 8

2.2.3. THE INDUSTRY AT PRESENT TIME ..... 10

2.2.4. FUTURE PROJECTIONS ..... 12

**3. DEVELOPING A CONSTRUCTION PROJECT** ..... 15

**3.1. PROCUREMENT OPTIONS** ..... 15

3.1.1. SINGLE PHASE PROCUREMENT ..... 18

3.1.2. THREE PHASE PROCUREMENT ..... 19

**3.2. TENDERING FOR DESIGN AND CONSTRUCTION** ..... 20

3.2.1. SINGLE STAGE TENDERING ..... 23

3.2.2. TWO STAGE TENDERING ..... 23

**3.3. APPOINTING THE ARCHITECT** ..... 24

**3.4. APPOINTING THE DESIGN CONSULTANT** ..... 26

<b>3.5. BASIS OF FEES CALCULATIONS</b> .....	28
3.5.1. FOR THE ARCHITECT .....	28
3.5.2. FOR THE DESIGN CONSULTANT .....	30
<b>4. WORK STAGES OF DESIGN MANAGEMENT</b> .....	33
<b>4.1. ROLES, INTERFACE AND RESPONSIBILITIES BETWEEN ALL PARTS</b> .....	33
4.1.1. COORDINATION THROUGH ALL DISCIPLINES .....	34
4.1.2. DESIGN CHECKING, APPROVAL AND CERTIFICATION .....	35
<b>4.2. THE NETWORK OF PROJECT MANAGEMENT</b> .....	37
4.2.1. ALIGNMENT OF WORK STAGES TO MEET THE DESIGN MANAGEMENT PLAN OF WORK.....	37
4.2.2. MANAGEMENT OF THE DIFFERENT LEVELS OF INVOLVEMENT.....	39
<b>5. LAWS GOVERNING THE PROFESSIONAL ACTIVITY</b> .....	41
<b>5.1. GENERAL REMARKS</b> .....	41
<b>5.2. KEY REPRESENTATIVE BODIES</b> .....	44
<b>5.3. STANDARD AGREEMENTS BETWEEN STAKEHOLDERS AND INVOLVED PARTIES</b> .....	45
<b>6. CONCLUSIONS</b> .....	47
<b>REFERENCES</b> .....	49
<b>Appendix</b> .....	51
<b>A.1. TYPICAL AGREEMENT BETWEEN THE DESIGN CONSULTANT AND THE CLIENT</b> .....	51

**FIGURE INDEX**

Fig.1 - Mortgage approvals by type of lender .....8

Fig.2 - House price changes between 2006 and 2008 .....9

Fig.3 - New housing statistics ..... 10

Fig.4 - Public and private infrastructure statistics ..... 10

Fig.5 - Repair and maintenance (Housing) statistics ..... 11

Fig.6 - Public non-housing excluding infrastructure statistics ..... 11

Fig.7 - Construction output and GDP forecasts ..... 12

Fig.8 – The Construction output forecast ..... 13

Fig. 9 - Summary of design and Construction options ..... 15

Fig.10 - Traditional procurement ..... 16

Fig.11 - Three Phase procurement ..... 16

Fig.12 - Single Phase procurement..... 17

Fig.13 - BOT structure ..... 17

Fig.14 - Single phase procurement schedule..... 19

Fig.15 - Three phase procurement schedule ..... 20

Fig.16 - The Tendering process ..... 21

Fig.17 – The process after receiving Tender documentation..... 22

Fig.18 - Architects fees relative to project resource requirements ..... 28

Fig 19 - Graph showing the relationship of percentage fee with works cost / project cost for Agreement for a Non-lead Consultant, Civil/Structural Engineer..... 32

Fig.20 - Inter-relationship between client, design and project management functions ..... 33

Fig.21 - Multi-discipline coordination ..... 34

Fig.22 - Organisation in the implementation phase..... 35

Fig.23 - Design check process flowchart ..... 37

Fig 24 - Alignment of work stages to meet the design management plan of work ..... 38

Fig.25 - Levels of production organizations interpreted into a design practice ..... 39

Fig.26 - Levels of work across the project team..... 40



**TABLE INDEX**

Table 1 - Nomenclature for various procurement strategies ..... 18

Table 2 - RIBA Outline Plan of work.....25

Table 3 - Relationship of resource requirements to Building type .....29



## **SYMBOLS AND ABBREVIATIONS**

CDM – CONSTRUCTION DESIGN MANAGEMENT

HSE – HEALTH AND SAFETY EXECUTIVE

GDP – GROSS DOMESTIC PRODUCT

D&C – DESIGN AND CONSTRUCT

BOT – BUILD OWN TRANSFER

RIBA – ROYAL INSTITUTION OF BRITISH ARCHITECTS

ICE – INSTITUTION OF CIVIL ENGINEERS

ISTRUCTE – INSTITUTION OF STRUCTURAL ENGINEERS

CPD – CONTINUOUS PROFESSIONAL DEVELOPMENT



# 1

## INTRODUCTION

Design is a complex process that continues to grow in complexity because of the dramatic increase in specialist knowledge. There are now many contributors to the processes that consist of a continual exchange and refinement of information and knowledge. Even the most experienced design teams can fail to manage this complex process and supply information at the wrong time and of the wrong quality to members of the production team.

Property investment performance in the UK was extremely strong over the period from 2004 to the early part of 2007, in the context of exceptionally high liquidity in world financial markets.

Trends in property investment mirrored, and were shaped by, conditions in other investment markets. The collapse of the US market caused widespread contamination in world financial markets, with effects felt across a wide range of banks and investors with exposure to what proved to be highly opaque and risky securitised debt products. From this moment on, the construction industry was severally affected in terms of new investments.

Following these last issues, this work supports an approach which encourages long-term thinking. The construction industry is one of the most successful industries in Europe therefore, Portugal should be having a critical opinion to establish a comparison with a foreign method in order to implement a possible continuous improvement method in their Management systems.

In the present climate, a consulting engineer has and had to explore their areas of knowledge. The types of projects are more in the Civil engineering sector rather than the structural sector. From experience, was noted that due the economical situation in the UK, for example a Structural Engineer had to seek new challenges in the likes of drainage design, soil investigation or even Geo-environmental engineering. The structural design roles were and are very few at this stage, presenting a lot of difficulties for young engineers that want to achieve career progression.

Therefore, the present work will provide guidance through how a project develops in the UK industry with an overview of the present economical climate in England, its present status and possible future forecasts in their economy.

This dissertation is organized as follows:

In Chapter 2 there's an approach to how the UK Construction Industry is arranged at present times. It includes some interesting points in terms of the profile of the main parties of a Construction project, like the Clients, Design consultants, Quantity surveyors and Contractors. There's, as well, an explanation about the Credit crunch, its impact on the economy and a possible forecast for the next years in the industry.

Chapter 3 resumes the way that a Project is developed. Includes the different procurement options available in the industry, the Tendering process, how the Architect and the Engineering consultants are appointed in a Project and the way fees are established for Architectural and Engineering services.

In Chapter 4, the different work stages of a Construction Project are explained. This thesis approaches the way a design team is coordinated, the roles, responsibilities, relationships, levels of involvement and communication between all relevant parties.

The last Chapter includes a reference to the relevant key institutions and bodies involved in the industry. It shows the different agreements and its stages available between the Client and the Consultant in the market.

The Appendix has an example of an agreement between the Client and Consultant on a non lead-consultant basis.

This thesis provides the key features and elements that are important to provide a general analysis of the main aspects of the Construction industry in the UK.

# 2

## ORGANIZATION OF THE CONSTRUCTION INDUSTRY IN THE UK

### 2.1. PROFESSIONAL PROFILES

#### 2.1.1. CLIENTS

The Client is the institution or organisation that will commission the construction project. And, eventually is the owner of the construction site and will be the owner of the building. The range of Clients can go from individual consumers just having work done on their private home to multinational companies or even the government.

The Client normally is responsible to implement the procedure to hire the designers. All relevant professionals can be involved beforehand but only when the Briefing begins is when the main design information is generated.

#### *The Experienced client:*

The Experienced client understands what he or she needs for the building usage and they show their fine knowledge when producing the briefing documents. These are very detailed and will set out all the criteria for the project such as, use of space and quality standards

These clients include local authorities, banks, building societies, breweries, hotel chains, supermarket companies, housing associations, and well-established development companies. And, they have construction professionals involved on site in a daily basis to control their building schedule.

#### *The Inexperienced client*

When the Client does not have construction experience, problems will definitely occur in a financial and building point of view. So, it's always better to have a bit of knowledge in the construction industry. Sometimes this type of client wants to show his financial superiors that he can bring the costs down by cutting professional fee levels down not realising that might be affecting the performance of the project by, for example, choosing a cheaper consultant to do the design work.

*Obligations by the client:*

The Client needs to provide all necessary and relevant data and information (including details of the services to be performed by any Other Consultants) in such time to avoid disruptions in the Consultants performance.

The Client shall insure that agents, servants, Other Consultants and Contractors assist the Consultant when required to insure a good performance of the design services.

The Client will appoint the Contractors to produce and manage the building works of the project. And makes sure that the Contractors execute these works in accordance to what's specified in the terms of the construction contract.

The Client can appoint a Representative who will have authority to manage the works on the Clients behalf.

2.1.2. DESIGN CONSULTANTS

The Consulting Engineer will issue instructions concerning his own work through the architect's office in accordance with the contract.

The Design consultant issues the relevant instructions regarding his work to the Architect's office according to what's specified in the contract.

The Consultant reports to the Quantity surveyor regarding the costs of his works and equipment required in his area of consultancy and needs to provide site inspections, normally done by a member of his office or by a resident engineer who's on site on a full time basis and then issues a report back to the Architect's office regarding any measures to be adopted from that moment on.

The Design consultant will prepare all information regarding the Civil and structural design for the project. The consultant will also provide information on the local conditions of the site, like existing services, geotechnical factors, possible hazards on site etc. The engineer will arrange structural and drainage surveys and will prepare design and calculations for party walls, temporary structures and demolition work.

Who are the designers involved in a project?

- Architects, civil and structural engineers, building surveyors, landscape architects, other consultants, manufacturers and design practices (of whatever discipline).
- Any professional, in this case, a design manager, that modifies a design or can specify a particular method of work or material.
- building service designers, engineering practices or others designing plant which forms part of the permanent structure
- those purchasing materials where the choice has been left open, for example those purchasing building blocks and so deciding the weights that bricklayers must handle

- contractors carrying out design work as part of their contribution to a project, such as an engineering contractor providing design, procurement and construction management services
- temporary works engineers, including those designing auxiliary structures, such as formwork, falsework, falsework, façade retention schemes, scaffolding, and sheet piling
- heritage organisations who specify how work is to be done in detail, for example providing detailed requirements to stabilise existing structures
- Those determining how buildings and structures are altered, e.g. during refurbishment, where this has the potential for partial or complete collapse.

Designers under the Construction Design and Management (CDM) regulations must:

- Make sure that the Client understands about their duties under the CDM regulations and that made the necessary arrangements to fulfil the regulations like, for example, appointing the CDM coordinator and notifying the HSE.
- Provide enough detailed information on their design work and to avoid hazards and reduce risks on site.
- Work along side with CDM coordinator and other design professionals.

### 2.1.3. QUANTITY SURVEYORS

Back in the day, the Quantity surveyor's role was limited to the preparation of Bills of Quantities for tendering purposes. Nowadays, this role includes the preparation of valuations and final accounts in a construction project.

The role includes assessing site problems like access, topography, economic use and working. The Quantity surveyor can assess whether the Client's budget is realistic and compatible with the Project requirements based on information from similar projects, local building costs etc.

They will also advise on important parts of project such as procurement and tendering processes, on contract documentation on cash flow forecasting, financial reports and interim payments, and on the final account.

This role should be appointed directly by the Client or by the Designer on the client's behalf. On the client's behalf, the Quantity surveyor keeps the contract under a more accurate financial control and any communication should be made as early as possible by the designers and the Client before regarding any project changes, in order to achieve a better financial control.

The Quantity surveyor must inform the Client regarding the range of Architectural options in the project, even if they cost more. The Client should take the final decision on this rather than be blocked by budget allocation.

All these points should relate to the brief and basic design considerations and arrange for the Quantity Surveyor to submit a report to be attached to the Designers report and then send it to the client.

The Quantity Surveyor's report in any event, should cover aspects like the cost of the different methods of constructions involved, the time that will take to prepare the Bill of quantities, different types of contracts from a cost control point of view, date and periods allowed for the submission of the tender documents to contractors, means of checking payments from the Contractor to Sub-contractor and the statement of final account to be agreed with the contractor on behalf of the client.

#### 2.1.4. CONTRACTORS AND SUB-CONTRACTORS

Contractors:

In the UK, most of the building work is sub-contracted and the Contractors can vary from a small firm with just a few permanent employed staff to larger organisations with a head office, permanent staff with several regional and international offices.

The Contractors key staff would be the Contract/Construction manager and the Site agent/Manager.

The *Contract/Construction manager* is the role that is responsible for the management of the work on site in the general contractor's company and reports, as well, to the architect. This role is responsible for the day to day running of the contract in the architect's office.

The Contract Manager has to liaise with the Site agent on a daily basis and has effective control of the entire building operation, since day one.

He can be based on site or in the contractor's main office and visits the site when it's necessary for co-ordination and control of the site work.

The Contract Manager keeps the site agent fully instructed and he's obliged with providing everything necessary and has to make sure that the work is being done in accordance with the contract and everything that was agreed previously.

Normally on smaller firms, he may be responsible for ordering plant, materials and labour, arranging meetings, subcontractors, programming, estimating and cost control.

The *Site agent/Manager* has direct control of the whole site operation through the Contract Manager.

