# PRICING AND BIDDING

IYCB 1

## Handbook

# PRICING AND BIDDING (IYCB 1) HANDBOOK

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# PREFACE

The *Improve Your Business (IYB)* approach to small enterprise development has proved its worth in many different countries, and has demonstrated the need for publications which are written simply and clearly but which can still communicate the basic management knowledge required by entrepreneurs if they are to run small businesses successfully.

Although all small businesses face some common problems and certain management principles are universal, experience has shown that a sector-specific development of the IYB approach would be widely welcomed.

This demand was particularly strong from enterprises in the construction sector, since small contractors have to cope with the special managerial problems that arise from bidding for and carrying out varied and dispersed projects. They are also faced with highly cyclical demand.

The ILO has responded by developing this Improve Your Construction Business (IYCB) series to suit the specific needs of small building and public works contractors. The IYCB series of three handbooks and three workbooks is available either separately or as a set, and comprises:

Pricing and bidding (IYCB 1) Handbook and Workbook

Site management: (IYCB 2) Handbook and Workbook

Business management (IYCB 3) Handbook and Workbook

They have been designed for self-study, but there is also an IYCB trainer's guide to assist trainers in preparing for and running seminars and workshops. As demand emerges, further handbooks and workbooks will be added to suit the specialist needs of, for example, road contractors and materials manufacturers.

The first handbook and workbook deal with pricing and bidding to obtain new projects. Too many contractors produce "guesstimates"–not estimates–of project costs, so they either bid too high and lose the contract or–often even worse–get the work at a price which is below cost. This first handbook takes the reader step-by-step through the preparation of the

bid for a small building contract, and also contains a contract glossary, while the workbook tests the readers' estimating skills and helps to identify the strengths and weaknesses of their businesses.

The second handbook and workbook start where the first set finishes–a potentially profitable contract has been won. The first part of these books, "planning for profit", helps the reader to prepare a realistic plan to carry out the work, while the second part, "making it happen", deals with the principles and practice of site supervision.

The third handbook and workbook cover business management. A contracting firm is not just a collection of individual contracts; it is also a business enterprise. These books focus on financial control and office administration, areas frequently neglected by contractors, who are generally more interested in the technical aspects of building work.

The way the IYCB system works is that the *handbook* provides ideas and information and the *workbook* gives readers a chance to look at their business in a disciplined way, and decide on action plans to make it more competitive and successful. Together, the IYCB series should enable you, as the owner or manager of a small construction enterprise, to improve *your* construction business. As joint authors with between us about a hundred years' experience of working with small contractors around the world, we understand the risky and demanding environment in which you work and hope that the IYCB series will help you and your firm to survive and prosper.

This book was prepared and edited under the auspices of the ILO's Construction Management Programme, which was initiated within the Entrepreneurship and Management Development Branch of the Enterprise and Cooperative Development Department, and is now based in the Policies and Programmes for Development Branch of the Employment and Development Department.

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# THE AUTHORS

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# ACKNOWLEDGEMENTS

The *Improve Your Business (IYB)* approach to small enterprise development was conceived by the Swedish Employers' Confederation, and has since been developed internationally by the ILO with financial assistance from the Swedish International Development Authority (SIDA) and other donors.

The Government of the Netherlands agreed to finance the first "Improve Your Construction Business" (IYCB) project, based at the Management Development and Productivity Institute (MDPI) in Accra.

Ghana proved a good choice. As a result of recent changes there is a favourable climate for private sector initiatives, and Ghanaians have a well-deserved reputation for entrepreneurial drive. The Civil Engineering and Building Contractors Association of Ghana (CEBCAG) appreciated the opportunity that the project offered for its members to improve their management skills, and worked closely with the MDPI team and the ILO chief technical adviser to ensure that the training programme met the most urgent needs of its members.

This initial IYCB project provided an opportunity to develop and test a series of *Improve Your Construction Business* handbooks and workbooks and we wish to specifically acknowledge the dedication and enthusiasm of the MDPI/CEBCAG training teams or "cohorts". [1] The project package contained a certain amount of material that was specific to operating conditions in Ghana, but this published edition has been carefully edited to meet the general needs of small-scale construction entrepreneurs for basic advice on ways to improve business performance.

[1] Yahaya Abu, Michael Adjei, Margaret Agyemang, Kofitse Ahadzi, Henry Amoh-Mensa, Ernest Asare, John Asiedu, Franklin Badu, Fidelis Baku, Siegward Bakudie, Joseph Dick, Hamidu Haruna, Mathias Kudafa, D. Nsowah, Eric Ofori, Yaw Owusu-Kumih, S. Sakyi, Harry Seglah.

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# HOW TO USE THIS HANDBOOK

This handbook is written for you–the owner or manager of a small construction business. Together the three basic IYCB handbooks provide advice on most aspects of running such a business, and the three complementary workbooks give you the chance to test your management skills, assess the performance of your business in a disciplined way and develop your own action plans.

Improve Your Construction Business provides material for you to work with. It is available in a series of modules which take you step-by-step through the activities involved in running a small contracting business. They are best read together. We suggest you first read the chapter in the handbook, and then work through the examples in the corresponding chapter of the workbook.

## This handbook

This handbook contains a worked example of a simple building project, showing how to calculate costs and prepare a realistic estimate. It is both a basic textbook and a reference book, and contains many check-lists which should be useful whenever you are bidding for a new project. The chapters are set out in the same order as the chapters in the workbook, so that you can easily go from workbook to handbook or from handbook to workbook.

## The workbook

The workbook enables you to test your estimating skills by means of exercises in management practice. It will also make you think hard about the way you estimate costs and prepare your bids by asking you a number of questions.





In each chapter of the workbook there is a list of simple

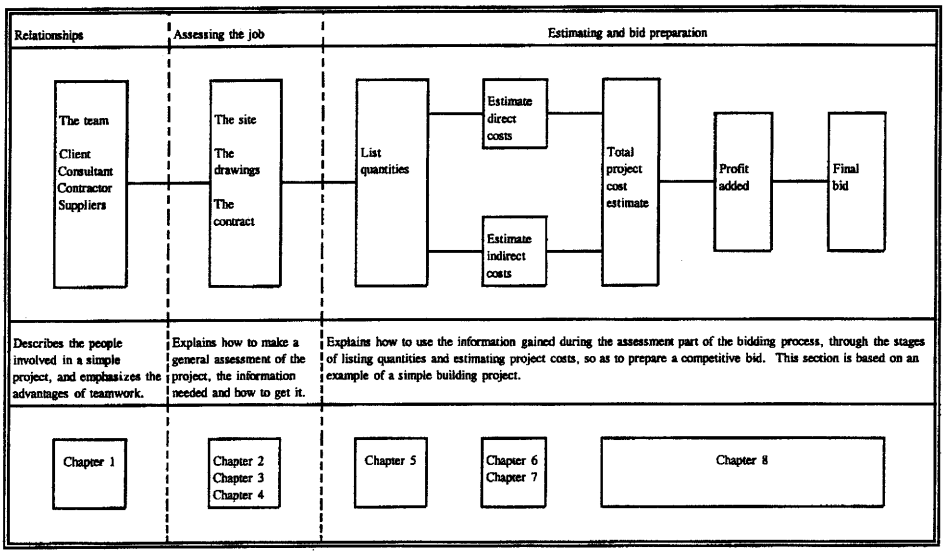
questions to which you answer "yes" or "no". The answers will tell you about the strengths and weaknesses of your business.

If you find that you need to improve your management skills in certain areas after going through the workbook, you can turn back to the appropriate section in the handbook and make sure you understand all the items and techniques introduced there.

# Where to start

We recommend that you start by reading quickly through the whole of the handbook. Then you can go back over it more slowly, concentrating on the chapters which deal with those parts of management which you think are weakest in your business.

The following route map will help you to find your way around the handbook.



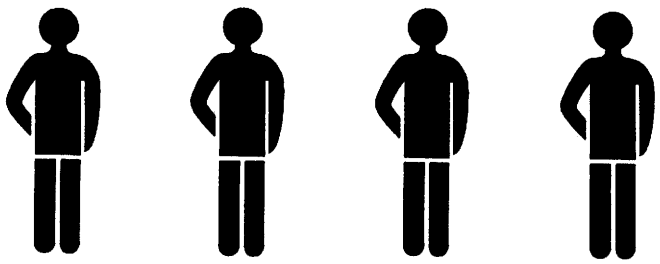

Note: Since this book is intended for use in many different countries, we have used the term "NU" in the examples to represent an imaginary "National Unit of currency" and NS to stand for imaginary "National Standards".

# THE BUILDING TEAM 1

## Client/consultant/contractor/supplier

The contractor is one player in the building team. Like a football team, the building team can only work well if everyone plays well together. This means you should get to know the jobs of the other members of the building team, so that you can help them to help you.

*Figure 1.* Players in the building team.




Winning teams work together and take care not to get in each other's way. No football team would perform well if the team members did not know each other before they ran on to the field for the big match. This chapter should help you to understand the duties of the key members of the building team.

Please take the time to work through this chapter before you go on to the "moneymaking" chapters on site inspection, contract documents and the preparation of a bid. Once you understand that all the other members of the building team have their own businesses to run, you will be in a better position to be a helpful team member so that *everyone* can win.

# Improving everyone's business

The client may be within the public sector, but the contractor, the consultant and the supplier usually all have their own private businesses to run. The other members of the building team will not want to deal with an inefficient contractor who may cause them to lose money and put the success of the project at risk.

The consultant in particular may lose money if the contractor is inefficient. Consultants are paid to ensure that work is done according to drawings and specifications. Inefficient contractors force them to supervise more closely, so the consultant's staff have to keep going back to the site to make sure that work is done properly. The supplier will lose money if the contractor fails to settle invoices when payment is due. Private clients lose money if buildings such as shops or warehouses are not completed on time. Public clients may not lose money directly, but their reputation will be damaged if schools, hospitals or roads are delayed or become unnecessarily expensive. This means a "loss" for all members of society since less money will be available for other projects.

By helping the other members of the building team to run their businesses well, the contractor can make money and gain goodwill. This chapter shows how the business responsibilities of the client, the contractor, the consultant and the supplier fit together.

The theme of the ILO Construction Management Programme is "working together". It is also the theme of this book and the other books in the series. This chapter of the handbook describes the main tasks of the four key members of the building team, and the first chapter of the workbook helps you to find ways to improve your contribution to the team effort–and thereby improve your own construction business!

# The players in the team

Before we look at the responsibilities of the various members of the building team, it is useful to look at the way in which they work.

## TYPICAL CLIENTS

The client is the private individual, organization or government department for whom the work is being done and who provides the money to pay for it.

The client is the most important person in the building team as far as the contractor is concerned. Without a client the contractor would have no business at all. Clients come in all shapes and sizes. The simplest division is between public sector clients and private clients. Here are some examples:

public
- ☐ a government roads department having a road built
- ☐ a public utility corporation requiring a new power station
- ☐ a local education authority commissioning a new school
- ☐ a government department needing to renovate a post office

private
- ☐ a property company developing an estate of private houses for sale
- ☐ a supermarket company requiring a new store
- ☐ a large company having an office built
- ☐ a house owner requiring a small extension
- ☐ a businessman having a small workshop painted.

## TYPICAL CONSULTANTS

The consultant is the private individual, organization or government department who can be *consulted* by the client and the contractor on matters concerning the contract. Usually the consultant is appointed to design the project, advise on the choice of contractor, and then to supervise the work on the site.

In this book we use the general term "consultant" to describe the client's professional representative. We also talk about consultants as being separate from the client since this is the most common way to organize construction work.

However, the person representing the client can come from within the client's organization. This is more common in contracts for public works.

There are many different types of consultants. Here are some examples:

- ☐ a private individual, hired by a person who requires a new house, to draw the plans and check that the contractor is doing a good job of building the house
- ☐ an architectural, engineering or quantity surveying firm who will appoint a job architect, clerk of works or a resident engineer
- ☐ a government department which will nominate a staff civil

engineer, architect, structural engineer or clerk of works to represent it.