All the various trades will be instructed by the Site Agent for the detailed work from their trade and one of the main concerns is to establish a good initiation on each particular operation and its coordination with all the trades. For this, as well, The Site agent needs to check if the Site has been supplied with appropriate plant, labour and relevant materials.

A sub-contractor has their own foremen and they need to report to the Site agent.

Sub-contractors:

Sub-contractors are firms who are sub-let by the Contractors.

They can range from firms that provide unskilled labour for general construction work to highly specialised labour to carry out a more technical task, highly, for example cladding manufacturers.

Normally the Contractor chooses the sub-contractor and it's up to the Contractor to evaluate their performance but, in some cases, the Client or the Designers can choose the Sub-contractor. This mainly only happens when specialist design input is required within the Project.

## **2.2. PRESENT SITUATION OF THE CONSTRUCTION INDUSTRY IN THE UK**

### **2.2.1. GENERAL REMARKS**

The Construction industry in the UK constitutes a very important sector in the economy which provides ten per cent of the gross domestic product. This industry has around 19,000 firms and 1.4 million people employed within the sector and Construction professional services are provided by approximately 350,000 professionals.

In this industry there is a substantial range of services to be provided, that goes from the erection of steel structures to the manufacture of special components and equipment, maintenance of buildings and structures.

In terms of project values, the costs can range from a few thousand pounds, like in domestic projects or maintenance work, to big infrastructure projects that can cost billions of pounds,

This sector has a small number of large companies and many small firms and sole trader. Regarding architectural and structural firms, there are a few practices with several hundred employees and about, 90 per cent of practices have more or less ten people involved in projects that can go up to €3-4 million.

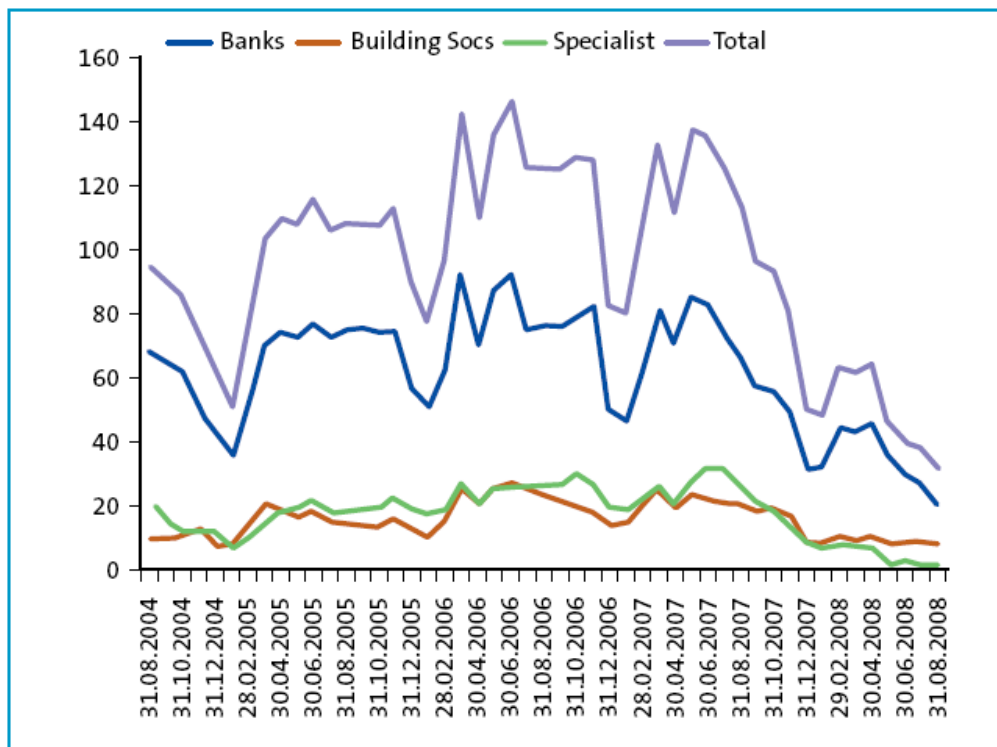
### 2.2.2. THE CREDIT CRUNCH

During 2004 till the early part of 2007, there was a lot of property investment in the UK. The main reasons that caused this successful period of investment were due to a growth in cheap debt and to a strong flow of money by private investors.

In the middle of 2007, the collapse of the US sub-prime mortgage market contaminated the world financial markets. Around the UK, the financial sector activity was severely affected by this financial collapse which saw the financial services sector being deteriorated.

The credit crunch affected the future on property market investment and its development.

Figures 1 and 2 show the Mortgage approvals and house prices changes through those periods [1].



Source: Bank of England

Fig.1 - Mortgage approvals by type of lender. [1]

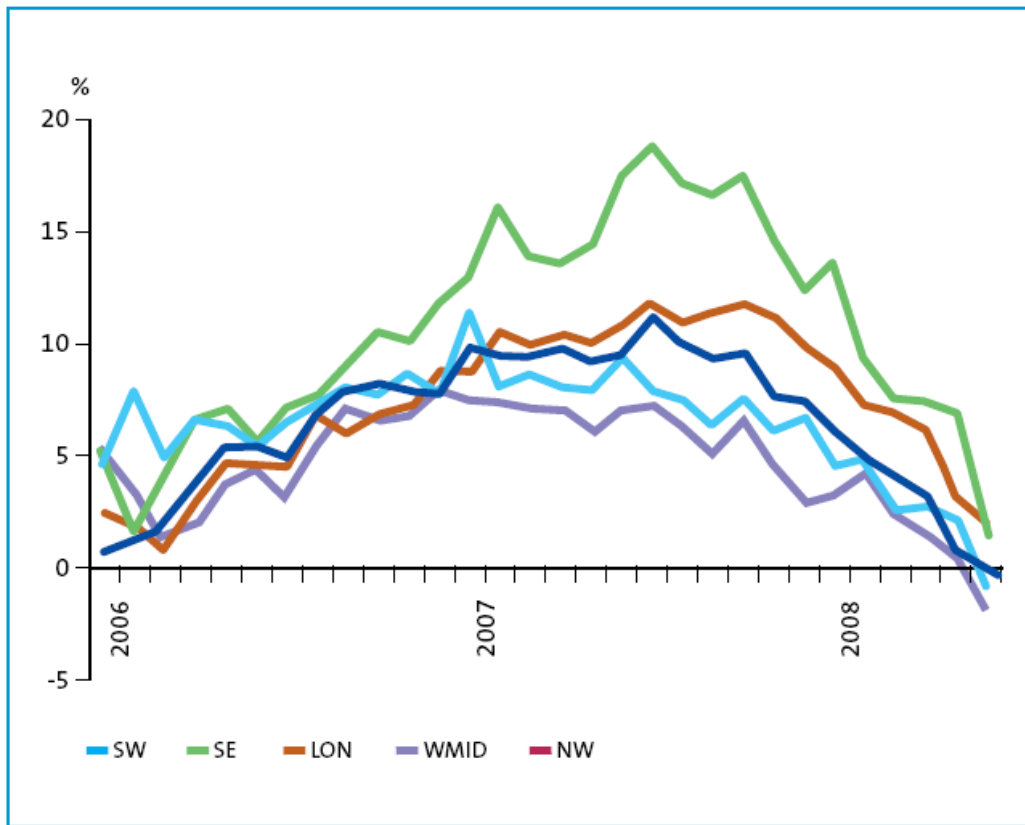


Fig.2 - House price changes between 2006 and 2008. [1]

2007 was the year where there was strong capital growth in the UK property market. But, after the summer of 2007, with the arrival of the credit crunch, the credit markets entered a major dislocation and a reduced availability of debt for property investment.

This period was very pessimist in terms of lending conditions for example; the banks became very selective regarding what borrowers will they support and became very tight regarding expanding their loan books.

Construction cost inflation was one of the problems that development companies faced during this period. Thanks to the credit crunch, a lot of construction firms had to go into administration so this led to a shortage of key skills and specialist contractors.

During this awful environment, development companies pursued overseas funding companies in order to achieve finance for future developments.

2.2.3. THE INDUSTRY AT PRESENT TIME

New Housing:

Fig. 3 shows that, new housing investments started to decay straight after the beginning of 2008, the year that was notorious, in a negative way, by the credit crunch appearance. The Public new housing maintained stable to previous public funding.

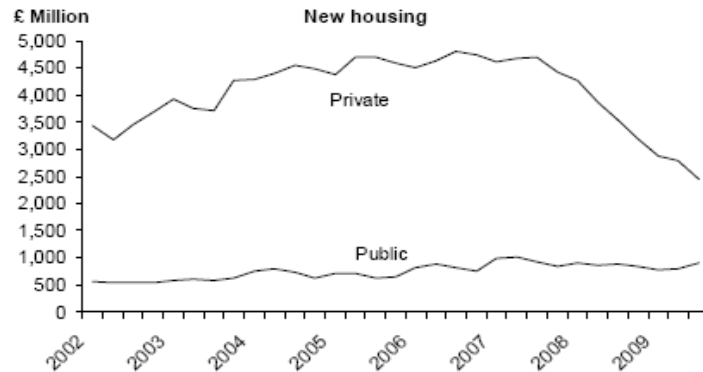


Fig.3 – New housing statistics. [2]

New Infrastructure:

New infrastructure output in the 2009 was 7 per cent higher compared with the previous years and it appeared to have increased after the year 2007.

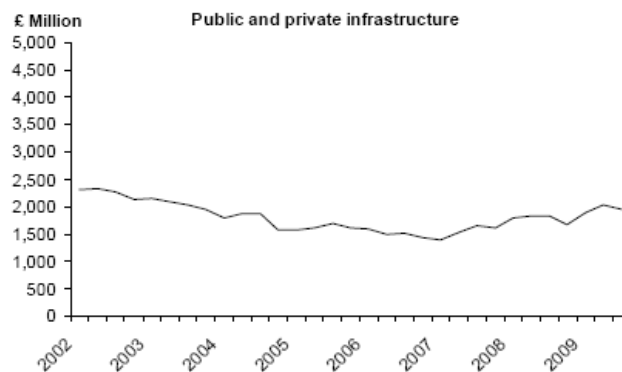


Fig.4 – Public and private infrastructure statistics. [2]

Housing repair and maintenance:

Housing repair and maintenance work (including improvement work) in the private sector saw a decline in the end of the year 2008. Both private and public sectors had a slight improvement in the beginning of 2009.

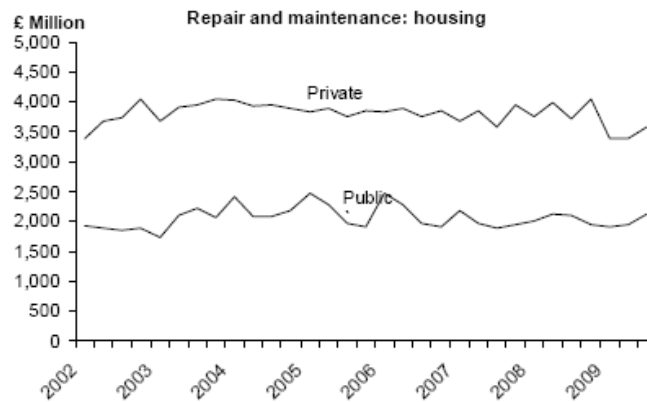


Fig.5 - Repair and maintenance (Housing) statistics. [2]

New public non-housing:

New work in the public non-housing sector (excluding infrastructure) started to gain improvement in the beginning of 2008.

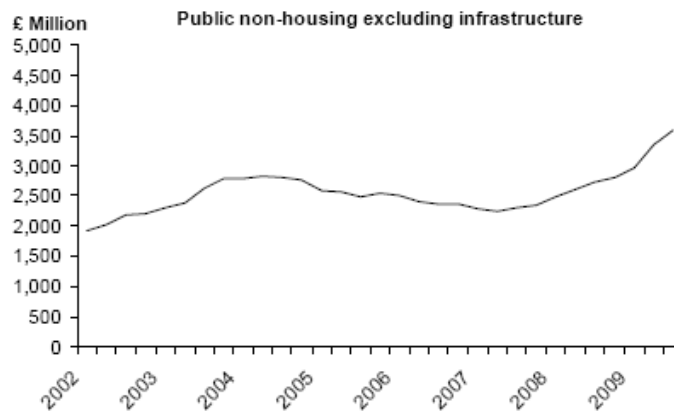


Fig.6 – Public non-housing excluding infrastructure statistics. [2]

According to these statistics, there was a sign of improvement by the end of 2009 in particular areas of the construction industry. The forecasts indicate that 2010 won't bring any increase in the construction sector but in the beginning of 2011, this market will start to pick up.

2.2.4. FUTURE PROJECTIONS

The current recession, and in particular the decline in demand for housing, has led to a downturn in construction output and a rise in the number of redundancies.

The credit crunch period affected the construction industry in a negative way in particular the rise on the number of redundancies in the industry.

*According to Oxford economics there was a 5 times increase in redundancies since 2007. Oxford Economics, in its spring 2009 forecast, saw an output in the UK construction sector to fall by 5.9% in 2009 and expects a fall by 1.4% in 2010. [3]*

**Construction output and GDP forecasts**  
% change on previous year

	2007	2008	2009	2010
Construction	+2.5	+0.3	-5.9	-1.4
GDP	+3.0	+0.7	-2.7	+0.1

Note: 2007 and 2008 figures are official data from the ONS.  
2009 and 2010 figures are forecasts from Oxford Economics.  
Source: ONS, Gross Value Added, series GDQB and CGCE;  
Oxford Economics, UK Sectoral Prospects, Spring 2009

Fig.7 – Construction output and GDP forecasts. [3]

*Future forecast Key Points include [3]:*

- *Construction output to fall 15% in 2009 and 2% in 2010 before returning to growth in 2011[3]*
- *With trend growth each year after 2013, construction would only return to 2007 level in 2021[3]*
- *Slow housing recovery from historically low level [3]*
- *Public sector set to provide higher workloads near term prior to anticipated spending cuts [3]*
- *Infrastructure sector set to grow throughout [3]*

The forecast indicate that unemployment will reach around three million in 2010 and that a construction growth is to be started in 2012 and construction will only return to the 2007’s peak only in 2021.