## TYPICAL CONTRACTORS

The contractor is the private individual, organization or government department who enters into a *contract* to do the work required by the client.

Contractors also vary a lot in size and shape. Multinational construction firms often employ several thousand workers and engineers and operate in many different countries on major projects such as dams, motorways and power stations. At the other end of the market, small contracting firms work close to their base and specialize in simple buildings and public works projects such as drainage and feeder roads.

Many advanced textbooks on construction management have been written to help the staff of large construction enterprises, but the needs of small contractors have generally been forgotten. IYCB is designed to help these small-scale construction enterprises to improve their productivity, profitability and general performance.

IYCB also aims to help policy-makers to understand the importance of small-scale contractors to national development. Typically each enterprise will only employ between five and 15 people, but together they make a big contribution to providing employment and undertaking essential local projects that would not interest their larger competitors.

Here are some examples of small-scale contractors:

- ☐ jobbing builders of small private dwellings
- ☐ contractors specializing in labour-based road construction and maintenance
- ☐ specialists in building repairs and maintenance.

## TYPICAL SUPPLIERS

The supplier is also a member of the building team. A supplier may provide materials, equipment or subcontract services.

Even a small job may require quite a number of separate suppliers, which means that the contractor must be a good organizer and a good manager. Remember that your suppliers are important members of the building team. In times when the building industry is booming and materials are in short supply, the contractor depends on the goodwill of suppliers to avoid delays and loss of profit.

Suppliers can help the contractor by allowing credit and offering discounts. This can make bids more competitive and help you to gain more contracts. Remember that a credit arrangement with a supplier is like a loan from a bank. It *must* be paid on time if you are to keep your reputation and your supplier's goodwill.

Here are some examples of suppliers:

- ☐ building materials merchants
- ☐ cement manufacturers
- ☐ concrete block manufacturers
- ☐ joinery manufacturers
- ☐ plant and equipment dealers
- ☐ plant hire companies
- ☐ fuel suppliers
- ☐ brickwork and blockwork subcontractors
- ☐ carpentry subcontractors
- ☐ electrical subcontractors
- ☐ plumbing subcontractors.

# Responsibilities

All members of the building team have certain responsibilities. As a contractor, you need to know the responsibilities of the other members of the team as well as your own.

## THE CLIENT

The client is responsible for:

- ☐ providing the money to pay for the work to be done
- ☐ paying the contractor on a regular basis as agreed in the contract
- ☐ paying all *legitimate* entitlements (claims) for extra costs the contractor has had in connection with the job once they have been agreed by the consultant.

The client pays the bills, so the client is the boss of the building team. But the rights of the client are strictly limited by the normal construction contract. In particular, the client should always give instructions through the consultant as the professional adviser, and has no right to instruct the contractor directly.

Although the site belongs to the client, it is the contractor's factory for the duration of the contract. Just as the owner of a football team cannot run onto the field in the middle of a game, the owner should never visit the site unless accompanied by a representative of the consultant. The contractor should keep a careful record of all site visits.

- ☐ The client and consultant should always be asked to sign the visitors' book or site diary.

## THE CONSULTANT

The consultant is responsible for:

- ☐ designing the work
- ☐ communicating regularly between client and contractor
- ☐ ensuring that the contractor carries out all obligations according to the contract
- ☐ ensuring that the client carries out all obligations according to the contract
- ☐ resolving technical problems as they arise.

Here are some examples of ways in which the consultant can help the building team to work more effectively:

- ☐ call regular site meetings to resolve any problems that may delay the work
- ☐ copy and distribute all correspondence to each party
- ☐ make regular site inspections
- ☐ revise designs and provide other information quickly when required
- ☐ provide impartial advice in dealings with client and contractor.

Experience shows that consultants are more likely to cooperate with contractors who take the trouble to cooperate with them. So *you*, as the owner or manager of a building business, should take the initiative in building up a cooperative relationship. This means answering letters promptly, keeping appointments and submitting certificates and claims in a clear and easily understandable form.

## THE CONTRACTOR

The contractor is responsible for:

- ☐ completing the work to the quality standards laid down in the contract

- ☐ completing the work within the time-limit laid down in the contract
- ☐ completing the work with due regard for safety and health.

Quality standards in contract documents are unfortunately sometimes very vague. For example, "the contractor should complete the work to the satisfaction of the client". This depends on what standard the consultant is prepared to accept and recommend, although most experienced contractors, engineers, architects, supervisors and artisans can easily judge the difference between acceptable and unacceptable quality.

- ☐ It is particularly important that work by the finishing trades is of high quality since their mistakes are very easy to spot even by people who are not professionals in the construction business. A minor mistake here will damage the contractor's reputation with the owner and the users. Remember that after the job has been completed nobody will see what a tremendous job you did when fixing steel for the ring beam, but everyone can spot that the ceiling is not properly painted. Therefore it is not wise to compensate for time lost at earlier stages of the job by doing the finishing work too hastily.

The contractor should always aim to complete projects on or before the contract completion date, both to save money and to please the client. But sometimes delays cannot be avoided and an extension of time can be negotiated provided a good case is made for it, so it pays to keep good records on which negotiations can be based.

Site safety is primarily the responsibility of the contractor. However, if the consultant or the client see dangerous practices on site, they should point these out to the contractor. All parties to the contract must make sure that the work is carried out without danger either to construction workers or to the general public.

## THE SUPPLIER

The supplier's responsibility is to ensure that goods or services are supplied at the right standard of quality, at the right price, in the right place and at the right time.

Major supplies will be the subject of a quotation which will

be valid for a specified period. Smaller items will be supplied in accordance with an order form given by the contractor, and according to the supplier's standard conditions.

As the main contractor, you are responsible for coordinating the work of your suppliers, and ensuring that they supply goods or services that are in accordance with the specifications laid down by the consultant. You cannot pass this responsibility on to the supplier, although you may have a separate claim against the supplier if the consultant makes a claim against you.

Good contractors depend on good suppliers. Here are some ways in which you can help your suppliers to provide you with a better service:

- ☐ plan your orders well in advance
- ☐ specify goods and services clearly, and double-check to make sure that they are in accordance with the specifications and the drawings
- ☐ deal regularly with the same supplier, so that you can build a good working relationship
- ☐ make sure your site staff check deliveries carefully before they sign for them
- ☐ show you deserve credit by making payments promptly.

Remember to regularly get quotations from a number of suppliers to make sure that "your" supplier is offering you a good deal.

## Teamwork

The theme of this chapter is teamwork or "working together". Think of a football team. At the start of the season they are all happy, fit and motivated to win. But they are human beings, and small quarrels happen between the players as they go through to the cup final.

The team that will win the cup is the team that resolves its quarrels. Construction is a high-risk business and unexpected problems are bound to occur. Bad managers react to a problem by looking for someone to blame. The intelligent manager saves time and argument by concentrating on finding a solution which will minimize the trouble and cost for *all* members of the team.

## Problem solving

If the members of a football team take their small quarrels to the coach they can usually be sorted out. In this respect, the consul-

tant is similar to the coach, except for sorting out problems and mistakes rather than small quarrels.

The contractor should always be able to approach the consultant to discuss problems that arise during a job. But think about the problems before you see the consultant (unless it is a real emergency), and suggest some alternative solutions.

Above all, don't panic and don't ignore the problem in the hope that it will go away. Panic causes confusion and uncertainty, and very few problems solve themselves.

## Trust your staff

This chapter has discussed the work of the client, the consultant, the contractor and the supplier as members of the building team. For the contractor, the site staff are also members of the building team. Without their cooperation and hard work, nothing will happen.

The site supervisor is particularly important. A good and well-paid supervisor can save you money while a cheap but poor one can turn out to be an expensive disaster.

How do you choose your supervisors? The best craftsman may not turn into the best foreman. A good supervisor needs basic technical skills so as to read drawings and specifications, as well as basic management skills so as to get the best out of the workforce. The supervisor is also the contractor's site "ambassador". By building up a friendly and mutually respectful relationship with the client's representative, a good agent or site foreman can ensure that problems are tackled in an understanding way and the contractor does not lose out.

Even a good site supervisor cannot achieve results if the rest of the staff do not work effectively. Try to get a reputation for being a fair employer. Here are a few tips:

- ☐ give clear instructions
- ☐ make sure (by good planning) that materials and equipment are available when needed
- ☐ when you have a problem, ask your own staff for advice before going to others
- ☐ say "thank you" when a job has been done well
- ☐ *always* pay wages and salaries on time.

# SITE INSPECTION 2

This is the first step in the building process. A careful site inspection is the *ONLY* way you can find out what you need to know about the site conditions. Information obtained from others may be helpful, but there is no substitute for a proper site inspection. After all, it is your money that will be at stake if the ground conditions or other factors turn out to be worse than expected. Site plans are often faulty or incomplete, and the contract documents always point out that the contractor is expected to check any information before bidding.

No contractor should submit a tender without a clear understanding of the practical difficulties that will have to be faced in carrying out the work. This means that there is no alternative to inspecting the site yourself or sending a trusted member of your staff.

What if the site is a long way from your location or cannot even be reached by 4-wheel drive vehicle? That is even more reason to make the visit!

The site inspection is the first step to preparing a sensible bid, that is a bid that gives you a good chance of getting the job at a price which takes proper account of the risks involved. The good contractor is a risk measurer and a risk manager–not a gambler.

When you make a site inspection, it is always best to have a check-list of all the points that have to be noted. This chapter will help you to prepare a good check-list for your next site inspection.

## How to do it

All projects spring unpleasant surprises from time to time. Your job at the time of the site inspection is to try to identify as many of them as you can. Think of yourself as a detective. All those unpleasant surprises are hiding somewhere on the site. If you fail to find them they will cost you a lot of money because you have not included them in your price.

## WHAT YOU NEED

Prepare carefully for your site inspection. Make sure you have all the equipment you need, particularly if the site is a long way from your home or office. Here is a basic check-list:

- ☐ a long tape–at least 10 metres (for measuring length)
- ☐ a short tape–say 2 metres (for measuring height)
- ☐ a builder's line
- ☐ a line level
- ☐ a pencil
- ☐ an eraser
- ☐ a ruler
- ☐ a hard backing for the paper
- ☐ a notebook and a pen
- ☐ pick and shovel to dig trial holes (if necessary and permitted by the owner)
- ☐ a scythe to cut vegetation.

# The sketch plan and notes

Your sketch plan and notes will be vital when you start to prepare your estimate. So make sure they are clear and easy to read and understand. This means that notes should be made neatly, in ink. The sketch plan can be made in pencil, but it should also be clear–particularly the figures giving measurements and levels.

## THE SKETCH PLAN

It is best to start by preparing the sketch plan, so try to locate boundary markers and make a set of check measurements as indicated below. If there is any discrepancy between your own measurements and those marked on the sketch map, check back with the client before proceeding any further.

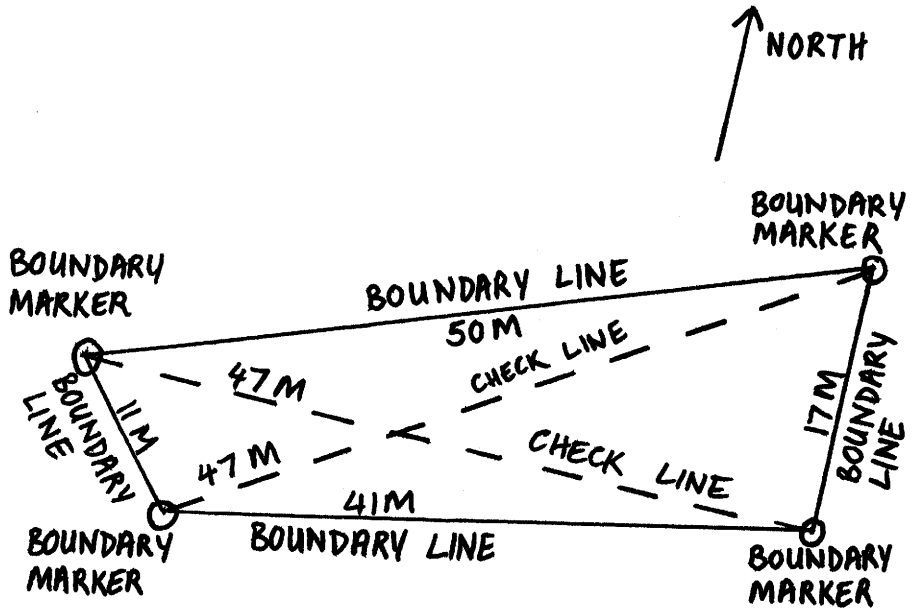
## CHECK ALL PLANS

Even if you have been provided with a site plan by the consultant, you should check it yourself. For example:

- ☐ something may have been added to or taken away from the site since the site plan was made

☐ the boundaries in the field on which you are going to build could be different from the site plan (see figure 2).