In 2010, the housing market is entering a wave of optimism with new house developers opening new sites due to the fact that they could verify that there’s a growth in mortgage lending and low interest rates.

New government plans like Building Britain’s Future plan is helping the growth and expects to provide 30,000 new private and affordable homes.

The public spending cuts will determined the length and depth of the recession, as the private sector is still in a difficult condition.

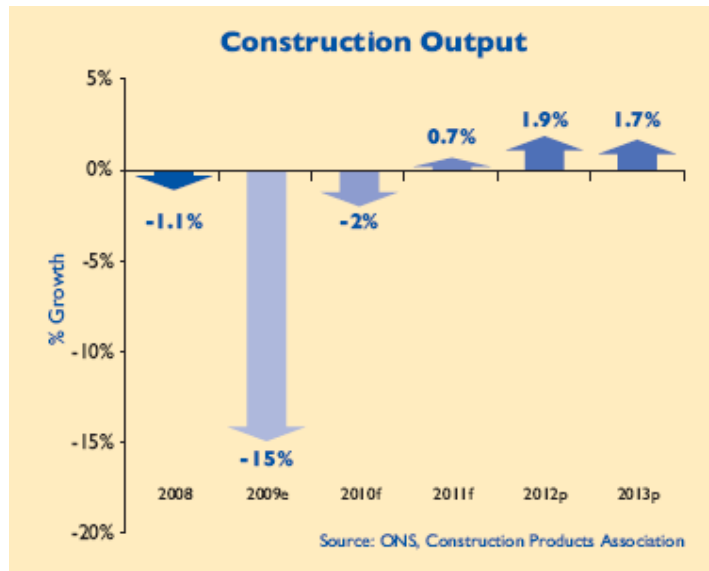


Fig.8 – The Construction output forecast. [3]



# 3

## DEVELOPING A CONSTRUCTION PROJECT

### 3.1. PROCUREMENT OPTIONS

Many construction clients are not regular purchasers of construction work. This chapter is an introduction to construction procurement with a view to achieve a basic understanding of the procurement process.

Figures 9 to 13 include a diagram of the various procurement options available in the construction industry.

The procurement options under a Design and Construct contract are based in two different approaches: Time and cost certainty or value driven innovation. For example, The Three phase procurement on a basic form of D&C contractor is more appropriate to achieve time and cost certainty. But, with a fully integrated team approach through a form of Single phase procurement, value driven innovation is more likely to happen.

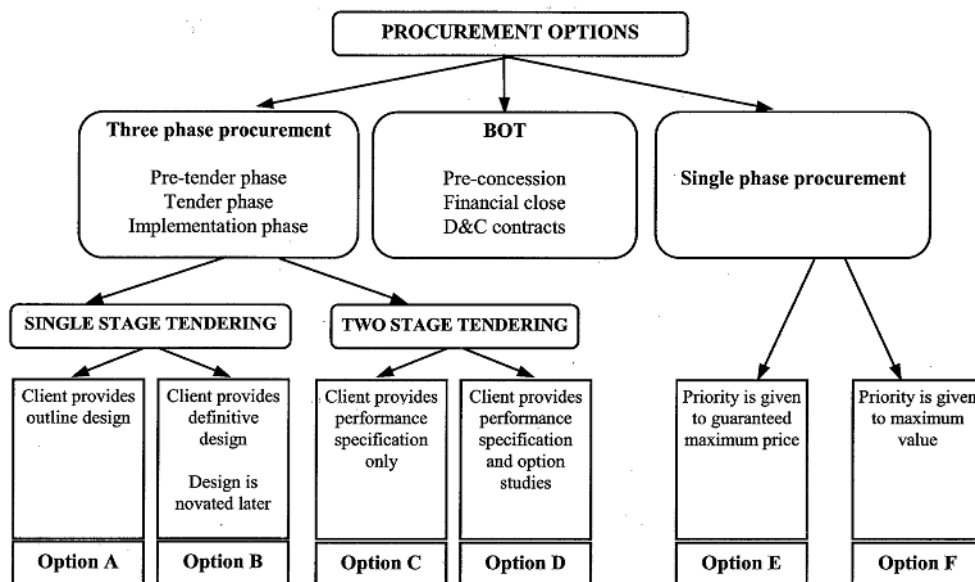


Fig. 9 - Summary of D&C Procurement options. [6]

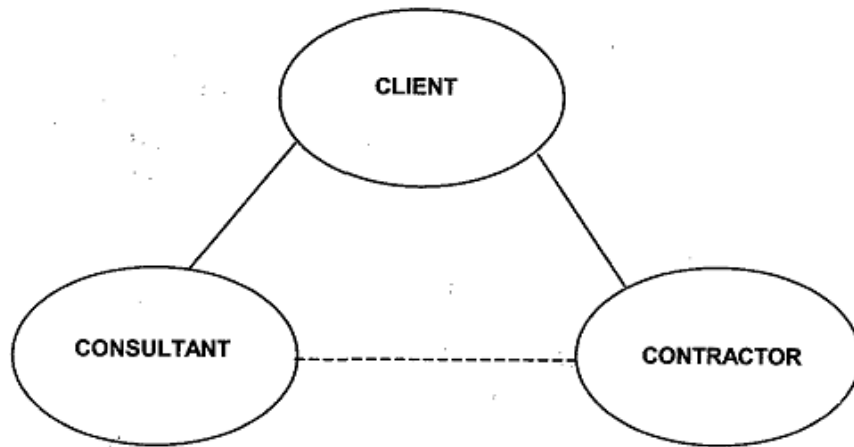
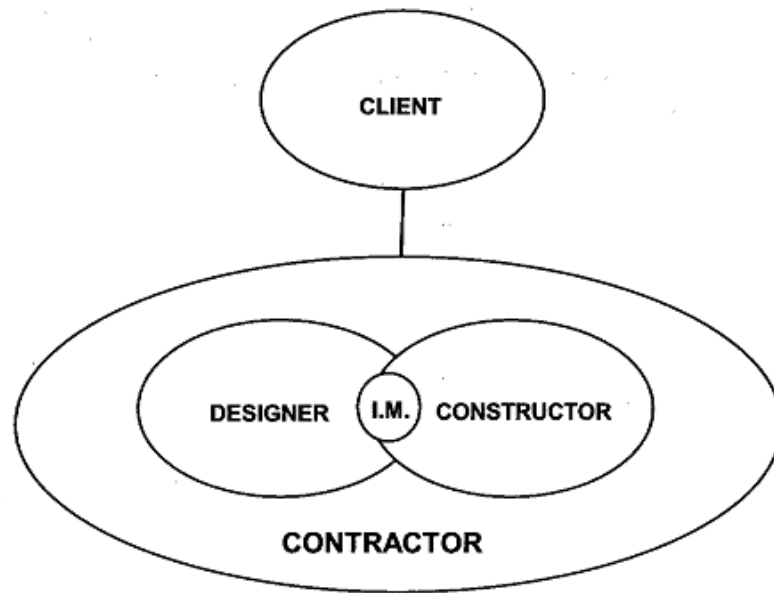


Fig.10 - traditional procurement. [6]



I.M. = D&C interface manager

Fig.11 - Three Phase procurement. [6]

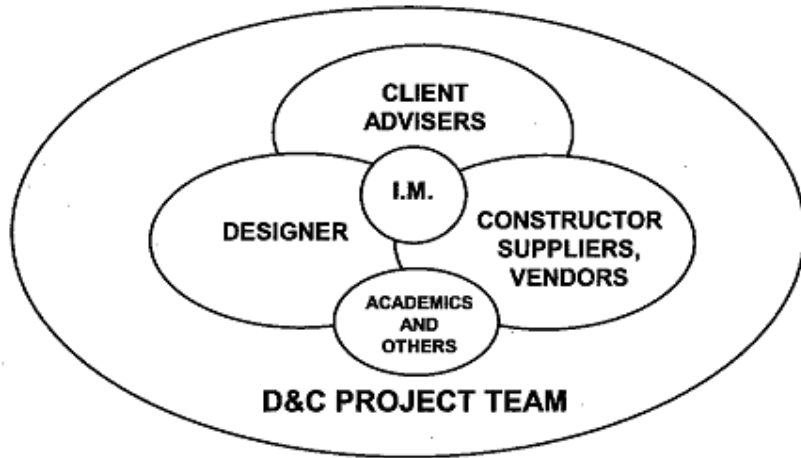


Fig.12 - Single Phase procurement. [6]

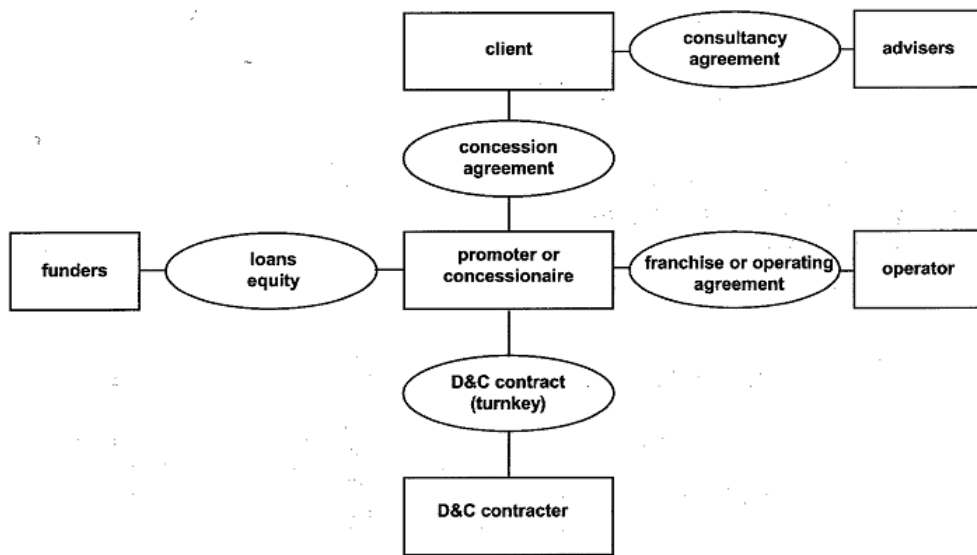


Fig.13 - Typical BOT structure. [6]

Table 1 - Nomenclature for various procurement strategies. [6]

Procurement strategy	Who is the client?	Who is the designer?	Who is the builder?	Who is the operator?
Traditional	owner	consultant	consultant	owner
Three phase procurement	owner	D&C contractor designer                  constructor		owner or franchisee
Single phase procurement	owner                  D&C contractor designer                  constructor			owner or franchisee
BOT	owner	D&C contractor designer                  constructor		promoter or franchisee

In these procurement options the D&C interface manager needs to have good communication, planning and programming skills, needs to understand about M&E installations, get the best of all areas of expertise, build up trust and respect between all parts and maintain good relationships throughout the design and build period.

One of the main requirements for a D&C interface manager is to have management experience in both design and construction.

At all stages the interface manager should be used as the principal point of contact, not just between the designers and constructors but also with the client and its advisers, sub-contractors, local authorities and other third parties, to smooth and accelerate the flow of information.

The Interface manager is the main contact and an information coordinator between the designer and the contractor and for the sub-contractors, local authorities and other relevant third parties.

### 3.1.1. SINGLE PHASE PROCUREMENT

This procurement option is the best choice if the Client is looking for a Value-driven approach on a construction project. In order to achieve this, it's required to build a good partnering relationship between the Client and the Contractor.

Figure 14 illustrates the normal schedule tasks during Single phase procurement.

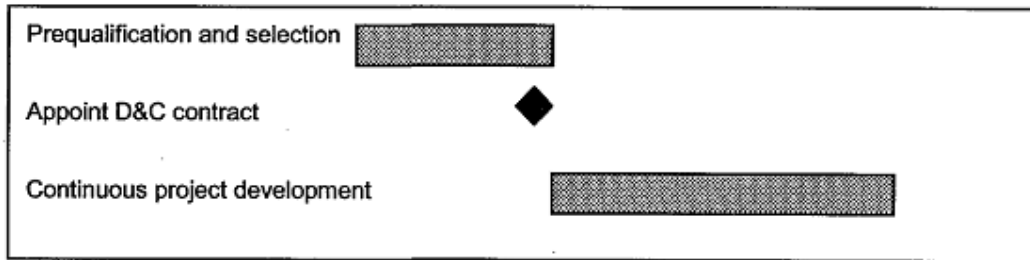


Fig 14 - Single phase procurement schedule [6]

The contractor can ensure a maximum price in Single stage procurement therefore the cost certainty can probably be achieved. This figure, along with time certainty, will be developed through the course of the design process.

In this option, the design process is influenced by value consideration but is not affected by the changing relationship among the client, designer and constructor which happens in Three phase procurement.

### 3.1.2. THREE PHASE PROCUREMENT

Currently the most common approach to a D&C project involves the Client taking three distinct steps: Appoint a technical adviser to prepare the concept design, invite Tenders for a D&C contract and award the D&C contract.

In this procurement option, the Client takes three steps and that are equivalent to each phase in the three phase procurement option:

First step: A technical advisor is appointed to prepare the Concept design.

Second step: Invited Tenders for a Design and Construct, D&C contract.

Third and last step: Choose the Contractor and award the D&C contract.

The Tendering process in this option can be done in single stage or two stages. The three phase procurement option is better for the Client to achieve Time and cost certainty in a construction project.

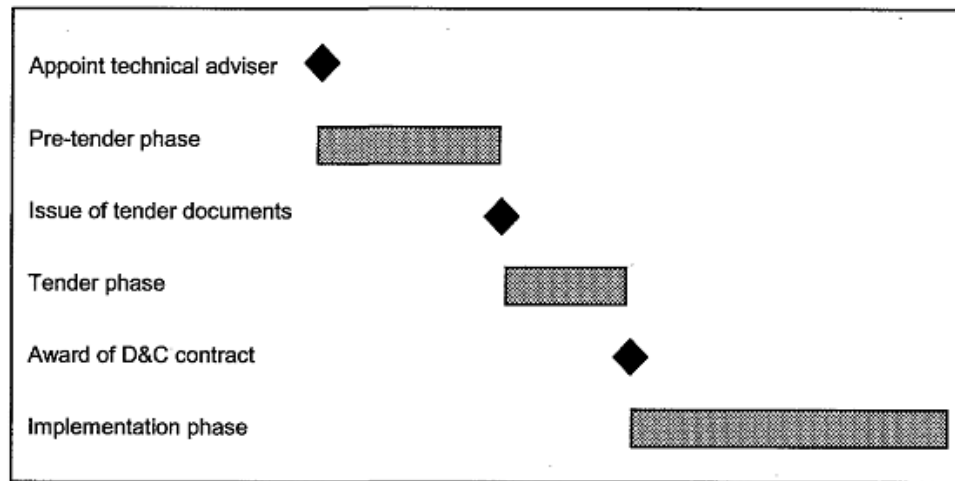


Fig 15 - Three phase procurement schedule [6]

### 3.2. TENDERING FOR DESIGN AND CONSTRUCTION

The Tendering process is when the Client seeks for contractors in order to supply him with the construction services that are required in a construction project.

Initially, the relevant documents are sent to the contractors through the quantity surveyor and they need to be fully informative. These documents contain the relevant drawings and bill of quantities in order for the contractor to prepare their documents.

A standard form of tender will be included in a standard envelope that will go to the Architects office.

A full set of contract drawings and documentation should be available in both the architect's office and the quantity surveyor's office during the period of tendering, for inspection by any of the tendering contractors.

During the tendering period, all the relevant documents and a full set of contract drawings will be available in the Quantity surveyor's and the Architect's office for inspections by the tendering contractors.

After the receipt of all the information and drawings, the Contractor will issue a lump sum cost of the work after having priced every item in the bill of quantities.

On the form, the contractors are required to state that they have read the conditions of contract and bills of quantities that they have examined the drawings and offer to execute and complete works in accordance with the contract for the total sum, which they then insert.

There are special forms that the contractors need to fill and to state that they understood the terms and conditions of the contract, bill of quantities and will execute the construction work in accordance with the lump sum that they specified.

They need to specify a construction period from the date of possession of the site. Normally their Tender forms remain opened for consideration during 28 days from the date of submission.

Afterwards, if the tender is successful then it will be signed and witnessed ready to become a contract document.

The health and safety plan must be sent to competing contractors in accordance with CDM requirements in order that they may assess needs for their own contract arrangements.

A health and safety plan must be sent to the competing contractors before they start to assess their work requirements under the CDM regulations.

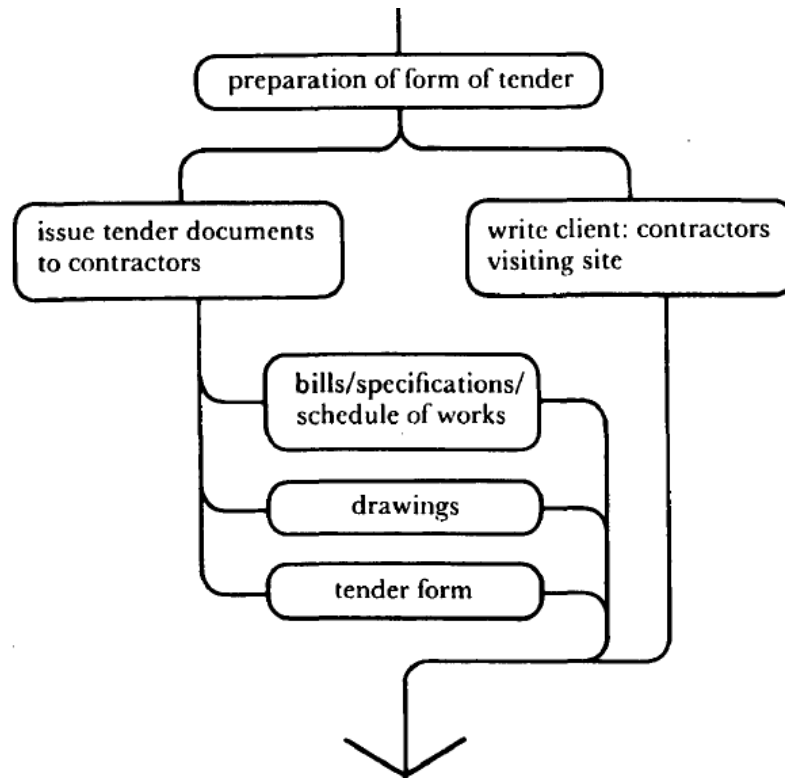


Fig. 16 - The Tendering process [5]

**Receipt of tendering documentation:**

After the receipt of all the tender forms, these must be opened at the time noted in the tender form and those arriving late must be excluded.

The quantity surveyor should prepare a report which covers an arithmetical check of the lowest tender and comments of tender which may have been inserted by contractors.

All tenders involved should be acknowledged immediately and the second lowest tender will be asked to hold his tender until the lowest has been examined.

Forward this to the client with your recommendations and advice on which tender to accept. Ask for the client's instructions to make the appointment on his behalf and prepare the contract documents in accordance with the tender submitted.

Afterwards, the report will be issued to the Client and the quantity surveyor will advise the best option to be accepted and will ask to appoint the contractor on his behalf. Then, the contract documents will be issued to the successful contractor.

Where an error in pricing is discovered in the lowest tender, the contractor should be informed. He has the option of withdrawing his tender, in which case the next lowest is examined; or he can stand by his tender or correct genuine errors.

The lowest tender should be informed, if the Quantity surveyor discovers a pricing error on the tender information. The contractor then can withdraw his tender and then the second lowest tender will be examined. If not, the contractor can stand by his tender or revise and modify the tender pricing.

When the contractor has been appointed, the other contractors should immediately be informed. Give a list of the prices received in descending order but without names so that they are able to see how their price compares with others.

The other contractors should be informed straight away after the contract was awarded to the successful bidder. The quantity surveyor normally issues a list of prices to the unsuccessful contractors in descending order with no names so they can have a better understanding of the price breakdown from the other competitors.

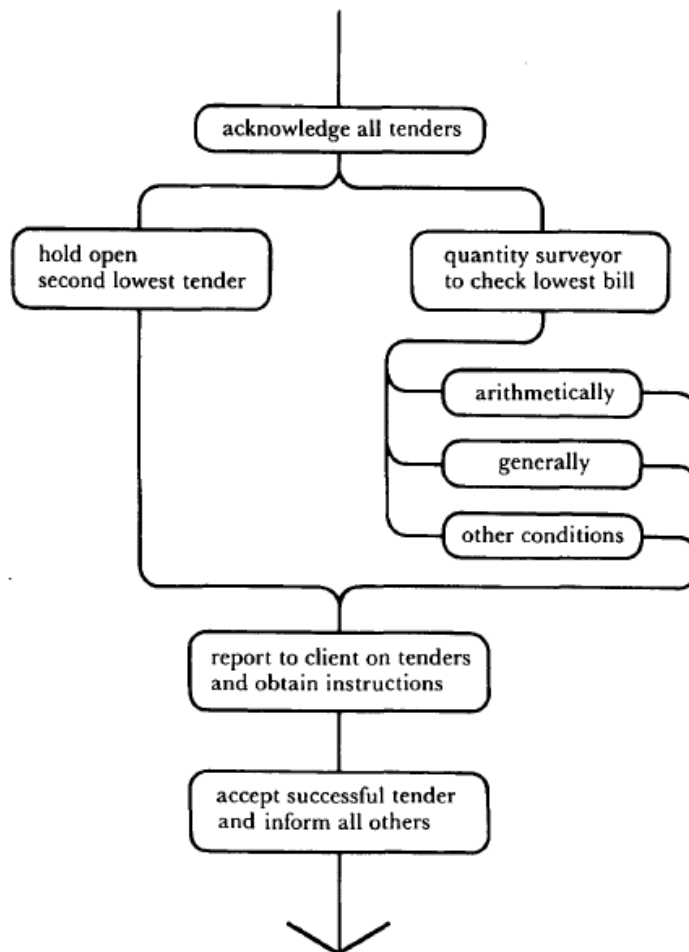


Fig. 17 - The Process after receiving Tender documentation [5]

### 3.2.1. SINGLE STAGE TENDERING

This tendering option is more suitable when the project needs to be fully designed and specified by the design team when the time available is not enough for a two-stage tendering. The contractor simply takes care of managing the construction work. The design team can identify, eliminate and control the possible risks in the project.

If time allows, and the project will benefit by an early input by the Contractor, then two-stage tendering should be considered. So, what are these benefits? Assuming that the design, specification and description/measurement of the works are correct, construction projects can fail financially in three main areas:

The Single stage tendering can fail, from a financial point of view, in three key areas:

1. Poor buildability - what looks good on paper or the computer screen can be difficult to build
2. Selection of uneconomic products and materials - alternative products and materials meeting the same performance requirements can reduce costs.
3. Inadequate risk identification, elimination, allowance and management - unidentified and uncontrolled risk wastes money.

Advantages of single stage tendering include:

- The Client control of design
- Design risk transfer to D&C contractor
- Time/cost certainty at award of D&C contract

### 3.2.2. TWO STAGE TENDERING

Two stage tendering is when the contractor's tenders are based on a partially developed consultant's design (Stage 1 tender). The contractor then assists with the final development of the design and tender documents, against which tenders for the construction works are prepared (Stage 2 tender). The first stage tender has the opportunity to tender or negotiate the second (construction) stage. This is suitable for a performance specification

In this option, the contractors submit outline design proposals in competition. After these have been evaluated, the client selects one or two preferred bidders who then work closely with the client and their technical advisor to prepare design upon which the D&C contract is negotiated.

Bringing the Contractor on board at an early stage and using his construction expertise in design can reduce the three failures described above in the Single stage tendering. The Contractor will be able to advise designers on buildability and help achieve economic design. The Contractor will be able to suggest alternative products and materials for consideration. The Contractor will be able to assist in the identification, elimination, allowance and management of construction risk.

This is a more reliable option regarding the three disadvantages that were mentioned above on the Single stage tendering option. With initial input from the contractor, the Client can achieve an economic design, a better understanding in terms of alternative products and materials and the construction risks can be better identified than in Single stage tendering.

The Contractor will add value engineering at an early stage and, therefore, with good potential to increase value.

Advantages of two stage tendering include:

- Short pre-tender period.
- An opportunity for value engineering due to an early input by the D&C contractor.

### **3.3. APPOINTING THE ARCHITECT**

*The Royal institution of British Architects, RIBA publishes a flexible range of Appointment Agreements suitable for use with projects of all sizes and complexity [7]:*

- *Standard Agreement*
- *Concise Agreement*
- *Domestic Project Agreement.*

In a construction project, the architect is required to:

- Supply the services through the normal standards of the architect's profession.
- Make sure the Client updated in relation to issues that might affect the program, cost or quality.
- Work along side other designers and the CDM co-ordinator.
- Have professional indemnity insurance cover
- Only make material alteration to the services or the approved design with the client's prior approval.
- Alter any design services only having the Client's approval.

#### **The range of architectural services:**

In addition to the role as the designer of your project, the architect could be invited to your project team and could also provide complementary management services such as:

The Architect will be the main designer of the construction project, but can be asked to provide additional services like:

- Project manager: In order to manage the programme, cost and quality requirements and the design team.
- Lead consultant: The architect can act like the main design consultant that will manage the other specialist consultants.
- Lead designer: Who co-ordinates the design by other consultants, specialists and suppliers
- Contract administrator or employer's agent: To help the Client in the appraisal of tenders and to administrate the construction contract.

The following table 2, shows The RIBA Outline Plan of Work that organises the process of managing, designing building projects and administering building contracts into a number of stages A–L. Architect’s services and fees are usually based on these stages[7].

Table 2 - RIBA Outline Plan of work [7]

PREPARATION	<p><b>A Appraisal</b>                      Identification of client’s needs and objectives, business case and possible constraints on development.                      Preparation of feasibility studies and assessment of options to enable the client to decide whether to proceed.</p>
	<p><b>B Design brief</b>                      Development of the client’s initial statement of requirements into the design brief by or on behalf of the client confirming key requirements and constraints.                      Identification of procurement method, procedures, organisational structure and range of consultants and others to be engaged for the project.</p>
DESIGN	<p><b>C Concept</b>                      Implementation of a design brief and input to the project brief.                      Preparation of a concept design including outline proposals for structural and building services systems, outline specifications and preliminary cost plan.                      Review of procurement route.</p>
	<p><b>D Design development</b>                      Preparation of a developed design to include structural and building services systems, updated outline specifications and cost plan.                      Completion of the project brief.                      Application for detailed planning permission.</p>
	<p><b>E Technical design</b>                      Preparation of technical design(s) and specifications, sufficient to co-ordinate components and elements of the project and information for statutory standards and construction safety.</p>

PRE-CONSTRUCTION	<b>F Production information</b> F1 Preparation of production information in sufficient detail to enable a tender or tenders to be obtained. Application for statutory approvals. F2 Preparation of further information for construction required under the building contract.
	<b>G Tender documentation</b> Preparation and/or collation of tender documentation in sufficient detail to enable a tender or tenders to be obtained for the project.
	<b>H Tender action</b> Identification and evaluation of potential contractors and/or specialists for the project. Obtaining and appraising tenders; submission of recommendations to the client.
CONSTRUCTION	<b>J Mobilisation</b> Letting the building contract, appointing the contractor. Issuing of information to the contractor. Arranging site handover to the contractor.
	<b>K Construction to practical completion</b> Administration of the building contract to practical completion. Provision to the contractor of further information as and when reasonably required. Review of information provided by contractors and specialists.
USE	<b>L Post-practical completion</b> L1 Administration of the building contract after practical completion and making final inspections. L2 Assisting building user during initial occupation period. L3 Post-occupation evaluation: review of project performance in use.