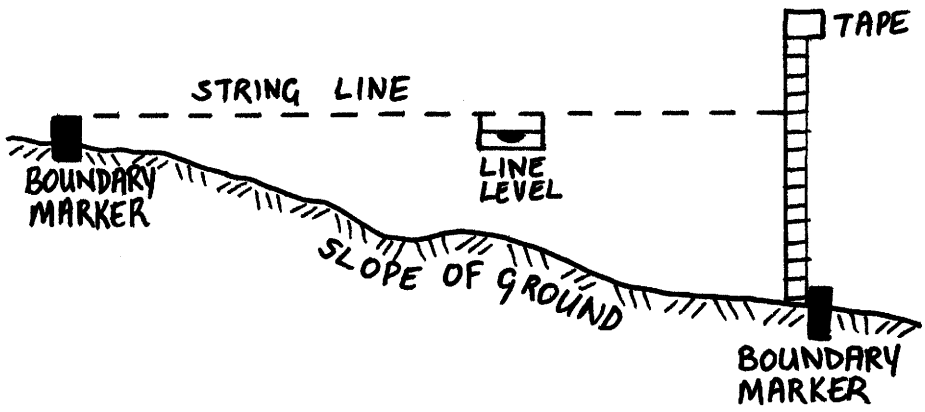
*Figure 2.* Check measurements.




## CHECKING LEVELS

Discrepancies in levels can be very expensive in terms of extra excavation or fill, so again you should check all levels, whether or not they are shown on contract drawings.

*Figure 3.* Checking levels.



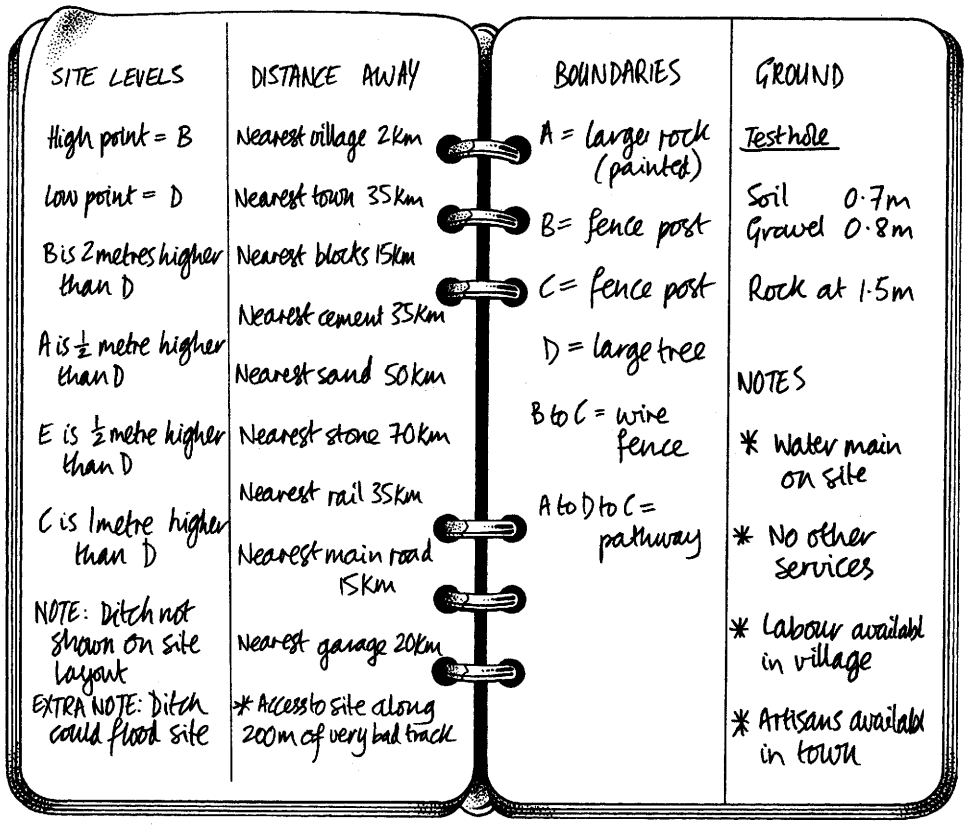
It is best to use a surveyor's level, but you can get approximate levels with a line, a line level and a tape as shown in figure 3. A line level is easy to use and reasonably accurate so long as you remember that:

- ☐ your string line must not be too long; and
- ☐ you must put the line level in the middle of the string line.

## SITE NOTES

The site notes that you will make after drawing up your sketch plan are an essential part of the information to be gathered in your site inspection. Even for a simple job there are a lot of things that you need to check in order to prepare a realistic estimate, so you should work out a standard check-list to suit your needs.

Notes from the site visit




The following show some of the questions that you might like to answer in your check-list.

## CHECK-LIST FOR NOTES

- ☐ What factors may affect transport costs?
- ☐ What special features of the site may lead to additional costs, such as:
  - tree roots running into foundation trenches?
  - streams which may flood the site if they become blocked?
- ☐ Is *clean* water available nearby for concrete mixing and can you get permission to use it? Is the water suitable for drinking? Will you have to cart the water by barrel or bowser? Will you have to pump the water?
- ☐ Are there any adjacent buildings that need special consideration?
- ☐ Is there an electricity supply on, or near, the site?
- ☐ Where will you get your petrol and diesel?
- ☐ Where is the nearest garage or mechanic's workshop?
- ☐ What is the soil type and stability? If in doubt, dig a trial hole at a carefully chosen location (outside the area that will eventually be part of the foundations of the building)–after getting permission from the client and/or landowner.

## ASK FOR ADVICE

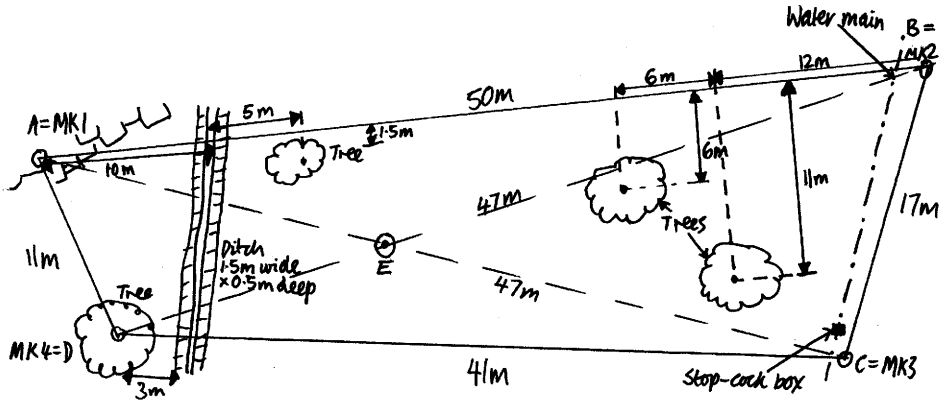
If you do not know the area well, find someone who does and ask them to give you advice. Here are some examples of the questions you might ask:

- ☐ Does the access road run over private land so you will have to pay for using it?
- ☐ Does the access get flooded?
- ☐ Is it possible to recruit reasonably hard-working casual labour locally as an alternative to bringing workers from the nearest town?
- ☐ Where can you store surplus soil?
- ☐ Are there local materials available?
- ☐ Will the site be secure without special measures?

## SAMPLE SKETCH PLAN AND NOTES

A sample sketch plan and notes appear in figure 4. They refer to the building for which we will be preparing an estimate and bid during the rest of this handbook, so it is worth looking at it carefully before going on to the next chapter.

*Figure 4.* Large sketch map.




## A FINAL CHECK

A good manager does a job once and does it properly, but a bad manager has to keep redoing work to get it right. Site inspections cost time and money, so make sure you get all the information you need first time.

After you have made your sketch plan and detailed notes, take another good look at the site and make sure you have missed nothing from your check-list. Then think how you will organize work if and when you start the job. Write all your ideas down so that you can refer to them later.

# CONTRACT DRAWINGS 3

Drawings are part of the language of building, so as a professional builder you should draw out on a plan all the details that you noted during the site inspection. On larger jobs a full site plan and contract drawings will be provided by the consultant, and it is just a question of making supplementary notes for your own purposes. But on small jobs for private clients, it may be necessary to prepare your own drawings so as to give a proper quotation.

Even if you cannot prepare your own drawings, it is vital that you should be able to read and understand drawings provided by the consultant. This chapter will help you do that.

## Understanding drawings

The consultant will have designed the structure to fit in as closely as possible with the requirements of the client. The contract drawings should describe that design exactly and contain all the information required to prepare an accurate estimate.

However, consultants do make mistakes and omissions, so you should check the contract drawings and other documents carefully to make sure that they contain all the information you will need for the three stages of:

- ☐ estimating
- ☐ setting out
- ☐ construction.

The notes on the following pages should help you to check that the information is sufficient.

### ESTIMATING

- ☐ If existing services have to be moved or protected, the cost of moving or protecting them should be included in the bid.

- ☐ Items such as overhanging trees, ponds or spoil dumps could affect the site works. Some trees may have to be felled or protected, or tree roots may interfere with foundation work.
- ☐ Rocks may have to be removed, possibly even blasted out, at high cost. Is there an "extra over" item in the bill of quantities for excavating rock?
- ☐ Existing walls may have to be removed or protected.
- ☐ The drawings should provide enough information to enable the bidder to calculate the volume of excavation or fill required, or to check the amount shown in the bill of quantities.
- ☐ Borehole data: This information is required for foundation design and may be shown on the drawings. If so, it may help you to estimate the cost of excavation. Will trenches have to be shored up? At what intervals will planking be required? Such costs have to be included in the bid.

## SETTING OUT

- ☐ You should not have to resort to scaling measurements off the plan in order to set out the works. If there is any doubt about measurements, you should ask the consultant for clarification.
- ☐ A baseline is essential to avoid errors in setting out. The ends of the baseline should be set where they will not be disturbed and where they will be available for the whole of the contract period.
- ☐ Identify a suitable benchmark, which will not be disturbed by the construction works and which will be available throughout the whole of the contract period.

## CONSTRUCTION

- ☐ Mark boundaries clearly to avoid future disputes.
- ☐ Check the access to the site. A poor access road can increase costs due to loss of time, damage to materials and the expense of towing out and repairing vehicles. If the access is across private land then the ground will have to be reinstated at the completion of the contract. This cost should be covered in the bid.
- ☐ Ensure that there is adequate working space to position site offices, aggregate storage bins, mixing areas and so on.

- [ ] Check drainage details since sewers must be laid to strictly controlled falls, often connecting to existing pipelines. Normally it is best to start laying services from the lowest point in the run.

# General drawings

Contract drawings of buildings should include:

- [ ] a floor plan
- [ ] elevations
- [ ] sections
- [ ] detailed drawings
- [ ] schedules.

## FLOOR PLAN

This should show:

- [ ] the overall dimensions of the building
- [ ] intermediate dimensions to features such as columns, windows, doors, walls, centre beams, floor joints and finished floor levels
- [ ] any services such as sewerage, water and rights of way (paths) within or in the immediate vicinity of the building
- [ ] descriptions of materials used such as concrete floor, terrazzo finish, floor tiles, doors, windows, brickwork, concrete block walls
- [ ] any other information relevant to floor and wall construction and finishes.