### 3.4. APPOINTING THE DESIGN CONSULTANT

Small/medium Engineering design firm in the UK, normally consists of:

*Partners* – The stakeholders of the design firm. They are Chartered Engineers who own the company and normally assist the Directors when required, in terms of professional services.

*Technical Directors* – Engineering professionals, who are chartered engineers. They run the engineering design team and liaise with the Partners updating them how the projects are developing financially and technically.

*Senior or Project Engineers* – Work directly with Graduate Engineers. They inform the Directors how the work is developing and produce work schedules for all projects involved. These are Chartered engineers and are entitled to check all the drawings and calculations coming from the graduate engineers. They run a project in terms of drawings and calculations required.

*Graduate Engineers* – Entry level engineers who work directly for the Senior or Project Engineers. They are involved normally in small number of projects and are gaining experience in order to become chartered engineers.

Chartered engineering status is a professional achievement in terms of work experience. This status is normally achieved after 5 or 6 years (or even less, in some cases) of experience in Design engineering. This depends on the requirements from the relevant institution (IStructE, the Institution of Structural Engineers or ICE, The institution of Civil Engineers). With this professional achievement, the graduate engineer has a professional status to become a Senior Engineer and run a design team and can endure in his career progression.

There are four key capabilities to choose the best design organization:

- The type of experience of designing similar projects.
- Experience and background of the people nominated for the project.
- The human resources and management systems of that design firm.
- Financial resources.

The Consulting engineer should be appointed directly by the Client. If we are talking about minor works, the architect can appoint the consultant. The terms and conditions of the agreement between the Client and the Consultant should be confirmed by letter including the basis of fees. The design consultant's accounts will be specified and passed to the Client for future payments.

An early meeting should be arranged with the Consulting engineer in order to discuss the following key information:

- Soil tests, position of trial holes on the site
- Materials and general construction relative to Fire engineering.
- Alternative types of structural system and it's interaction with electrical and mechanical services and its costs.
- Submission of calculations to local authorities, etc.
- Deliveries of materials or any special plant, access to site, or site restrictions.
- His own programme for the work and liaison between the Client and the Architect.

The main Design Management Work stages for the Consultant go as follows:

**Development of the brief:**

In this stage the designer is appointed. It's the starting point of the project and where the design information starts to be generated. All this information will be gathered towards a model of conceptual design, to be complemented on the next stage.

**Conceptual and scheme design stage:**

Is where the concept and outline design for the project is created. The project manager will start creating the budgets for time and cost and set to be approved by the Client. After it's approved, the designers will start working on the Scheme design where they will specified the basic structural systems, design solutions and specifications will be developed in order to have better understanding in terms of feasibility, cost and time budgets then all this information needs to be approved by the Client

### Engineering stage:

At this stage, the design consultant will issue the full design information. The project will be separated into different packages in order to establish the best procurement methods. The content of each package determines the type of procurement.

After the specialist contractors have been selected and the contracts signed, the design consultant will start producing all the detailed designs and these needs to be coordinated in a way to have all the necessary information for the construction stage

## 3.5. BASIS OF FEES CALCULATIONS

### 3.5.1. FOR THE ARCHITECT

The Architect's fee has no standard way of being calculated and depends on the type of services provided, procurement method, timetable, cost of the whole project and its complexity.

In Figure 18 shows the relationship between the level of resources and typical fees charged by private architectural practices. [8]

According to the RIBA, these are the most common options for fee payments [8]:

- a quoted percentage of the final cost of the building work
- a lump sum or sums
- time charges
- another agreed basis

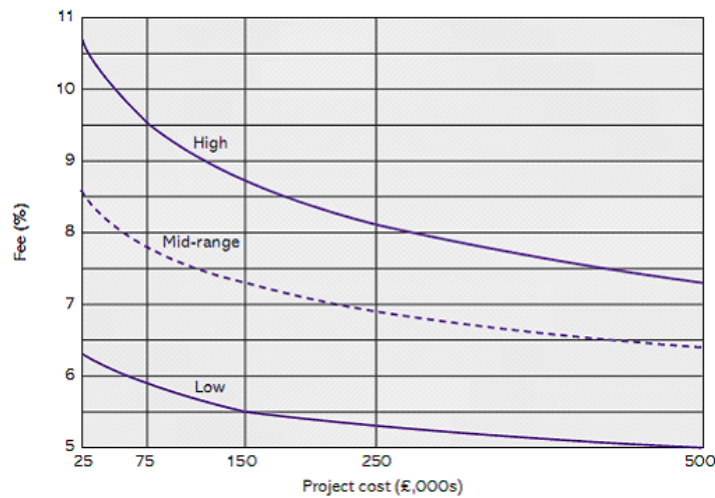


Fig.18 - Architects fees relative to project resource requirements. [8]

Table 3 - Relationship of resource requirements to Building type. [8]

	Architects resources		
	Low	Mid-range	High
Offices	Multi-storey and underground car parks	Banks Office developments	Telecom/computer buildings R&D laboratories Radio, TV, recording studios
Industrial	Barns and sheds Speculative warehouses Transport garages	Purpose-built factories and warehouses Animal breeding units	Food-processing units Breweries High-risk processes
Retail	Speculative retail	Food retail Non-food retail Garages/showrooms	Department stores Shopping centres
Community buildings		Community centres Branch libraries Schools Ambulance and fire stations Police stations Prisons Postal buildings Bus and railway stations Airports	Civic centres Specialist libraries Universities Churches and crematoria Museums and art galleries Courts Theatres, opera houses, concert halls and cinemas
Medical		Health centres Doctors' surgeries	Hospitals Dental surgeries
Public Housing		Social housing Sheltered housing Housing for single people	Special needs housing Residential care homes
Private housing		Apartment blocks	Individual houses/flats
Leisure		Sports halls Squash courts Swimming pools	Leisure complexes Restaurants Public houses Hotels

Percentage basis:

The fee is based on a percentage of the final construction cost and suitable for defined building projects with small variation on its budget.

Lump sums:

In this option the fee can be paid in Fixed lump sums or Variable lump sums.

Fixed lump sums are more used where time and cost are well defined from the start.

Variable lump sums are based on an agreed percentage normally at the end of stage D or in the beginning of each stage based on the latest approved budget.

Time basis:

This is the best option when the scope of services are not well defined or for additional design work or services like feasibility studies, party wall services etc.

### Value added

This option is calculated based on fact that the Architect might, for example increase the value of a site or the building when finished.

### Expenses

On top of the basic fee, expenses like administration work, travel, accommodation etc can also be charged.

For the RIBA Stages A and B (Appraisal and Design Brief) these are normally done on a time-charge basis additional to the basic fee. [8]

Normally of the basic fee for a full service (RIBA Work Stages C–L) up to applying for full planning permission (RIBA Work Stage D) will be about 35%. [8]

For the other stages, up to the acceptance of a tender (RIBA Work Stage H) approximately a further 40% and the rest during construction and on completion. [8]

The invoice for fees will be sent every month for payment within 28 days. Or, in some cases the fees can be paid in the end of every work stage. [8]

### 3.5.2. FOR THE DESIGN CONSULTANT

In terms of time charges:

Time charges are more suitable when a percentage of the construction budget can't be estimated. It's a good option for feasibility studies, advisory work and small projects.

The hourly rates are based on a multiplier to the staff remuneration cost. Normally a multiplier is 2.6 for office based and 1.3 for site staff, is recommended [8]

The multiplier is generated based on: [8]:

- a) Rent, rates, office equipment and supplies;
- b) Insurance and liability costs;
- c) Administrative, accounting, secretarial and financing costs;
- d) The cost of staff continuous professional development (CPD courses);
- e) The cost of preparing for new projects;
- f) The loss of productive time due to technical problems

Hourly cost of a Consulting engineer for a project is based on the following parameters is based on the annual remuneration of the Consulting Engineer of the gross remuneration including the cost of all benefits in kind, divided by 1600 [8]

In terms of lump sum payments:

For the Agreement B(1) – Non-Lead Consultant, Civil/Structural:

According to figure 19, the fee is calculated based a percentage of the works cost for Civil/ Structural construction work where the Consulting engineer takes responsibility using the upper B1 graph. But, if the fee is calculated as a percentage of the project cost, this is achieved by using the Project cost and the lower (B2) curve which is the ratio of Works Cost to Project cost (W/P). [8]

For additional services like detailed drawings and bar bending schedule or design services involving reinforced or pre-stressed concrete, masonry, timber, plastics, steel and other metals then an additional fee (usually 3% of the cost of such work) is charged. [8]

The proportionate amount of the fees for Normal services to be paid for each work stage is [8]:

Outline Proposals: 15%

Detailed Proposals: 20%

Final Proposals: 25%

Tender Action: 25%

Construction and Completion: 15%

These cases are the ones that normally every Architectural or engineering firm follows as a guide to generate fees. However, nowadays, in some cases this does not happen due to the fact that, after the credit crunch, there's even more competition in market than before.

So, firms have a tendency to drop the basic percentage fee, in order to be awarded with the contract easier than other competitors. Sometimes, the percentage can drop up to 50% less of the normal stated before in the guidance, leaving no choice for the client to choose the cheapest option. However, in some cases, the client will look towards the past experience and recognition achieved by the firms competing for that particular project. From my experience, sometimes clients go for a consultancy that they worked before and that achieve good results and performance in a project rather than the firm that presents the lowest fee.

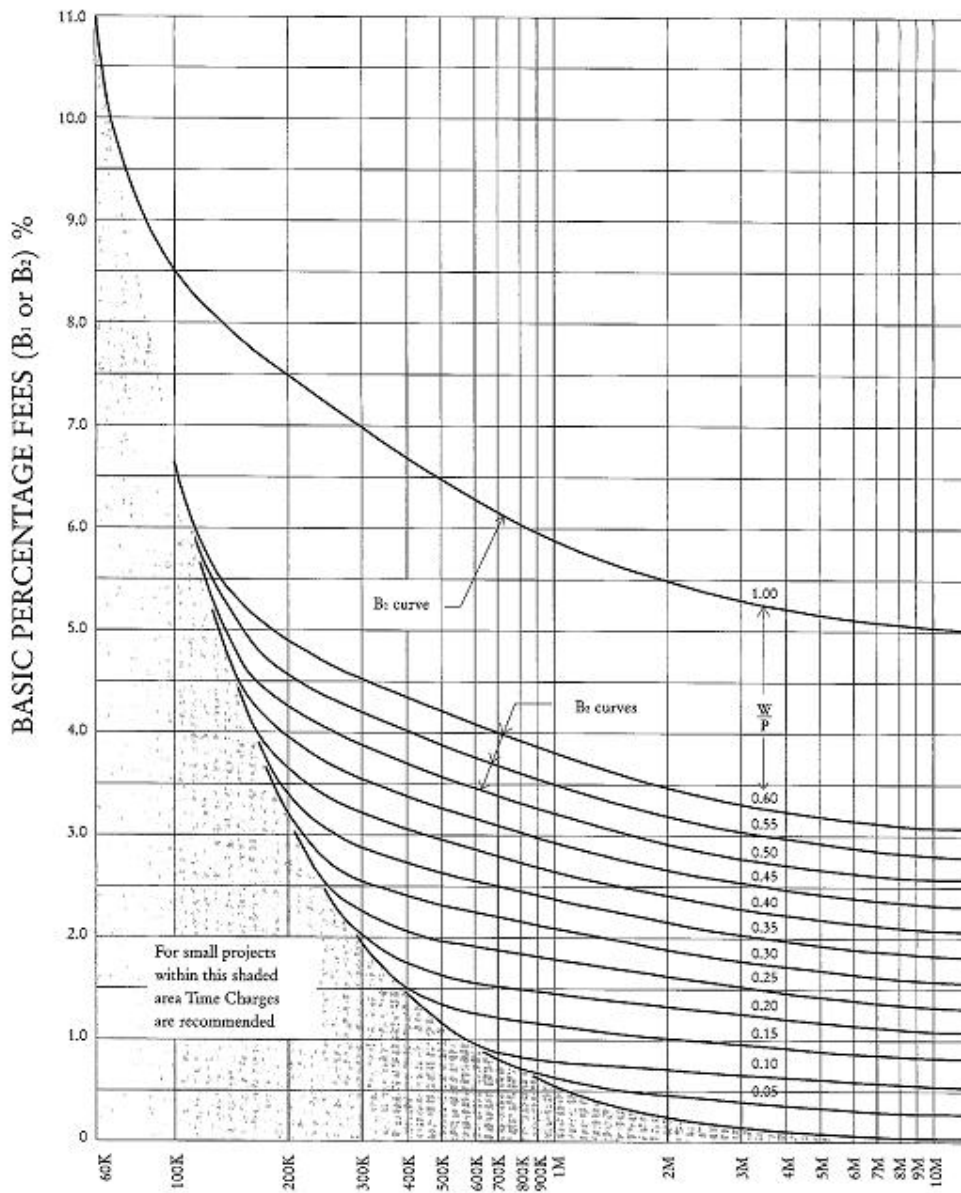


Fig.19 – Graph showing the relationship of percentage fee with works cost / project cost for Agreement B(1) – Non-lead Consultant, Civil/Structural Engineer. [8]

# 4

## WORK STAGES OF DESIGN MANAGEMENT

### 4.1. ROLES, INTERFACE AND RESPONSIBILITIES BETWEEN ALL PARTS

The process of design and construction is divided into stages: The approval of the functional brief; the approval of the scheme design; the completion of the engineering design and the placing of contracts either with a single contractor or by separate packages and the final acceptance and hand-over of the completed project. The Engineering design work is subdivided in the detail design by the architect, engineering, other specialist consultants and by the specialist contractors. Then, all drawings are signed off by all designers at the end of each stage with the Client's approval.