## ELEVATIONS

These should show:

- [ ] further details of walls, windows, doors, columns
- [ ] details of roof construction and finish, ring beam details, gable end details, eaves fill details, finished ground levels, finished floor levels
- [ ] details of gulleys, rainwater gutters, down pipes, soil vent pipes and so on
- [ ] heights above floor level of cills, ring beams, lintels, roof ridge, eaves.

## SECTIONS

These should show:

- ☐ further details of construction and finishes
- ☐ foundation details
- ☐ details of ceilings
- ☐ special details such as insulation, suspended ceilings, damp-proof membranes.

## DETAILED DRAWINGS

In addition to the general building drawings, there are likely to be various detailed drawings such as:

- ☐ steel fixing details
- ☐ plumbing details
- ☐ electrical installation
- ☐ road plans and cross-sections.

## SCHEDULES

These should show:

- ☐ bar bending schedules
- ☐ door and window schedules.

## KEEPING RECORDS

You should study all the drawings carefully and note down any mistakes or omissions. If you are not satisfied that the plans are accurate and complete, it is your responsibility to get in touch with the consultant and request further details.

Drawings received should be noted on a form or in a book. This evidence will be important if there is a dispute over a change in design, since the validity of any claim will depend upon when the contractor was informed.

| Date received | Reference No. and description | Main scale | Remarks |
|---|---|---|---|
| 1 July 1993 | G 01/10 Rev. B Foundations | 1:20 | Width increased from 600 to 700 mm |

## TYPICAL DRAWINGS

At the back of this book, we have provided a set of typical contract drawings that you might receive from a client. These drawings will be used later in the book as a basis for calculating a bid.

# SPECIFICATIONS AND CONDITIONS OF CONTRACT 4

A specification is a comprehensive description and explanation of the project, its components and materials and the required standard of work.

A "condition of contract" is any condition or prerequisite written into a contract setting out the obligations, rights and liabilities of the parties to the contract.

On large projects, the specifications and conditions of contract are prepared by the consultant in order to protect all the parties involved by laying down agreed rules before the work starts. Any contractor who submits a bid has to accept these conditions (unless the client is prepared to consider a counter--proposal).

On small jobs for private clients it is frequently the contractor who has to set out these rules in the form of a quotation which specifies certain general conditions relating to the contractor's bid. Once the client accepts the quotation, these conditions govern the contract.

Either way you need to understand the meaning of the clauses in quotations, specifications and conditions of contract so as to safeguard your interests as one of the main parties to the contract.

## Contracts prepared by a consultant

The contract documents consist of:

- ☐ drawings and bills of quantities
- ☐ specifications
- ☐ conditions of contract.

The drawings and bills of quantities define the scope of the work, the specification defines the quality standards to be achie-

ved and the conditions of contract lay down the obligations of the parties involved.

## DRAWINGS AND BILLS OF QUANTITIES

In Chapter 3, Contract drawings, there is a description of the different drawings you might come across during a construction project. In this chapter the importance of understanding drawings is underlined and some advice is given on how to understand and read them better.

Chapter 5, Listing quantities, contains guidelines on how to prepare a list of quantities yourself from drawings supplied by the client. It also looks at the important points you should think about when either preparing a list of quantities yourself or when using a bill of quantities supplied by the client.

## SPECIFICATIONS

If a local, district, regional or national standard specification exists, the first thing to do is to get hold of it and get to know it thoroughly!

If there is no standard specification, it will be necessary to work one out to cover the particular job. It would be very unsatisfactory to work without a specification, because there would be no way of settling disputes with the client on whether the quality of work was satisfactory.

The following is an extract from a brief specification that might be used in conjunction with the drawings at the back of this book.

### Foundations

- ☐ All aggregate (fine and coarse) shall comply with NS 12:223 and shall contain no harmful material in such quantities as to give adverse effects to the strength, durability or corrosion of reinforcement. The source of all aggregates shall be approved by the consultant.
- ☐ Fine aggregate shall also comply with NS 12:411 and shall be obtained from natural quartz or by crushing granite or from freshwater river deposits.
- ☐ Coarse aggregate shall comprise natural gravel or natural crushed rock taken from a source approved by the consultant.

☐ Concrete to be 1:2:4 mix by volume.

*Trial mix:* At the request of the consultant, the contractor shall carry out, in the presence of the consultant, a trial mix of concrete to be tested by a recognized laboratory to ensure that its strength is in accordance with NS 25:305.

☐ Hardcore fill to be crushed brick.

## Masonry

☐ Cement mortar to be used for jointing.

☐ Sample blocks to be provided for inspection before being used in the building.

☐ Plaster to be a weak mix with bag wash finish.

☐ Damp-proof course (DPC) to be 150 mm above finished ground level.

☐ PVC membrane to be built into walls at DPC level.

This is just an extract of a material and standard of work specification for the projects described in the drawings at the back of this book. A complete specification should, of course, be more extensive.

## CONDITIONS OF CONTRACT

The use of standard forms of contract is recommended because:

☐ their contents will be well known and understood by the parties involved

☐ their wording reflects experience in resolving difficulties of interpretation and enforcement

☐ they will have usually been tested in law

☐ the preparation of a special contract is expensive and time-consuming.

Some of the matters to be defined in the conditions of contract are listed below:

☐ contract period

☐ method of payment

☐ retention money

☐ payment for materials on site

☐ payment for extra work or variations

☐ price fluctuations (= changes in wages or cost of materials)

☐ giving notices or paying fees to local or service authorities

- ☐ insurances and indemnities
- ☐ conditions under which bad workmanship or materials can be condemned (sometimes used by unscrupulous clients to delay payments)
- ☐ liquidated damages
- ☐ conditions under which extension of time may be granted
- ☐ conditions for termination of contract
- ☐ arrangements for arbitration.

All these points are explained in detail in the reference section at the end of the book.

# Preparing a quotation

On small construction works the client may not want to go to the expense of getting a consultant to prepare formal conditions of contract. There will still be some form of contract between you and your client, even if it is only an oral agreement that you will do some work and get paid a certain sum in return. But verbal contracts are dangerous. People can easily forget their commitments, and many contractors have lost money as a result of doing work that their clients afterwards deny asking for.

The answer in a case like this is for the contractor to propose basic conditions of contract to the client in the form of a quotation. Once the client has accepted the conditions contained in the quotation as proposed by the contractor, this quotation effectively becomes the basis of the contract between them and both sides know the rules of the game.

## HOW TO DO IT

Like the conditions of contract prepared by the consultant, the quotation is there to protect both parties. It must be fair to both the client and the contractor. The quotation format given on the following two pages shows what a standard quotation might look like.

If you are frequently involved in work for private clients, it might be worth having standard quotation forms printed, with your address and space for details of your quotation on the front and the standard "conditions of quotation" set out on the back.

## A TYPICAL QUOTATION FORM

This is a standard quotation form containing a number of words and expressions that are typical for legal documents in the construction sector. If you come across an expression that you are not familiar with, there is a reference section at the end of this book where you can find short explanations of all expressions commonly used in contracts and other legal documents.

- ☐ This quotation is open for a limited time only. The quotation should be accepted and possession of the site given within one month of the date of the quotation. Otherwise the quotation is subject to revision.
- ☐ Accounts shall be submitted on completion of the works, or, where the duration of the works is longer than one month, interim accounts shall be submitted monthly. Such interim accounts shall include the cost of work completed and materials on the site not yet fixed in the works. Payment for work done shall be due within one week of the submission of the account.
- ☐ Where possible, the value of extra works or variations from the original order shall be costed and agreed before the work starts. In any case the value of extra works shall be added to the original quotation. Where the variation is an omission, the cost shall be deducted from the original quotation.
- ☐ Where "provisional sum" is used in the quotation, this is to indicate that the cost of the item specifically requested by the client was not exactly known at the time of the quotation. Should the amounts payable to the supplier exceed or be less than this provisional sum, then the quotation shall be increased or reduced accordingly.
- ☐ Where the client provides or requires materials to be fixed in the works which, in the opinion of the contractor are unsuitable, the contractor shall so notify the client in writing. Should the client still insist on their inclusion in the works, then the contractor will accept no responsibility for any subsequent loss or damage to the works due to the use of such materials.
- ☐ The maintenance period shall extend for six months from the date when the consultant issues a certificate of practical completion of the works. Any defects appearing in this period arising from workmanship or materials inferior to the quality specified in the quotation will be made good by the contractor and at the contractor's own expense. The

defects should be notified to the contractor before the expiry of the maintenance period.

- ☐ The client shall indemnify the contractor against any claims for damage by fire or any other reason, of the existing buildings and contents, the new works undertaken under the contract, and unfixed materials and equipment.
- ☐ The agreed date for completion of the work may be subject to alteration on account of extra work ordered, or due to inclement weather, strikes, or events beyond the control of the contractor.
- ☐ Any disputes arising during the carrying out of the work may be resolved by the appointment of an arbitrator, mutually acceptable to both parties, whose decision shall be binding.

## A FAIR CONTRACT

Always aim at establishing a contract that is fair to all parties, including the client. You need to build up a good relationship with the client and the consultant, and this is more likely if the contract benefits all.

A client ending up with a quality building at a reasonable price will be happy, will probably tell friends about it, and is more likely to come back to you with another project.

You end up with a reasonable profit, you are more likely to get repeat business and your firm will grow stronger.

In general the best contract is one that is simple and easy to understand. Even so, it is worth taking care to make sure that the contract does not subject you to unusual risks.

Finally, check the payment conditions for interim and final payments, plus the reputation of the consultant and the client for issuing and honouring certificates. This kind of information can often be obtained from your local Contractors' Association.

# LISTING QUANTITIES 5

This chapter will develop your ability to "take-off" from the drawings and to make up a list of quantities for the items of work to be done. The more that you can do alone, the less dependent you will be upon specialists such as private estimators and quantity surveyors.

When there is no bill of quantities you will have to make one yourself. You need to find out how much you will have to spend on materials, plant, labour and overheads to do the job. The only alternative is to make a wild guess at the overall price for the job. Before very long, "guesstimating" contractors go out of business. Either they bid too high and get no work, or they bid too low and make losses.

Since the list of quantities describes uniquely the nature and quantity of all components of the finished building, it forms a common basis for estimating the cost of labour, materials and equipment needed to erect the building.

The list of quantities should note the items of construction in the order that they will be carried out during construction. This will be a big help in planning the work and controlling costs.

For every job there are two types of quantities:

- ☐ quantity surveyor's (QS) quantities
- ☐ builder's quantities.

It is important not to mix the two.

The QS quantities are the quantities you find in an ordinary bill of quantities and they show the job from the client's point of view, listing the quantities that the consultant's calculations are based on and that you get paid for.

Builder's quantities describe the job from your angle showing the actual work that will have to be done on site.

There can be quite a big difference between QS and builder's quantities, particularly in excavation and backfill of foundations and trenches, where you may have to batter back the sides of the excavation but only get paid for a theoretical vertical excavation. If you were to apply the correct unit rate for builder's

quantities, and measurement was based on QS quantities, you might only recover half of your actual costs. A good example showing the difference is Example 1, "Excavate foundations", shown below.

> We will base most of the examples in this book on builder's quantities, because these represent the amount of work which will have to be done on the site. It is easy to convert rates for builder's quantities to rates for QS quantities. Suppose, for example, that the builder's quantities for a job are 100 cubic metres ($m^3$) and your rate is 2 NU/$m^3$. If the QS quantities are shown in the bill of quantities as 50 $m^3$, your rate will have to be increased to: 2 NU/$m^3$ x (100 $m^3$/50 $m^3$) = 4 NU/$m^3$. The result will be that you will still be paid 200 NU for the job, but the calculation will be:
> 50 $m^3$ x 4 NU/$m^3$ = 200 NU
> instead of:
> 100 $m^3$ x 2 NU/$m^3$ = 200 NU

## What to do

First break the job down into all its separate operations. Then, from the drawings, measure the amount of work in each operation.

The list of items in table 1 is not a bill of quantities. It is a list of quantities showing the builder's quantities for one of the buildings shown in the working drawings at the back of this book. You will note that there are 30 items. This is typical for a small job. You need enough items to be able to calculate the major costs, but there is no point in having so many that you waste a lot of time and money in unnecessary calculation.

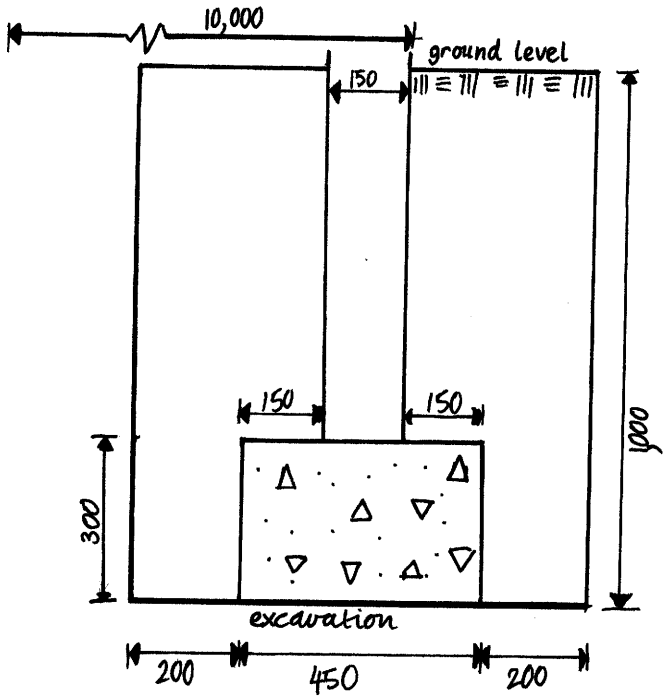
How should quantities be calculated? Here are some examples from table 1.

## EXAMPLES

### 1. Excavate foundations

Look at the drawings. The foundations are 300 mm x 450 mm. To get enough room for the formwork we have allowed 200 mm extra on each side. It is often helpful to make a little sketch as shown below. It does not have to be to scale but it must show lengths, widths and other relevant dimensions.

*Figure 5.* Sketch for foundations (in millimetres).




This example illustrates very well the difference between QS quantities and builder's quantities, mentioned earlier in this chapter. The volume of excavation that you are being paid for (QS quantities) is just the bottom area of the foundations multiplied with the depth, i.e.:

10.000 m + 0.150 m + 0.150 m = 10.300 m
10.300 m x 0.450 m x 1.0 m (depth) x 2 = 9.27 $m^3$
5.000 m - 0.300 m - 0.300 m = 4.400 m
4.400 m x 0.450 m x 1.0 m x 2 = 3.96 $m^3$
Altogether: 9.27 $m^3$ + 3.96 $m^3$ = 13.23 $m^3$
*QS quantity:* 13.2 $m^3$

*Table 1.* List of builder's quantities for one house

| Item No. | Description | Unit | Quantity |
|---|---|---|---|
| 1. | Excavate foundations | $m^3$ | 25 |
| 2. | Supply and fix steel 12 mm<br>to foundations 8 mm | lin. m<br>lin. m | 300<br>72 |
| 3. | Fix formwork to foundations | $m^2$ | 18 |
| 4. | Pour concrete to foundations | $m^3$ | 4.0 |
| 5. | Supply and fix steel 12 mm<br>to columns 8 mm | lin. m<br>lin. m | 231<br>76 |
| 6. | Fix formwork to columns | $m^2$ | 49 |
| 7. | Pour concrete to columns | $m^3$ | 3.7 |
| 8. | Concrete block walls up to floor | $m^2$ | 32 |
| 9. | Return fill and ram excavated material around foundations | $m^3$ | 17 |
| 10. | Placing of hardcore fill | $m^3$ | 17 |
| 11. | Reinforcement mesh to floor | $m^2$ | 51 |
| 12. | Concrete to floor | $m^3$ | 6.8 |
| 13. | Concrete block walls above floor | $m^2$ | 34 |
| 14. | Soffit forms to ring beam over openings | $m^2$ | 3 |
| 15. | Soffit forms to ring beam over infills panels | $m^2$ | 2.2 |
| 16. | Sideforms to ring beam | $m^2$ | 18 |
| 17. | Supply and fix steel 12mm<br>to ring beam 8 mm | lin. m<br>lin. m | 144<br>54 |
| 18. | Pour concrete to ring beam | $m^3$ | 2.6 |
| 19. | Fabricate roof trusses | No. | 11 |
| 20. | Fix roof trusses | No. | 11 |
| 21. | Roof tile battens | lin. m | 212 |
| 22. | Tile roof (supply and fix) including ridge | $m^2$ | 81 |
| 23. | Timber to gable end | $m^2$ | 6 |
| 24. | Form eaves (horizontal+ gable ends) | lin. m | 36 |
| 25. | Supply and fix ceiling boards (woodchip/cement) | $m^2$ | 42 |
| 26. | Prefabricated window panels | No. | 4 |
| 27. | Prefabricated door panel | No. | 1 |
| 28. | Terrazzo floor | $m^2$ | 44 |
| 29. | Bagwash walls and columns | $m^2$ | 48 |
| 30. | Paint walls and ceilings (including supply) | $m^2$ | 90 |

As a contractor you know that it will be necessary to excavate additional volumes to allow for the formwork and to make sure the sides of the excavation are stable (unless ground conditions are very favourable). As stated earlier we will allow 200 mm extra on each side for this. The builder's quantity for this item will therefore be calculated as:

10.700 m x 0.850 m x 1.0 m (depth) x 2 = 18.190 $m^3$
deduct 850 + 850 from the width:
5.700 m - 0.850 m - 0.850 m = 4.000 m
4.000 m x 0.850 m x 1.0 m x 2 = 6.800 $m^3$
Altogether: 18.19 $m^3$ + 6.80 $m^3$ = 24.99 $m^3$ (25)
*Builder's quantity:* 25.0 $m^3$

In the above example, there is a big difference between the two volumes. This is not unusual in excavation calculations and there can also be quite significant differences in other items. The differences between builder's and QS quantities do not matter to you as a contractor, provided you always know whether you are pricing builder's or QS quantities. And if you are asked to do additional excavation make sure you know what kind of quantities are presented to you and adjust your rates to ensure that all your costs are covered. This means that there are two things to remember:

- ☐ Your price for excavation should allow for the total volume necessary (24.99 $m^3$) although the volume on a bill of quantities will only be 13.23 $m^3$ (QS quantity). So, if a bill of quantities had been supplied on this project your rate (NU/$m^3$) should take into account the need to excavate almost twice as much as given. Knowing this, you also realize that it can be risky to compare with rates from other projects unless you have detailed records showing both the builder's and the QS quantities. See also Chapter 6.
- ☐ Your plan of work (amount of labour needed, equipment needed, etc.) has to be based on the builder's quantity (24.99 $m^3$) since that reflects the actual work needed to be done.

Usually excavation is one of the items where the difference between builder's and QS quantities is the greatest. For other items the difference is usually much smaller, and for some there may be no differences at all.

Since no bill of quantities was supplied for our project and builder's quantities are necessary for planning the job properly, we have concentrated on the calculation of builder's quantities. If a bill of quantities is supplied, the rates should be adjusted to make sure that you are paid the full amount for each item.

## 2. Supply and fix steel to foundations

The drawings say that you should use both 12 mm and 8 mm bars for the foundations so we make two separate calculations.

*A. 12 mm bars*

*Bars on the 10 m sides*
length of foundation is 10.000 m + 0.150 m + 0.150 m = 10.300 m
length of bars 10.300 m - (cover to reinforcement = 0.050 m + 0.050 m) = 10.200 m
So: 10.200 m x 4 bars x 2 sides = 81.600 m
*Bars on 5 m sides*
length of foundation: 5.300
length of bars: 5.300 - 0.050 - 0.050 = 5.200 m
So: 5.200 x 4 x 2 = 41.600 m
Add 20% for laps:
81.6 + 41.6 = 123.20 m
123.2 x 0.2 = 24.60 m
Altogether: 123.2 + 24.6 = 147.8 m
*L-bars*
length of L-bars: 1.0 m + 1.0 m = 2.0 m
number of bars: 4 bars per corner x 4 corners
total length: 2.0 m x 4 x 4 = 32.0 m
*Starter bars for columns*
length of bars: 1.0 m + 1.5 m = 2.5 m
number of bars: 4 per column x 12 columns
total length: 2.5 m x 4 x 12 = 120.0 m
Total length of 12 mm bars:
147.8 m + 32.0 m + 120.0 m = 299.8 m (300 m)

*B. 8 mm bars*

The 8 mm bars as shown on the drawings are stirrups placed with 500 mm spacing.
The total length of a stirrup is:
0.350 + 0.350 + 0.200 + 0.200 + 0.100 = 1.200 m
Number of stirrups on the 10 m sides:
Inner length: 10.300 m - 0.450 m - 0.450 m = 9.400 m
Number: 9.400 m/spacing (0.500 m) = 19
What is calculated now is really the number of spacings so you always have to add one more (one bar at each end): 19 + 1 = 20
Two sides: 20 + 20 = 40
Number of stirrups on 5 m sides:
Inner length: 5.300 m - 0.450 - 0.450 = 4.400 m
Number: 4.400/0.500 = 8. 8 + 1 = 9.8 (10)

Two sides: 10 + 10 = 20
Total number: 40 + 20 = 60
Total length: 60 x 1.200 m = 72.0 m

You will get a chance to practise your skills in calculating quantities in the workbook where all the other items will be calculated.

## Preparing the complete list

The entire project, as shown on the drawings, is to build three similar buildings plus general items such as the parking area and the fence. These general items can be quite costly, so always make sure that they are all listed and priced (see table 2).

*Table 2.* List of builder's quantities-general items

| | | | |
|---|---|---|---|
| 1. | Clear site | | |
| 2. | Excavate top soil | $m^2$ | 300 |
| 3. | External paths and parking | $m^2$ | 146 |
| 4. | Spread topsoil to landscape site | $m^2$ | 300 |
| 5. | Perimeter fence | lin. m | 115 |
| 6. | Dispose of surplus material off site | $m^3$ | 65 |

Now we have listed all the quantities, both general items and the house-specific ones. In order to produce the complete list of quantities we now need to:

1. Multiply what we have calculated for one house by three since there are three similar houses.
2. Add on the general items. Remember to list them all in the order they are to be carried out since it will be of great help to you at the planning stage. You can see the complete list in table 3.

Some general items such as preparing the parking area can be carried out at the same time as work is done inside the house, such as bagwashing the walls. We do not need a fully detailed plan for the work at this stage, so we can assume that general items are done as last.

If you feel that it would be useful to practise listing quantities before going further with this handbook, you should try the exercises in the workbook.

The ability to calculate quantities is an important skill for the contractor. Besides being essential at the bidding stage, it will also be important if you have to calculate claims for extra payment as a result of changes during the course of the contract.