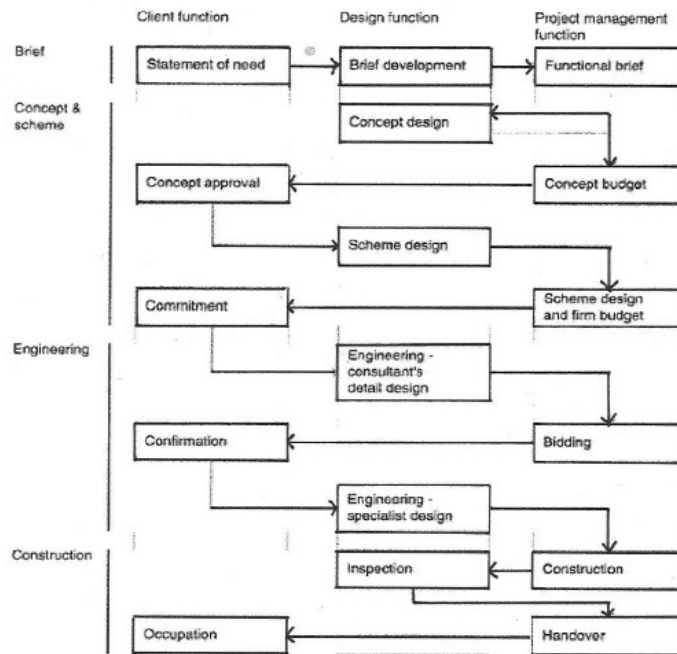


Fig.20 - Inter-relationship between client, design and project management functions in the process of design management. [9]

4.1.1. COORDINATION THROUGH ALL DISCIPLINES

In a construction project is necessary to have a good coordination between all the various disciplines in the starting stage, the Outline design. All this will help to accommodate electro-mechanical systems, structural openings, spatial requirements, landscaping etc.

Figure 21 shows how the information is coordinated through all the various disciplines in two stages:

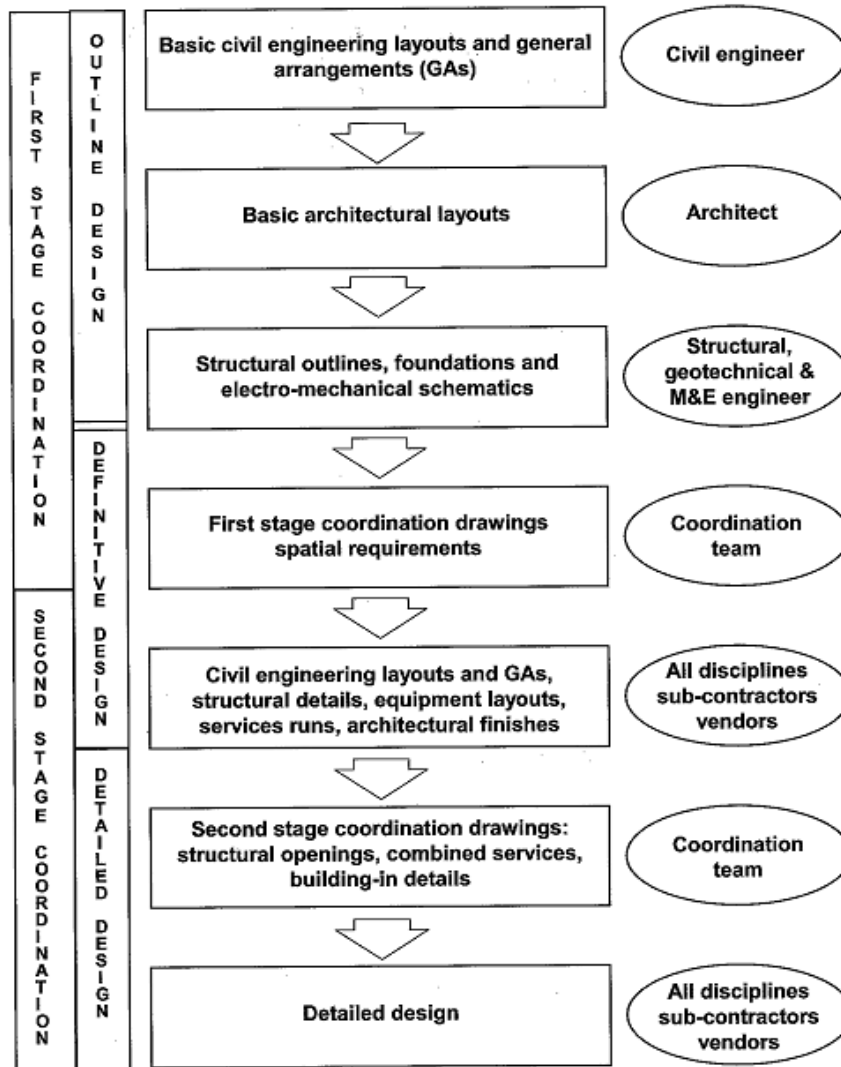


Fig 21, Multi-discipline coordination. [9]

During Implementation/Construction phase:

Organisation of the Implementation/Construction phase:

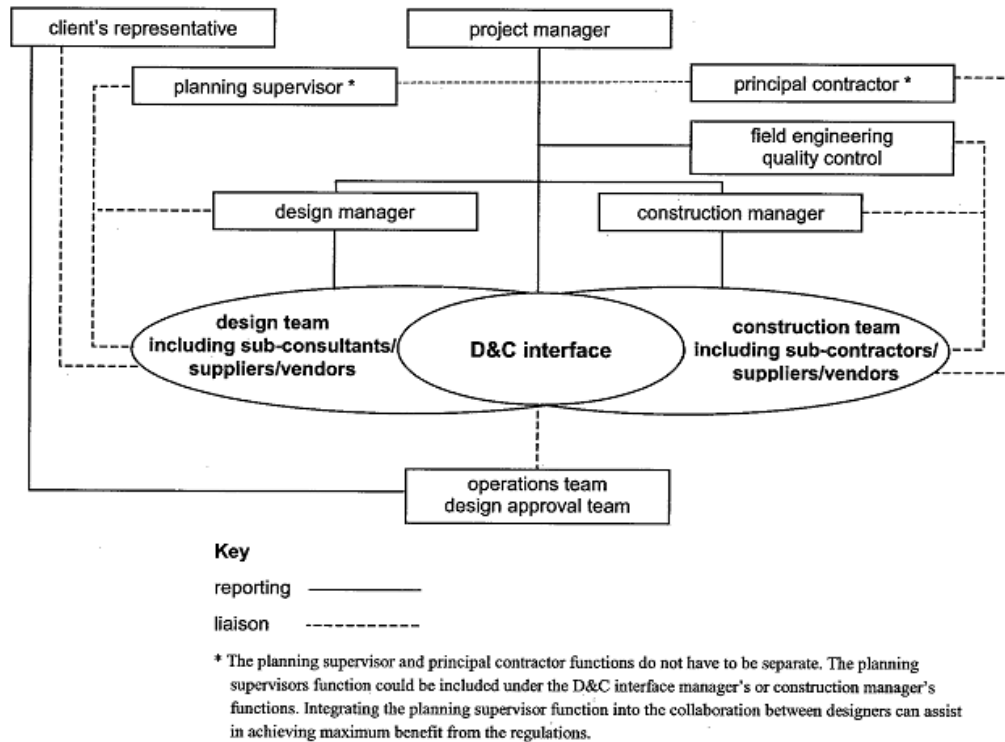


Fig.22 - Organisation in the implementation phase. [6]

#### 4.1.2 DESIGN CHECKING, APPROVAL AND CERTIFICATION

Responsibilities for certification, checking and review at the design/construction interface are divided between the various managers:

##### **Design manager**

- internal checking (via the design team)
- certification

##### **Construction manager**

- buildability
- programme

**D&C Interface manager**

- Multi-discipline coordination
- Cost control
- Issue to independent checker for approval

**Project manager**

- design review (undertaken by a senior engineer who is not a member of the design team)

Procedures should include a design flow diagram to summarise the process and responsibilities:

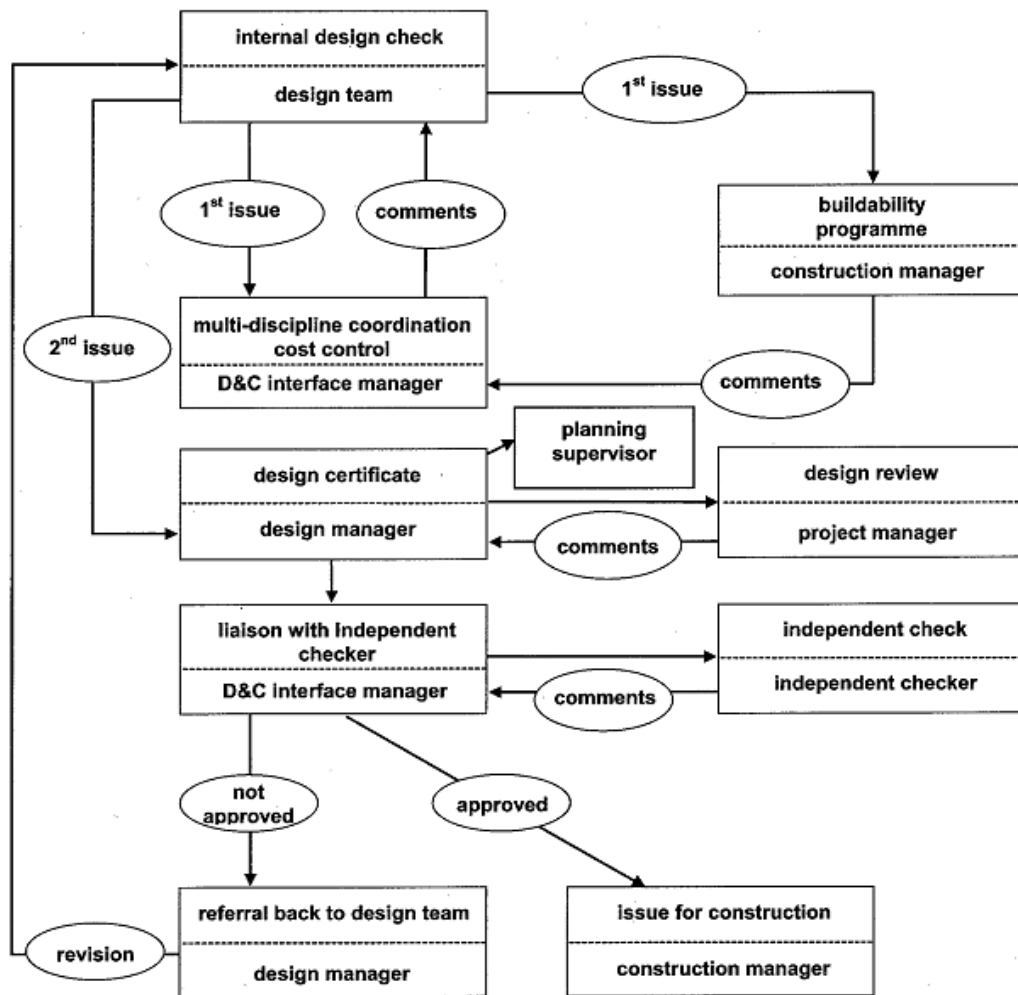


Fig.23 - Design check process flowchart. [6]

## 4.2. THE NETWORK OF PROJECT MANAGEMENT

### 4.2.1. ALIGNMENT OF WORK STAGES TO MEET THE DESIGN MANAGEMENT PLAN OF WORK

It's important, from the beginning, to establish the roles and relationships between all team members in order to achieve good management at each stage.

Figure 24 shows the different levels of involvement and a comparison between Architect's and Engineer's plan of work in terms of services proposed. This shows where the focus of influence lies between each side.

Architect's plan of work - work stages		Services proposed	Design management plan of work - work stages	
A	Inception	Brief and information gathering Site appraisal Advise on design work by specialist and other consultants	1	Brief: Statement of need Brief development Functional brief
B	Feasibility	Feasibility studies	2	Concept design, Feasibility studies and Scheme design
C	Outline proposals	Outline proposals		
D	Scheme design	Scheme design Advise on effect of changes Planning application		
E	Detail design	Detail design Cost checks on design Statutory approvals	3	Engineering: Detailed design by consultant design teams
F	Production information	Production information		
G	Bill of quantities	Bills of quantities		
H	Tender action	Other contracts Tender lists Tender action & appraisal	4	Procurement
J	Project planning	Project planning		
Engineering: Detail design by specialists				
K	Operations on site	Contract administration Inspections Financial appraisal	5	Construction
L	Completion	Completion Maintenance Record drawings	6	Commissioning & handover

Fig.24 - Alignment of work stages to meet the design management plan of work. [9]

4.2.2. MANAGEMENT OF THE DIFFERENT LEVELS OF INVOLVEMENT IN A PROJECT

Each construction project needs to have a good management structure in order to allow clear communication between every level of involvement. Figure 25, shows a model that describes the levels of involvement between Managerial and Designer's work and its responsibilities in the project.