*Table 3.* List of builder's quantities for complete project

| Item | Description | Unit | Quantity |
|---|---|---|---|
| 1. | Clear site | | |
| 2. | Excavate top soil | $m^3$ | 300 |
| 3. | Excavate foundations | $m^3$ | 75 |
| 4. | Supply and fix steel 12 mm to foundations. | lin. m | 900 |
| | 8 mm | lin. m | 216 |
| 5. | Fix formwork to foundations | $m^2$ | 54 |
| 6. | Pour concrete to foundations | $m^3$ | 12.0 |
| 7. | Supply and fix steel 12 mm to columns | lin. m | 693 |
| | 8 mm | lin. m | 228 |
| 8. | Fix formwork to columns | $m^2$ | 147 |
| 9. | Pour concrete to columns | $m^3$ | 11.1 |
| 10. | Concrete block walls up to floor | $m^2$ | 96 |
| 11. | Return fill and ram excavated material around foundations | $m^3$ | 51 |
| 12. | Hardcore fill | $m^3$ | 51 |
| 13. | Mesh to floor | $m^2$ | 153 |
| 14. | Concrete to floor | $m^3$ | 20.4 |
| 15. | Concrete block walls above floor | $m^2$ | 102 |
| 16. | Soffit forms to ring beam over openings | $m^2$ | 9 |
| 17. | Soffit forms to ring beam over infill panels | $m^2$ | 7 |
| 18. | Sideforms to ring beam | $m^2$ | 54 |
| 19. | Supply and fix steel 12 mm to ring beam | lin. m | 432 |
| | 8 mm | lin. m | 162 |
| 20. | Pour concrete to ring beam | $m^3$ | 7.8 |
| 21. | Fabricate roof trusses | No. | 33 |
| 22. | Fix roof trusses | No. | 33 |
| 23. | Roof tile battens | lin. m | 636 |
| 24. | Tile roof (supply and fix) including ridge | $m^2$ | 243 |
| 25. | Timber to gable end | $m^2$ | 18 |
| 26. | Form eaves (horizontal + gable ends) | lin. m | 108 |

| | | | |
|---|---|---|---|
| 27. | Supply and fix ceiling boards (woodchip/cement) | $m^2$ | 126 |
| 28. | Prefabricated window panels | No. | 12 |
| 29. | Prefabricated door panels | No. | 3 |
| 30. | Terrazzo floor | $m^2$ | 132 |
| 31. | Bagwash walls and columns | $m^2$ | 144 |
| 32 | Paint walls and ceilings (including supply) | $m^2$ | 270 |
| 33. | External paths and parking | $m^2$ | 146 |
| 34. | Spread topsoil to landscape site | $m^2$ | 300 |
| 35. | Perimeter fence | lin. m | 115 |
| 36. | Dispose of surplus material off site | $m^3$ | 65 |

# From quantities to costs

Calculating quantities is the first step on the way to preparing a bid, since the quantities will be used when we try to predict *our* costs for carrying out a contract.

The bid that we send to the client consists of two major parts:

- ☐ our estimated costs
- ☐ the profit.

Although contractors do not usually show the amount of profit that they expect to earn as part of their bids, it is important to keep estimated costs separate from profit in your own calculations. The estimated costs provide a set of targets for your site staff. If they can keep actual costs at or below the estimated costs, you know that you will earn your expected profit.

Since we want to be able to get a reasonable profit out of our projects it is obviously most important to predict our costs as accurately as possible. If we forget to price a major item and the costs are higher than predicted, we will have to take money that was originally part of our profit to cover these costs and we will get a smaller profit at the end of the job.

A good way to ensure that we estimate our costs as accurately as possible is to use a system. In this book we go through most of the different costs that you might have in your building business, so you can use these sections as check-lists to make sure that you have not forgotten any costs relevant to your company and your project.

In our system we start by dividing costs into two separate groups:

- ☐ direct project costs
- ☐ indirect project costs.

Direct project costs are directly related to carrying out construction activities on site. You estimate how much labour, material, equipment and transport you will need to complete the works.

Indirect project costs are not directly linked to carrying out a specific construction activity but are necessary to complete the contract. Included here are what are sometimes called preliminaries (temporary site buildings and arrangements, general tools and equipment, permanent staff salaries, insurances and bonds, and so on) as well as the general "company" costs you have for running your company, such as renting office space and paying your own salary. The third and last group of indirect project costs is the risk allowance, where you try to forecast how risky a contract is going to be and add an allowance to compensate for this risk. Since the indirect project costs are not directly linked to project activities they are often easier to forget when preparing a bid and therefore it is even more important to follow a check-list when calculating them.

The following three chapters (6-8) will take you through these cost calculations and give you some advice on what points to take into account when adding the profit.

## Cost and efficiency

Why do bids from different contractors vary so much, if they only cover the costs of completing a contract plus a profit? Is it just different profit margins or are there other factors involved? No, there are, of course, also a number of factors that influence your *costs*. To start with there is a crucial link between cost and *efficiency*. A contractor who is not efficient can only build at high cost and will therefore only obtain work when the profit margin is cut to a minimum or even results in a loss.

In a business as competitive as construction there is only one long-term strategy, that is to constantly look for ways to cut your costs by becoming more *efficient*. Again the key word is efficient. It is not the cutting of costs itself that makes you successful, but reducing costs while producing within the specified time and at the specified quality.

Since your own costs are the key to the future development

of your company, you must calculate them yourself and not use standard rates. There are two reasons for this:

- ☐ the only rates that are relevant to you are the rates at which *your* firm can carry out an activity
- ☐ knowing your own costs is essential when planning for future developments of your business.

Once you know your own unit rates, it may be useful to compare them with standard rates to make sure you are competitive. NEVER BASE A BID ON STANDARD RATES UNLESS YOU ARE REALLY SURE THAT YOU CAN MATCH OR BEAT THEM.

When estimating costs, it is easy to overestimate your efficiency. Putting down very low rates in your estimate might make your bid very competitive but it might be the beginning of the end for your company if you cannot build at these rates. If you think your rates are not competitive, the only solution is to look at ways to produce more efficiently. Theoretical rates which you cut in your bid may make you go bankrupt but real rates which you cut on the site mean profit.

The key to efficient production is *planning*. Successful contractors are always thinking about better ways of running their businesses and planning ways of improving their performance. Here are some of the things that you should plan:

- ☐ the layout of your site
- ☐ when labour and equipment is needed
- ☐ when material must be available
- ☐ how much money you need to carry out the project
- ☐ your office procedures.

These issues will be dealt with in the other two handbooks in the IYCB series. Handbook 2, *Site management*, tells how to make your site more efficient, mainly through planning. Handbook 3, *Business management*, is about how you can improve the way you run your company, again mainly by planning.

However, a well-planned project starts with a systematic preparation of the bid, so let us start by looking at direct project costs.

# DIRECT PROJECT COSTS 6

Direct project costs are all costs linked to a specific construction activity carried out on site. They make an estimate of how much material, labour, plant and transportation will cost.

You should calculate these costs yourself but records from previous jobs can be very useful and help you to save a considerable amount of time. Even if you do not have any records available, remember that knowledge and practical experience gained over the years is your most important source of information when estimating these costs; keep records on this job that can be used when calculating for your next bid.

Once again, the wealth of practical experience already gained on-the-job should help you to "do it alone". Nobody else can–or should–know as much about your costs as you know. It can be dangerous to rely on professional assistance which may be more theoretical than practical.

Following a list of "things to remember" on the next two pages, this chapter will show you how to work through the various stages of calculating the direct project cost for a typical item. You will then be able to turn to the workbook to try your skill at calculating the direct project cost for the other items.

## Things to remember

- ☐ When calculating labour and plant costs based on actual working time, remember that no allowance is being made for periods when no work is being done; labourers are not working but they are still being paid when plant is standing idle. Your experience will help you to determine how long an activity takes to complete, including breaks and stoppages.
- ☐ In these calculations you assume that the necessary labour and plant is always available when needed. Later on, when you balance the need for labour and plant with what you have available, that might lead to adjustments, since it is

often too expensive to bring in additional labour or plant for just a short period of time.

- ☐ If you have materials already in stock, then you should generally cost them at their replacement value because that is the value they have to you now.

For example, 100 concrete blocks bought six months ago for 100 NU may now cost 120 NU to replace. If you cost them at their original price (100 NU) and obtain the contract, this item will bring in 100 NU. If you use that sum of 100 NU to buy new blocks and replace those in stock, you will only be able to afford 83. If you keep on running your business like this, you will gradually lose your assets. (The only exception to this rule is when you have a non-standard item, such as a special window frame, which will otherwise probably remain in your store for years. In such a case, it may pay to offer it more cheaply to your client and save storage and financing costs.)

- ☐ If you are a small-scale contractor, you may own a small truck or a small mixer, but not much more, so most plant will have to be hired. However, if more plant is bought a portion of the cost of running the plant (fuel, maintenance, etc.) *must* be offset against the contract being estimated. Also, as the plant gets one step closer to replacement every time you use it, an allowance for this lost value (depreciation) *must* also be offset against the contract. How to include this in your bid is covered in Chapter 7, Indirect project costs, and the use of depreciation in bookkeeping and when making financial forecasts is dealt with in IYCB Handbook 3, *Business management*.

Remember that it is KNOWLEDGE AND SKILL, not equipment, that makes an efficient contractor. So only buy plant and equipment when you really need it, since unnecessary purchases tie up much-needed capital.

- ☐ In this chapter we show you how to calculate the direct project costs. Later on, when you compare this result with your plans for completing the project and the resources you have available, you will have a second chance to ask yourself if the calculations made here are realistic. If you find that the calculations are not based on correct assumptions, they will have to be adjusted.
- ☐ The direct project costs are an estimate of the job before the indirect project costs and profit are added. If you were to submit a bid based on direct project costs alone, you would be making the client a present of your

indirect project costs and your business would soon run out of cash.

# How to calculate direct project costs

## USING A SYSTEM

The calculations that lead to an estimate of direct project costs are all quite simple. The problem is that there are a lot of them. This means that it is best to work to a system, so that nothing is forgotten and the calculations are easy to check and refer back to.

The basis of systematic estimating is to make good use of forms, charts and tables, and fill them in step-by-step to build up an accurate estimate. So we will start the process by preparing a Direct project costs chart.

DIRECT PROJECT COSTS CHART

| | List of quantities taken off drawings | | | Direct project costs (NU) | | | | |
|---|---|---|---|---|---|---|---|---|
| Item No. | Description | Unit | Quantity | Labour | Plant | Material | Transport | Total |
| | 1 | | | | | 2 | | |
| | | | | | | | Final total of direct project costs | |

The first four columns are taken directly from the bill of quantities or from a list of quantities that you have calculated yourself; they provide basic information for the calculation.

The second set of five columns contains the four cost elements for each item that you will calculate, plus the total for that

item. Some contractors prefer to calculate unit costs for comparison with past jobs, but it is usually easier to deal with actual costs on small projects.

## A sample calculation

The following is an example of direct project cost calculation using item 6, "Pour concrete to foundations" from the list of quantities in table 3. Note that the calculations here are done on one of the houses.

The procedure for filling in the chart will be shown step-by-step.

**Step 1**: Transfer the item number, description, unit and quantity to the direct project costs chart

This is the first and simplest step. It gives you the basic information you need to carry out the next steps in the calculation.

DIRECT PROJECT COSTS CHART

| List of quantities taken off drawings | | | | Direct project costs (NU) | | | | |
|---|---|---|---|---|---|---|---|---|
| Item No. | Description | Unit | Quantity | Labour | Plant | Material | Transport | Total |
| 6. | Pour concrete to foundations | $m^3$ | 4.0 | | | | | |
| | | | | | | Final total of direct project costs | | |

**Step 2**: Calculate labour costs using past experience

Task: mix and place 4.0 $m^3$ of concrete into a strip footing.
We have assumed that past experience suggests this task will

take 4 hours (or 0.5 days) and will require the following labour inputs:

Mixing 2 labourers loading
1 mixer operator (semi-skilled)

Placing 4 labourers barrowing
2 labourers placing
1 vibrator operator (semi-skilled)

We will further assume that the daily cost of semi-skilled labour (wages plus direct overheads) is 8 NU per day and the daily cost of general labourers is 5 NU per day.

So the labour costs for this item are:

| | | |
|---|---|---|
| General | 8 labourers for 0.5 days<br>= 4 workdays<br>Thus cost of 4 days at 5 NU per day | 20 NU |
| Semi-skilled | 2 semi-skilled for 0.5 days<br>= 1 workday<br>Thus cost of 1 day at 8 NU per day | 8 NU |
| | So total labour direct project cost = | 28 NU |

This figure of 28 NU can now be entered on the chart:

DIRECT PROJECT COSTS CHART

| List of quantities taken off drawings | | | | Direct project costs (NU) | | | | |
|---|---|---|---|---|---|---|---|---|
| Item No. | Description | Unit | Quantity | Labour | Plant | Material | Transport | Total |
| 6. | Pour concrete to foundations | $m^3$ | 4.0 | 28 | | | | |
| | | | | | | | Final total of direct project costs | |

**Step 3**: Calculate plant costs using past experience

Task: mix and place 4.0 $m^3$ of concrete into a strip footing.

We have already decided that the task will take 4 hours (or 0.5 days), but again we have to draw upon our past experience to decide on the type and amount of plant required and its daily cost:

| | |
|---|---|
| Mixing | 1 concrete mixer $5/3^{1/2}$ (daily hire rate 10 NU) |
| Placing | 1 vibrator and poker (daily hire rate 2 NU) |
| Other | 1 water bowser (daily hire rate 4 NU) |

So the plant costs for this item are:

| | | |
|---|---|---|
| Mixer | 0.5 days at 10 NU per day | 5 NU |
| Vibrator | 0.5 days at 2 NU per day | 1 NU |
| Bowser | 0.5 days at 4 NU per day | 2 NU |
| | The total gives the plant direct project cost | 8 NU |

In these calculations we have assumed that you can either hire the plant for half a day or, if you have to hire it for a whole day, you can use it for other tasks during the other half of the day. If this is not possible, you have to take that into consideration when calculating, putting the daily rate as the cost.

The figure of 8 NU can now be entered on the chart:

| DIRECT PROJECT COSTS CHART | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| List of quantities taken off drawings | | | | Direct project costs (NU) | | | | |
| Item No. | Description | Unit | Quantity | Labour | Plant | Material | Transport | Total |
| 6. | Pour concrete to foundations | $m^3$ | 4.0 | 28 | 8 | | | |
| | | | | | | Final total of direct project costs | | |

**Step 4**: Calculate material costs using past experience

Task: mix and place 4.0 $m^3$ of concrete into a strip footing.

First we have to check on the mix design in the specification. By varying the proportion of cement, sand and aggregate the characteristics of the concrete change. More cement means that the concrete will be stronger but also that it will be more expensive. The proportion of cement–sand–aggregate for the various parts of the building should be given in the project documentation. In our building we assume, as stated earlier, that it reads "Concrete for foundations to be 1:2:4 mix by volume".

In this expression the first figure refers to the volume of cement, the second to the volume of sand and the third to the volume of aggregate. Hence, for every 0.1 $m^3$ of cement in the 1:2:4 mix, there would be 0.2 $m^3$ of sand and 0.4 $m^3$ of aggregate.

Remember:

- ☐ Concrete mix by volume is different from concrete mix by weight, since 1 $m^3$ of cement does not weigh the same as 1 $m^3$ of sand or 1 $m^3$ of aggregate.
- ☐ Always allow extra volume for wastage of material when it is handled and transported (approx. 10 per cent).
- ☐ Approximately 1.5 $m^3$ of dry ingredients (cement, sand, aggregates) results in 1 $m^3$ of mixed concrete.

Here is a table to help you calculate the right volumes and/or weights for the most common mixtures by volume.

*Table 4.* Gross quantities per cubic metre concrete

| Mix by volume | Cement | | Sand | | Aggregate | |
|---|---|---|---|---|---|---|
| | cu. m | kg | cu. m | kg | cu. m | kg |
| 1 : 1 : 2 | 0.375 | 540 | 0.375 | 600 | 0.750 | 1 080 |
| 1 : 1.5. : 3 | 0.273 | 393 | 0.409 | 654 | 0.818 | 1 179 |
| 1 : 2 : 4 | 0.214 | 308 | 0.428 | 685 | 0.858 | 1 132 |
| 1 : 2.5 : 5 | 0.176 | 254 | 0.441 | 706 | 0.882 | 1 275 |
| 1 : 3 : 6 | 0.150 | 216 | 0.450 | 720 | 0.900 | 1 297 |

For our 4.0 $m^3$ of placed 1:2:4 mix concrete we start by allowing for wastage (10 per cent) which gives us 4.4 $m^3$.

10 per cent of 4.0 $m^3$ is 0.4 $m^3$ (0.1 x 4.0 = 0.4)
So adding 10 per cent for wastage gives us 4.4 $m^3$ (0.4 + 4.0 = 4.4)

We will need approximately: (by weight)
1 355 kg of cement (308 kg x 4.4 = 1 355 kg)
3 014 kg of sand (685 kg x 4.4 = 3 014 kg)
4 980 kg of stone (coarse aggregate) (1 132 kg x 4.4 = 4 980 kg)

The same calculations by volume give us:
0.95 $m^3$ of cement (0.214 $m^3$ x 4.4 = 0.942 $m^3$)
1.9 $m^3$ of sand (0.428 $m^3$ x 4.4 = 1.883 $m^3$)
3.8 $m^3$ of stone (coarse aggregate) (0.858 $m^3$ x 4.4 = 3.775 $m^3$)

Now we have calculated the mix by volume and by weight but the contractor as manager also needs to know the "cost mix" of concrete. The cost per ton of cement is often about 10 times as high as the cost per ton of sand and aggregate. If we assume that the cost of cement is 5.0 NU per 100 kg bag, the cost of sand is 5.0 NU per 1 000 kg and the cost of aggregate is 4.0 NU per 1 000 kg you get a "cost mix" that is very different from the mix by volume.

The material costs for this item are:

| | |
|---|---|
| Cement 1 355 kg at 5.0 NU per 100 kg bag | 68 NU |
| Sand 3 014 kg at 5.0 NU per 1 000 kg (loaded) | 15 NU |
| Stone 4 980 kg at 4.0 NU per 1 000 kg (loaded) | 20 NU |
| So total material direct project cost = | 103 NU |

This shows that approximately 4/6 of the cost (68/103) is cement while sand and stone account for approximately 1/6 each. So the "cost mix" of the 1:2:4 volume mix is something like a 4:1:1. Now the high cost ingredient has been identified, and you know where to concentrate your attention in order to achieve the maximum savings. It means, for instance, that you would gain much more from a 10 per cent discount on cement purchases than from a 20 per cent discount on sand and also that it is important to be careful when transporting and unloading your cement and necessary to store it properly to minimize waste.

The material direct project cost has been calculated to be 103 NU, and this figure can now be entered on the chart:

DIRECT PROJECT COSTS CHART

| | List of quantities taken off drawings | | | Direct project costs (NU) | | | | |
|---|---|---|---|---|---|---|---|---|
| Item No. | Description | Unit | Quantity | Labour | Plant | Material | Transport | Total |
| 6. | Pour concrete to foundations | $m^3$ | 4.0 | 28 | 8 | 103 | | |
| | | | | | | Final total of direct project costs | | |

**Step 5**: Calculate transport costs using past experience

Task: mix and place 4.0 $m^3$ of concrete into a strip footing.

The materials estimate did not allow for the cost of transport. We will assume that at the site inspection the coarse aggregate quarry was found to be 10 km away and the sand pit 20 km away. The charge for delivery of sand and stone (using a 10 000 kg tipper truck) is 1 NU/10 000kg/km. The nearest cement supplier is 5 km away and loads free, but charges 1 NU/1 000 kg/km for transport. We must also allow for the cost of water transported from the village and the offloading of cement bags at the site.

So the transport costs for this item are:

| | |
|---|---|
| Cement 1 355 kg for 5 km at 1 NU/1 000 kg/km | 7 NU |
| Sand 3 014 kg for 20 km at 1 NU/10 000 kg/km | 6 NU |
| Stone 4 980 kg for 10 km at 1 NU/10 000 kg/km | 5 NU |
| Water 2 tankloads (5 t each) 1 km at 1 NU/10 000 kg/km | 1 NU |
| Offloading cement: 27 sacks of 50 kg | |
| 3 unskilled 0.5 hours | |
| 5 NU/day x 3 x (0.5/8) | 1 NU |
| So transport direct project cost = | 20 NU |

This figure of 20 NU can now be entered on the chart:

| DIRECT PROJECT COSTS CHART | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| List of quantities taken off drawings | | | | Direct project costs (NU) | | | | |
| Item No. | Description | Unit | Quantity | Labour | Plant | Material | Transport | Total |
| 6. | Pour concrete to foundations | $m^3$ | 4.0 | 28 | 8 | 103 | 20 | |
| | | | | | | Final total of direct project costs | | |

**Step 6**: Complete the direct project costs chart for item 6

We can now add the previous four figures to get the total for item 6:

| | | |
|---|---|---|
| Labour | = | 28 NU |
| Plant | = | 8 NU |
| Material | = | 103 NU |
| Transport | = | 20 NU |
| Total | = | 159 NU |

Since this project deals with the construction of three similar houses the total direct project cost for item No. 6 will be 159 NU x 3 = 477 NU.

Now try your own skill at calculating direct project costs for the other items in the workbook.

DIRECT PROJECT COSTS CHART

| List of quantities taken off drawings | | | | Direct project costs (NU) | | | | |
|---|---|---|---|---|---|---|---|---|
| Item No. | Description | Unit | Quantity | Labour | Plant | Material | Transport | Total |
| 6. | Pour concrete to foundations | $m^3$ | 4.0 | 28 | 8 | 103 | 20 | 159 |
| | | | | | | Final total of direct project costs | | |

Table 5 gives a complete list of the direct project costs for this project, including the three similar houses and the general items.

*Table 5.* Direct project costs (3 houses)

| Item No. | Description | Direct project cost |
|---|---|---|
| 1. | Clear site | 30 |
| 2. | Excavate top soil | 125 |
| 3. | Excavate foundations | 375 |
| 4. | Steel reinforcement to foundations | 863 |
| 5. | Formwork to foundations | 284 |
| 6. | Concrete to foundations | 477 |
| 7. | Steel reinforcement to columns | 814 |
| 8. | Formwork to columns | 572 |
| 9. | Concrete to columns | 770 |
| 10 | Concrete block walls up to floor | 1 565 |
| 11. | Return fill and ram excavated material around foundations | 117 |
| 12. | Hardcore fill | 727 |
| 13. | Mesh to floor | 484 |
| 14. | Concrete to floor | 1 264 |
| 15. | Concrete block walls above floor | 1 658 |
| 16. | Soffit forms to ring beam, openings | 95 |
| 17. | Soffit forms to ring beam, infill panels | 92 |
| 18. | Sideforms to ring beam | 329 |
| 19. | Steel to ring beam | 556 |
| 20. | Concrete to ring beam | 669 |
| 21. | Fabricate roof trusses | 1 065 |
| 22. | Fix roof trusses | 210 |
| 23. | Roof tile battens | 184 |
| 24. | Tile roof | 3 138 |
| 25. | Timber to gable ends | 215 |
| 26. | Form eaves | 226 |
| 27. | Supply and fix ceiling boards | 624 |
| 28. | Fix prefabricated window panels | 1 008 |
| 29. | Fix prefabricated door panels | 354 |
| 30. | Terrazzo floor | 442 |
| 31. | Bagwash walls and columns | 249 |
| 32. | Paint | 546 |
| 33. | External paths and parking | 574 |
| 34. | Spread topsoil to landscape site | 60 |
| 35. | Perimeter fence | 418 |
| 36. | Dispose of surplus material off-site | 129 |
| | Totals | 21 308 |

# INDIRECT PROJECT COSTS 7

Direct project costs are only a part of the total cost of completing a contract. This chapter will help you to calculate how much to add in order to cover all the indirect project costs before you begin to make a profit.

Indirect project costs are not linked to a specific project activity but are nevertheless necessary to complete the project. Costs for site offices, water supply, scaffolding, rent of a permanent office and your secretary's salary are all examples of indirect project costs.

Some indirect costs can be recovered over a series of separate contracts. Temporary buildings, such as site offices, are dismantled and reused many times before they come to the end of their useful life. Even so, they lose some of their value each time they are used and each job should help to pay for their replacement.

Other costs will have to be recovered in full on the project on which they are used. The important thing is to make sure your estimate has taken account of *all* the indirect project costs that you are likely to face. If any major indirect cost is forgotten, it can easily turn an anticipated profit into an actual loss.