<b>Managerial work</b>	<b>Level</b>	<b>Designer's work</b>
<i>Senior executive</i> Responsible for direction and representation of organization or very large project	V	<i>Senior partner</i> Responsible for representing practice and developing new technologies
<i>Contracts manager</i> Responsible for profitability of venture, including development of new and termination of old	IV	<i>Partner</i> Responsible for conceptual design and developing alternative solutions for client problems
<i>Site manager</i> Responsible for optimizing available resources to meet time and cost constraints	III	<i>Associate</i> Responsible for designing systems to make the concept work
<i>Foreman</i> Responsible for the allocation of work and the communication and overseeing of standards of output from Level I	II	<i>First entry professional</i> Responsible for detailed design of component parts
<i>Craftsman</i> Responsible for the direct physical output relating to the work of all levels above	I	<i>Technician</i> Prescribed output as defined by those in higher levels, e.g. drafting

Fig 25, Levels of production organizations interpreted into a design practice. [9]

Figure 26, shows these levels of involvement described into work across the project team.

On Level V, a good relationship between the director of the client and the project director from the management function is required. On this level it's going to be discussed what the project is going to achieve in terms of the client's business.

On Level IV, people such as financial experts and concept designers, liaise with those who will be involved for each phase of construction.

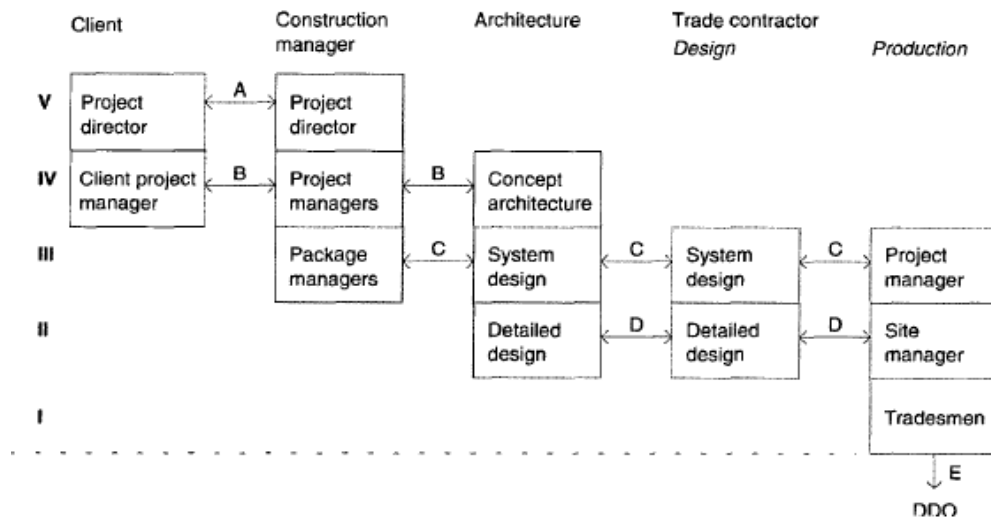


Fig.26 - Levels of work across the project team. [9]

Level III has to do with operational matters regarding the framework provided by the managers at level IV.

At level II, that's where the interface between design staff and construction or production supervisors happens.

By level I, the design work should be finalised and detailed in order not to compromise any disruption for the workers involved.

# 5

## LAWS GOVERNING THE PROFESSIONAL ACTIVITY

### 5.1. GENERAL REMARKS

Legislation imposes conditions on the practising consultants (on Architect or Engineers) work, and is increasingly used to reformulate areas of law which have become unmanageable. It is also used to introduce new areas of law, some of which are the result of complying with European Directives:

***Laws regarding the business premises:***

*(These are the laws used for the premises that the company will be using)*

Occupier's Liability Acts 1957-84 Trade Descriptions Acts 1968-72

Offices Shops and Railway Premises Unfair Contract Terms Act 1977

***Laws applied when running the business:***

*(These are the laws that the company needs to comply in order to trade)*

Business Names Act 1985

Civil Liability (Contribution) Act 1978

Companies Acts 1985-89

Copyright Designs and Patents Act 1988

Data Protection Act 1998

Employer's Liability (Compulsory Insurance) Act 1969

Health and Safety at Work, etc Act 1974

Insolvency Act 1986

Limitation Act 1980

Limited Partnership Act 1907

Limited Liability Partnership Act 2000

Partnership Act 1890

***Laws regarding employing staff:***

*(These are the laws that need to be complied in order to manage and employ staff)*

Disability Discrimination Act 1995

Employment Protection (Consolidation) Act 1978

Employment Acts 1980-88

Employment Rights Act 1996

Employment Relations Act 1999

Equal Pay Act 1970

National Minimum Wage Act 1998

Pensions Schemes Act 1993

Race Relations Act 1976

Sex Discrimination Acts 1975-86

***Laws applied for professional services:***

*(These are the laws to be followed regarding the services that the company will be providing)*

Architects Act 1997

Arbitration Act 1996

Consumer Protection Act 1987

Housing Grants, Construction and Regeneration Act 1996

Supply of Goods and Services Act 1982

Trade Descriptions Acts 1968-72

Unfair Contract Terms Act 1977

Contracts (Rights of Third Parties) Act 1999

***Laws to be followed regarding projects:***

*(These are the laws regarding all aspects of project development):*

Ancient Monuments and Archaeological Areas Act 1979

Building Act 1984

Control of Pollution Act 1974

Control of Pollution (Amendment) Act 1989

Countryside and Rights of Way Act 2000.

Defective Premises Act 1972

Environmental Protection Act 1990

Environment Act 1995

Factories Act 1961.

Fire Precautions Act 1971

Highways Act 1980

Historic Building and Ancient Monuments Act 1953

Housing Acts 1974-96

Latent Damage Act 1986

Law of Property Acts 1925-69

Licensing Acts 1964-88

Museums and Galleries Act 1992

Noise and statutory Nuisance Act 1993

Party Wall, etc Act 1996

Planning and Compensation Act 1991

Planning (Listed Buildings and Conservation Areas) Act 1990

Prescription Act 1832

Rights of Light Act 1959

Safety of Sports Grounds Act 1975

Sale and Supply of Goods Act 1994

Town and Planning Act 1990

## **5.2. KEY REPRESENTATIVE BODIES**

The following are the organisations that represent all the parties involved in a project:

### **Client organisations:**

*British Property Federation (BPF)*

*Local Government Association (LGA)*

*Confederation of Construction Clients (CCC, Formerly the Construction Clients' Forum)*

### **Professional organisations:**

*Architecture and Surveying Institute (ASI)*

*Architects' Council of Europe (ACE)*

*Association of Building Engineers (ABE)*

*Association of Consultant Architects (ACA)*

*Association of Consulting Engineers (ACE)*

*Association of Planning Supervisors (APS)*

*Association of Project Managers (APM)*

*Commonwealth Association of Architects (CAA)*

*Institute of Clerks of Works of Great Britain (ICW)*

*Institute of Civil Engineers (ICE)*

*Institute of Electrical Engineers (IEE)*

*Institute of Mechanical Engineers (IMechE)*

*Institute of Structural Engineers (IStructE)*

*International Union of Architects (IUA)*

*Landscape Institute (LI)*

*Royal Town Planning Institute (RTPI)*

*Royal Institution of Chartered Surveyors (RICS)*

*Royal Institute of British Architects (RIBA)*

**Contractor organisations:**

*Construction Confederation (CC)*

**Industry organisations:**

*British Board Agreement (BBA)*

*British Standards Institute (BSI)*

*Building Research Establishment (BRE)*

*Building Services Research and Information Association (BSRIA)*

*Building Cost Information Service (BCIS)*

*Construction Industry Council (CIC)*

*Construction Industry Board (CIB)*

*Construction Industry Research and Information Association (CIRIA)*

*Construction Industry Training Board (CITB)*

*Joint Contracts Tribunal Ltd (JCT)*

*National House Building Council (NHBC)*

*Timber Research and Development Association (TRADA)*

### **5.3. STANDARD AGREEMENTS BETWEEN STAKEHOLDERS AND INVOLVED PARTIES**

The following are the initial agreements between the client and the consultant engineer for engineering services:

**Agreement A** – for use where a Consulting engineer is engaged as a Lead consultant.

**Agreement B** – for use where a Consulting engineer is engaged directly by the Client, but not as Lead Consultant.

**Agreement C** – for use where a Consulting engineer is engaged to provide design services for a design and construct Contractor.

**Agreement D** – for use where a Consulting engineer is engaged to provide Report and Advisory Services.

**Agreement E** – for use where a Consulting engineer is engaged as Project Manager.

**Agreement F** – for use where a Consulting engineer is engaged to act as a Planning Supervisor in accordance with the Construction (Design and Management) Regulations.

**Agreement G** – for Minor works.

**Agreement H** – for the Clients representative for Design and Construct work.

**Agreement I** – for Sub-Consultancy services.

Agreements A, B and C are each published in two variants for different engineering disciplines as follows:

**Variation 1:** Civil and Structural Engineering

**Variation 2:** The Engineering of electrical and Mechanical Services in Buildings.

In terms of Contents, each agreement comprises the following:

- Memorandum of agreement.
- Conditions of engagement
- Appendix I – Services of the Consulting Engineer
- Appendix II – Remuneration of the Consulting Engineer

The Memorandum of Agreement:

There is a different memorandum for each agreement, reflecting in each instance the particular relationships between the parties.

Conditions of Engagement:

The conditions can normally stand as drafted but clauses maybe be deleted and others be added should circumstances be so require for a particular commission.

Appendix I – Services:

This relates to the services performed, Normal or additional Services.

Appendix II – Fees and Disbursements:

This part relates to the fee payments applicable for normal services. This part needs to state time charge rates, fee percentages and, as well, interest rates on delayed payments.

# 6

## CONCLUSIONS

From experience in Project and construction management in both countries Portugal and England (just a bit in Portugal, but enough to analyse both), it is safe to say that the level of communication between levels is more efficient in England than in Portugal. The level of respect and decent dialog between, for example, a construction manager and the site agent, is very well achieved in England rather than the “chaotic” levels that, unfortunately, still exist in Portugal. A good and polite level of communication proved to create a harmony of better production in the design and construction team.

The design consultancies provide graduate engineers with more learning and continuous professional developments. There is always an “open door” in terms of career progression. So, a graduate engineer that proves to be efficient in their tasks can climb the company hierarchy tree faster than in Portugal.

The Management systems in England proved to be efficient, as well, due to a good law enforcement system in England. For example, payments of fees to a consultant are not delayed compared with what happens regularly in Portugal. The Client will have to stick to the dates specified in the Memorandum of agreement between him and the Consultant or else will be sued and prosecuted in a faster way.

The Health and Safety laws are very strict in the UK and its enforcement as well providing safer sites all across the country and prosecuting all companies who don't comply with the rules for millions of pounds per year. There are surprise Health and Safety investigations on almost all sites in the UK. The construction company, when approached by a member of the Health and safety institution will have to provide all the necessary documentation that ranges from, example, Site workers professional documentation to safety equipment warranty documents. All documentation needs to be up to date, if not the company will be sued and all construction work will be stopped. Construction sites in England have a site documentation system in place ready to inspect that provides good company efficiency.

The design teams in UK have different ways to determine the professional recognition, in terms of management levels. Only an Engineer that achieved chartered status within a recognised institution like the IStructE (Institution of Structural Engineers) or for example, the ICE (Institution of Civil Engineers, can become a Design manager in order to check drawings and calculations before submission. In order to achieve chartered status, the graduate engineer needs to follow all the necessary procedures, within the relevant institution, to achieve this recognition. Normally, after some years of experience for example, in the IStructE, the Engineer will need write a report about the professional activity through the years in terms of different projects that have been involved through a format given by the relevant institution. Then all these documents will be submitted to a technical committee that will evaluate the candidate's process.

If the committee accepted the candidature, the candidate will have to do a presentation that will reflect all the documents submitted followed by a portfolio of all the projects that was involved in the past. Then, the committee will determine if the candidate was accepted or not. If they determined that it was accepted then, the Engineer will have to do the part 3 exam, which is an all day exam with several exercises with structural design cases. The candidates will pick up 2 cases of study and will have to provide the relevant calculations and construction details for each case. After some months, the Institution will announce if the candidate passed the exam or not. If the Engineer passed the exam, he will be awarded with chartered status, if not; will have to do the exam again in the following year.

Only a Chartered Engineer can be a design checker and sign the final project. With this recognition, the Engineer can achieve a senior position like a Technical director and run the design team.

This example of this professional institution reflects the long process in order to achieve this recognition, which can be a downturn if the Engineer wants to achieve a quick career progression.

Even with slight optimistic forecast for 2011 in the UK, the young engineering professionals should as well, continue continuous professional development in their main areas of study and prepare for a possible upturn in economy.

This project course provides the main information for an engineering professional in a Civil and Structural Engineering background that wants to learn more about the Construction industry in UK and maybe compare it with the Portuguese industry in order to establish a critical comparison between the two in order to, maybe, get better ideas for their management systems.

Most important the good principles that have worked in the past will work again in the future. We must support an approach which encourages: long-term thinking and planning; government commitment; public-private partnership and investment which shares risks and rewards; more efficient, flexible and innovative local leadership and decision-making; a commitment to economic and social as well as physical regeneration. The next period will present some challenging questions and problems. It is crucial we use the time not panicking but finding some good answers and solutions. Regeneration is a long haul business. There is every reason and need to continue with it.

## REFERENCES

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- [3] Kern, David. UK Economic Forecast. September 2009. <http://www.britishchambers.org.uk/>
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- [5] Green, Ronald. The Architects guides to running a job, 6<sup>th</sup> edition. Architectural press, London, 2001
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- [9] Gray, Colin. Hughes, Will. Building design Management, Butterworth Heinmann, London, 2002
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## **APPENDIX**

### **A.1. TYPICAL AGREEMENT BETWEEN THE DESIGN CONSULTANT AND THE CLIENT**

The following is a typical Agreement between the Design consultant and the Client for a non Lead consultant in the UK [10]:

## A MEMORANDUM OF AGREEMENT

**MEMORANDUM OF AGREEMENT** made the \_\_\_\_\_ day of \_\_\_\_\_

BETWEEN \_\_\_\_\_

of \_\_\_\_\_

\_\_\_\_\_ ("the Client")

and \_\_\_\_\_

of \_\_\_\_\_

\_\_\_\_\_ ("the Consultant").

The Client is proposing to \_\_\_\_\_

\_\_\_\_\_ ("the Project")

at \_\_\_\_\_

and hereby appoints the Consultant to provide the professional services as described in this Agreement and the Consultant agrees to provide such services. Save in respect of the benefits or rights conferred on the Consultant's Personnel pursuant to B8.9 nothing in this Agreement confers or purports to confer on any third party any benefit or right to enforce any term of this Agreement pursuant to the Contracts (Rights of Third Parties) Act 1999.

**A1** This Agreement comprises  
A: Memorandum of Agreement  
B: Conditions  
C: Schedule of Services

**A2** The Services to be performed under this Agreement shall be the professional civil/structural engineering services listed at A19 in relation to those particular parts of the Project for which the Client has appointed the Consultant and comprising the work elements listed at A7.

**A3** The Client proposes to use \_\_\_\_\_  
as the method for procurement of the Project.

A4 The Client's estimated costs for the Project are £

A5 The intended date for completion of the Project is scheduled to be

A6 The Client has appointed or proposes to appoint

of  as Lead Consultant

and

of

and

of

and

of

as Other Consultants to provide professional services in respect of other aspects of the Project.

A7 The particular parts of the Project for which the Client has appointed the Consultant are

and which shall comprise the following work elements ("the Works")<sup>1</sup>.

- Earthworks and excavation
- Dredging and land reclamation
- Foundations including forms of piling but not the design of the piling
- Earth and water retaining structures including reinforced earth
- Ground and surface treatment
- Local and main, public health and land drainage; inspection chambers, sewers, interceptors, tanks, treatment works and ground dewatering
- Irrigation systems
- Paving and surfacing; roads, carparks and footpaths
- Fencing and landscaping
- Railways including permanent way
- Tunnels; excavations, linings, supports and ground stabilisation
- Structures in in-situ or precast concrete employing unreinforced, reinforced or prestressed techniques
- Structures in masonry, brickwork or blockwork, unreinforced or reinforced
- Structures in metalwork, ferrous or non-ferrous
- Structures in timber or reinforced plastics
- Demolition of structures

<sup>1</sup> Delete elements in respect of which the Services are not required and add others as necessary.

**A8** The Consultant's Project Leader shall be [redacted] (B2.7 refers)

**A9** The Client's Representative shall be [redacted] (B3.5 refers)

**A10** The sum referred to in B8.1 in respect of the liability of the Consultant for any claim or series of claims arising out of the same occurrence or series of occurrences is £ [redacted] (B8.1 refers)

**A10A** The Consultant is not responsible under this Agreement or otherwise for designing or advising on or otherwise taking measures to prevent or mitigate the effect of any act of terrorism or any action that may be taken in controlling preventing suppressing or in any way relating to an act of terrorism<sup>1</sup>.

*Either*<sup>2</sup>

**A10B** Notwithstanding anything to the contrary in this Agreement and without prejudice to any provision in this Agreement whereby liability is excluded or limited to a lesser amount:

(a) the total liability of the Consultant in respect of all claims under or in connection with this Agreement arising out of or in connection with pollution and contamination shall not exceed in aggregate the sum of [redacted]

(b) such pollution or contamination liability as limited by the aggregate or balance thereof under (a) shall not exceed in respect of any one claim or series of claims arising out of the same occurrence or series of occurrences the lesser of (i) the direct costs reasonably incurred by the Client in cleaning up the site of the Project or the Works as the case may be or any part thereof or (ii) the amount, if any, recoverable by the Consultant by way of indemnity against the claim or claims in question under any professional indemnity insurance taken out by the Consultant and in force at the time that the claim or claims or (if earlier) circumstances that might give rise to the claim or claims is or are reported to the insurers in question. Alternative (ii) shall not apply if no such amount is recoverable due to the Consultant having been in breach of his obligations under B8.11 or of the terms of any insurance maintained in accordance therewith or having failed to report the claim or such circumstances to the insurers in question timeously.

*Or*<sup>2</sup>

**A10B** The liability of the Consultant for any claim or claims arising out of or in connection with pollution and contamination is excluded. (B8.7 refers)

**A11** The period of the Consultant's liability is from the effective date hereof to [redacted] years after the date of substantial/practical<sup>3</sup> completion of the Project. (B8.10 refers)

<sup>1</sup> Delete if not applicable – see Guidance on Completion  
<sup>2</sup> Delete one of the paragraphs A10B – see Guidance on Completion  
<sup>3</sup> Delete as applicable

**A12** The amount of Professional Indemnity Insurance to be carried by the Consultant for any one occurrence or series of occurrences is £ [redacted] (B8.11 refers)

**A13** The period for which Professional Indemnity Insurance is to be maintained is from the effective date hereof to [redacted] years after the date of substantial/practical<sup>1</sup> completion of the Project. (B8.11 refers)

**A14** Where liability for pollution and contamination is not excluded under A10B, within that amount of Professional Indemnity Insurance, the annual aggregate limit of cover in respect of pollution and contamination is £ [redacted] (B8.11 refers)

**A15** The amount of Public Liability Insurance to be carried by the Consultant is £ [redacted] (B8.12 refers)

**A16** Warranties for the benefit of third parties are/are not<sup>2</sup> to be provided. (B8.14 refers)

**A17** The number of periodic visits to the site by the Consultant during the construction of the Works (including attendance at site meetings and additional to the presence of Site Staff, if any, appointed under B4) allowed for in the Normal Services is [redacted] (C8.6 refers)

**A18** This Agreement shall be governed by and construed in all respects in accordance with the laws of England/Scotland<sup>3</sup> and each party hereby submits to the non-exclusive jurisdiction of the English/Scottish<sup>3</sup> courts.

**A19** For the purposes of this Agreement, "Normal Services" shall mean the Services set out in C1 to C9<sup>4</sup> [redacted]  
[redacted]  
[redacted]

and "Additional Services" shall mean all Additional Services set out in C10 save for those if any listed above as Normal Services together with any other further Services requested by the Client and consented to by the Consultant.

<sup>1</sup> Delete as applicable.

<sup>2</sup> Delete as applicable.

<sup>3</sup> Delete as applicable. If a different law is to apply, amend as appropriate.

<sup>4</sup> Complete as appropriate.

**A20** Basis of Payment of Fees<sup>1</sup>

20.1 Payment of fees for Normal Services shall be

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

20.2 The rates for time based fees

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**A21** Payment by Instalments

21.1 Time based fees shall be paid by instalments \_\_\_\_\_ and the amount due in each instalment shall be the sum calculated in accordance with B6.2.4 for the period in question.

21.2 Fees for Additional Services shall (if a lump sum has been agreed) be paid by instalments \_\_\_\_\_ from the date of commencement of the Additional Services.

21.3 Otherwise payment by instalments shall be

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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<sup>1</sup> Refer to Guidance on Completion.

**A22** Payment of Expenses

22.1 Expenses incurred in performing the Normal Services shall be paid at cost/paid at cost plus a handling charge of [ ] % /paid as a lump sum of £ [ ] / paid as [ ] % of the Works Cost/Project Cost/included in the fee<sup>1</sup>. Invoices for the recovery of expenses shall be submitted monthly/quarterly<sup>1</sup> and the amount invoiced shall be the total of all expenses incurred during the interval in question.

22.2 Expenses incurred in performing Additional Services shall be paid at cost/paid at cost plus a handling charge at [ ] % included in the fee<sup>1</sup>. Invoices for the recovery of expenses shall be submitted monthly/quarterly<sup>1</sup> and the amount invoiced shall be the total of all expenses incurred during the interval in question.

**A23** Rate of Interest

Interest shall be calculated in accordance with the Late Payment of Commercial Debts (Interest) Act 1998 and at the relevant reference rate plus the statutory rate of interest.

(B6.6.1 refers)

**FOR EXECUTION OF THE AGREEMENT UNDER HAND**

*The Client and the Consultant should sign below.*

SIGNED by or on behalf of the Client



SIGNED by or on behalf of the Consultant



<sup>1</sup> Delete and complete as applicable.

**FOR EXECUTION OF THE AGREEMENT AS A DEED**

*The Client and the Consultant should sign below in the appropriate places, depending on whether they are doing so as companies, as partners, as members of a limited liability partnership or individuals.*

In Witness whereof the Parties have executed this Agreement as a Deed the day and year first before written.

**For use when the Client is a company**

EXECUTED as a Deed by the Client

by (Director)<sup>1</sup>

\_\_\_\_\_

Director<sup>2</sup>

\_\_\_\_\_

and (Director)<sup>1</sup>

\_\_\_\_\_

Director/Secretary<sup>2</sup>

\_\_\_\_\_

*The Company Seal need not be affixed.*

<sup>1</sup> Insert names and indicate offices of signatories.

<sup>2</sup> Signatures of Director and Director or Company Secretary.

**Or, for use when the Client is an individual**

SIGNED as a Deed by the Client<sup>1</sup>

in the presence of<sup>2</sup>

witness<sup>3</sup>

**For use when the Consultant is a company**

EXECUTED as a Deed by the Consultant

by (Director)<sup>4</sup>

Director<sup>5</sup>

and (Director/Secretary)<sup>4</sup>

Director/Secretary<sup>5</sup>

*The Company Seal need not be affixed.*

<sup>1</sup> Signature of individual Client.

<sup>2</sup> Name and address of witness

<sup>3</sup> Signature of witness

<sup>4</sup> Insert names and indicate offices of signatories

<sup>5</sup> Signatures of Director and Director or Company Secretary

**For use when the Consultant is a limited liability partnership**

Executed as a Deed by the Consultant

by (Member)<sup>1</sup>

Member<sup>2</sup>

and (Member)<sup>1</sup>

Member<sup>2</sup>

<sup>1</sup> Insert name of member of the limited liability partnership  
<sup>2</sup> Signature of member of the limited liability partnership

**Or, for use when the Consultant is a sole practitioner or partnership**

SIGNED as a Deed by the Consultant:

by (partner or sole practitioner)<sup>1</sup>

partner or sole practitioner<sup>2</sup>

in the presence of<sup>3</sup>

witness<sup>4</sup>

by (partner)<sup>1</sup>

partner<sup>2</sup>

in the presence of<sup>3</sup>

witness<sup>4</sup>

by (partner)<sup>1</sup>

partner<sup>2</sup>

in the presence of<sup>3</sup>

witness<sup>4</sup>

<sup>1</sup> Insert name of signatory.

<sup>2</sup> Signature of partner or sole practitioner.

<sup>3</sup> Name and address of witness.

<sup>4</sup> Signature of witness.

**FOR USE WHERE THE APPLICABLE LAW IS THAT OF SCOTLAND**

In witness whereof these presents together with Sections B and C and<sup>1</sup>

executed as follows:

They are executed for and on behalf of the Client by being subscribed for and on behalf of the Client by<sup>2</sup>

who is a director/secretary/person/partner/proper officer<sup>3</sup> authorised to sign these presents for and on behalf of the Client, before this witness

Person authorised to sign  
for and on behalf of the Client

Signature of Witness<sup>4</sup>

Full name of Witness

Address of Witness

Occupation

<sup>1</sup> Insert full details of any separate pages or schedules which are to form part of the document including the number of pages if more than one. Also include full details on each annexation eg the names of the Client and the Consultant and the site, so as to clearly identify the annexation as referable to the Conditions.

<sup>2</sup> Insert full name of director/secretary/person or authorised signatory/partner of Client/proper officer if a Local Authority.

<sup>3</sup> Delete as applicable.

<sup>4</sup> A witness must know the person whose signature they are witnessing but preferably should have no interest in the document e.g. one signatory should not witness the signature of another signatory. If the usual signature of the witness is not his/her full name (eg if James Donald Smith's signature is Jim Smith) then the witness should state this (eg James Donald Smith [subscribing "Jim Smith"]).

They are executed for and on behalf of the Consultant by being subscribed for and on behalf of the Consultant by <sup>1</sup> \_\_\_\_\_

who is director/secretary/person/partner/member<sup>2</sup> authorised to sign these presents for and on behalf of the Consultant, before this witness:-

\_\_\_\_\_

Person authorised to sign for and on behalf of the Consultant

Signature of Witness<sup>3</sup> \_\_\_\_\_

\_\_\_\_\_ Full name of Witness

\_\_\_\_\_ Address of Witness

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ Occupation

<sup>1</sup> Insert full name of director/secretary/person or authorised signatory/partner of Consultant/member of limited liability partnership.

<sup>2</sup> Delete as applicable.

<sup>3</sup> A witness must know the person whose signature they are witnessing but preferably should have no interest in the document e.g. one signatory should not witness the signature of another signatory. If the usual signature of the witness is not his/her full name (eg if James Donald Smith's signature is Jim Smith) then the witness should state this (eg James Donald Smith [subscribing "Jim Smith"]).