## What are the indirect costs?

Some of the following items may be included specifically for pricing in the bill of quantities of a contract. This makes things easier for the contractor, because there is no danger of them being forgotten. But often it is the bidder's responsibility to forecast all the indirect costs that may be incurred, so it pays to work through a check-list every time that you tender.

This chapter will help you to make up your own check-list to suit your own business, and price the individual items realistically.

Indirect costs are divided into three groups:

## A. PRELIMINARIES

Additional costs directly related to carrying out the project, for example supervision, site offices, transport of workers and site insurance.

## B. RISK ALLOWANCE

The contractor makes an extra allowance reflecting the risks involved in this particular project. Examples of risks involved in the construction business are bad weather and clients going bankrupt.

## C. COMPANY COSTS

Costs related to running your company but not directly related to carrying out the project, for example rent of permanent office, salaries of permanent staff and interest on bank loans.

# A. Preliminaries

All costs that are related to carrying out the project but are not directly linked to any specific project activity (item in the bill) are included here. Sometimes preliminaries are to be submitted as a part of the bill of quantities, making it easier for the contractor to remember to take these costs into account, but often it is entirely up to you to make sure that *all* these costs are covered. Here the preliminaries are presented and looked at in detail, with advice on how to take all these costs into account properly and correctly. After that, under the heading "Calculating preliminary costs", a calculation of preliminary costs on a project is done. The example is based on the same contract used when calculating direct project costs in the previous chapter.

The preliminary costs are presented under these headings:

- ☐ supervision
- ☐ offices, sheds, storage and access
- ☐ water supply and other services
- ☐ plant and tools
- ☐ transport
- ☐ safety, health and welfare
- ☐ security
- ☐ site clearance

- ☐ insurance
- ☐ bonds.

## SUPERVISION

Site supervision will be a combination of the cost of employing any or all of the following:

- ☐ site manager
- ☐ general foreman
- ☐ trades foremen
- ☐ site clerk
- ☐ storekeeper
- ☐ engineer
- ☐ surveyor.

On large contracts site supervision is often listed as a separate item in the bill. On contracts for which it is not listed, the amount of site supervision required must be calculated, costed and included in the total project estimate.

## OFFICES, SHEDS, STORAGE AND ACCESS

### Site offices

Temporary buildings can be reused several times, but how long you will be able to use them depends on how well you take care of them. If there is no maintenance done on the buildings they often only last two or three projects, but if you allow for maintenance and repairs on a regular basis, their useful life increases up to tenfold. This can have a big impact on project costs. If an office costs 1,000 NU, the charge against the project should be 500 NU if it can only be reused once but only 100 NU if it is reused nine times. Besides allowing for depreciation of site offices, always remember to allow for transport, erection and dismantling.

### Materials storage sheds

Replacing damaged or stolen materials is expensive, so it is worth spending enough to keep them safe.

Fencing will be needed to protect the works during the construction period.

This will be more expensive where there are deep trenches and in urban areas to stop trespassers and prevent accidents.

## Hard-standing for stacking aggregates

You need to provide a smooth and firm base for stacking aggregates. If the soil underneath is sufficiently firm, this can often be done just by removing the topsoil. However, if the layer of soft soil is too thick, you can put boards or a tarpaulin on the ground to provide a sufficiently firm base. Stacking your aggregates properly ensures that they are kept clean and reduces waste to a minimum.

## Access roads

When calculating the amount of labour, equipment and materials needed for access roads and storage areas, take care to plan the most effective layout possible. Major savings can be made by designing a layout where smooth access is ensured, storage areas are close to the building and double handling of materials is avoided.

# WATER SUPPLY AND OTHER SERVICES

## Water supply

A supply of clean water is essential both to comply with the conditions of the contract and to ensure that the concrete and mortar mixed on site is of adequate quality.

## Other services

On larger sites it is sometimes necessary to allow for the cost of electricity and telephone services. If mains electricity is not available, it may be necessary to allow for the cost of a generator to provide power and lighting.

# PLANT AND TOOLS

Sometimes it is better to cover the cost of essential site plant as an indirect project cost, rather than recover it bit by bit from each item. This generally applies to items such as mixers and hoists which are likely to be required on the site for a considerable period. There must also be allowance for the cost of hand tools and other small items of site equipment.

## Concrete mixer

A concrete mixer is a basic item of equipment which is needed on almost every site. Most contractors own at least one mixer, and mixers can last a long time if they are properly maintained and cleaned out thoroughly after every use.

It is worth thinking carefully about your needs for concrete mixing on the site, since you will waste time, money and material if you make the wrong decision. For example, sometimes it pays to keep a small mixer on site all the time and bring a larger capacity mixer on site when needed.

Another tip from experienced contractors is to calculate the size of mixer needed, and then order the next size up! This will enable you to increase production in emergencies or if you fall behind schedule.

## Hoists

Using manpower to move materials vertically consumes a lot of time and money on most building sites. So, even though they may seem expensive, hoists are often a cost-effective means of transporting material up from ground level. Types and capacities must be considered at the estimating stage.

## Small tools

These include spades, pickaxes, crowbars, sledgehammers, saws, axes, buckets, brushes, ropes, tarpaulins and so on. It is not realistic to try to calculate the quantity of each exactly, so a general estimate of the overall cost must be made. This is usually based on costs and experience from previous projects.

## Scaffolding

Scaffolding has to be provided for most building works. It is the bidder's responsibility to calculate what is needed and include it in the cost.

## TRANSPORT

This includes transport of site personnel and can also include the cost of setting up your facilities on site. It should be noted that transport of building materials needed for the construction may be allowed for in three separate ways:

- ☐ as an item under preliminaries
- ☐ in the unit price of materials
- ☐ as a portion of the direct project cost.

## SAFETY, HEALTH AND WELFARE

These costs include latrines, hand-washing facilities and a first-aid box in case of accidents. The facilities provided will depend partly on the number of workers on site. Apart from legal considerations it is false economy to cut down on these costs as it would reduce the productivity and goodwill of the workforce, and hence reduce the overall profit on the project.

## SECURITY

It may be necessary to provide protection outside working hours in the form of guards, alarms, dogs and so on. This cost will vary according to the location of the site and the "attractiveness" of the materials and equipment that are being kept there.

## SITE CLEARANCE

An allowance has to be made for clearing up the site, so that it is clean and tidy when handed over to the client.

## INSURANCE

Construction is a risky business; various types of insurance cover are required and others are advisable. Some are required by national law, some are required as a condition of contract, while some are altogether voluntary.

Some common types of insurance are:

- ☐ vehicle insurance
- ☐ employers' liability insurance
- ☐ public liability policies
- ☐ plant insurance
- ☐ contractor's all-risks policy
- ☐ workers' compensation policy.

Whilst no quantity calculations are required, it is wise to check with the insurance broker:

- ☐ which risks will be covered by existing policies and
- ☐ what new policies will be required and what rates are applicable.

## BONDS

Performance bonds can be seen as a form of insurance taken out to cover the risks to the owner of non-performance by the contractor (although they have to be paid for by the contractor).

Non-performance can include a number of risks such as:

- ☐ bankruptcy or liquidation of the contractor's business
- ☐ failure to complete the work on time, resulting in loss of income to the client
- ☐ the need to appoint another contractor to complete the work.

Although bonds are often issued by insurance companies, they are not insurance as far as the contractor is concerned. The issuer of the bond (or surety) simply stands behind the contractor with a fall-back guarantee, and the surety only becomes liable when the contractor has failed to meet the obligations under the contract. Thus the bond is paid for by the contractor but the only possible benefit goes to the client, so the cost of the bond must be fully reflected in the contractor's price.

In many countries small contractors find it very difficult to obtain bonds at any price, which means that they cannot even compete for many contracts. If you want to obtain bonds at a reasonable price, remember that the insurance companies are also in business for profit. They will be happy to write bonds for contractors with sound businesses and a good reputation, because the bond fees will almost certainly mean extra profit for them. The need to obtain bonds at a reasonable price is an extra reason for you to IMPROVE YOUR CONSTRUCTION BUSINESS.

# Calculating preliminary costs

The following table gives an example of calculating the preliminary costs that might occur on our typical project.

*Table 6.* Preliminary cost calculation

| Item | Description | Cost |
|---|---|---|
| P1 | Contractor's site office plus furniture and all temporary buildings such as dry store, workshops, timber racks, canteen.<br><br>*The total cost of buildings is 2000 NU, but they can usually be used 10 times so the cost will be 2000 NU/10 = 200 NU. The buildings are delivered to site for an extra charge of 80 NU but four labourers will need to help for a day.*<br>*4 x 5 NU/day = 20 NU. Altogether : 200 + 80 + 20 = 300 NU* | 300 NU |
| P2 | Prepare stockpiling areas, mixing area and access road.<br><br>*Grader for 3 days @ 75 NU/day for preparation.*<br>*Allow for maintenance over the contract period: 2 days @ 75 NU/day (according to records from previous jobs).* | 375 NU |
| P3 | Water is available in the pond to the north of the site, but it must be paid for and then pumped into a tank and filtered.<br><br>*Payment to farmer for water 50 NU*<br>*Tank, stand, small pump and filter (purchase) 2,000 NU*<br>*They can usually be used 10 times so : 2,000/10 = 200 NU* | 250 NU |
| P4 | *Purchase of hand tools and small plant.*<br>*Picks, shovels and wheelbarrows are already owned while concrete mixer and vibrator will be hired. A circular saw and a small electric drill is bought mainly to be used when fabricating roof trusses, but since they are used in other activities as well it is a preliminary cost.*<br>*Wear & tear of handtools 20 NU*<br>*Circular saw: price 1000 NU but cost is spread over 10 contracts 1000 NU/10 = 100 NU.*<br>*Electric drill : price, 90 NU; the drill is worn out faster so the cost is spread over 3 contracts*<br>*90 NU/3 = 30 NU* | 150 NU |
| P5 | Daily transport of workers from village (not included in direct project costs under "transport").<br><br>*Allow truck and driver for 1 hour per day for 100 days*<br>*100 hours at 4 NU/hour* | 400 NU |
| P6 | Contractor's fully comprehensive insurance<br><br>*Allow for single non-recoverable insurance premium* | 700 NU |
| P7 | Wages and overheads for foreman to supervise the contract.<br><br>*20 weeks at 50 NU/week* | 1000 NU |
| | Total preliminary costs | 3175 NU |

# B. Risk allowance

An experienced building contractor will know that construction is a risky business. Some of the most obvious of these risks are:

- ☐ inaccurate estimating
- ☐ rising prices on fixed price contracts
- ☐ delays due to bad weather
- ☐ carelessness by employees
- ☐ clients defaulting on their debts
- ☐ unexpected technical problems.

The contractor can be said to run a form of insurance company where the client has to pay a special hidden insurance premium within the contract price to take account of the risks. By signing a contract, the client ensures that the cost of the project will be known, and the risk will be passed on to the contractor in return for the margin of profit allowed. Whatever precautions are taken, the contractor will never be able to eliminate all the risks but it is possible, by proper planning and forecasting, to find ways to reduce them.

Risk allowance is not a part of the profit for the contractor, but an insurance for risks is impossible to eliminate. If you run several successful projects where the risk allowance did not have to be used it is tempting not to include a risk allowance in the next bid. This would be foolish, because construction is such a risky business that eventually something unforeseen will happen and you will need your risk allowance.

## CALCULATING THE RISK ALLOWANCE

There are two different ways of calculating risk allowance:

1. It can be added to individual items in the list of quantities. In this way it can be shared according to the amount of risk connected with various items. For example, you can add a 10 per cent risk allowance to groundworks, which can be seriously affected by bad weather, but only 2 per cent to carpentry, which is relatively free of risk except for theft of small tools and labour disputes.
2. It can be added as a percentage of the total direct project costs, as in the following example:

The job is shown on the project drawings at the end of this book with three buildings, a car park and a fence (see figure A).

We will assume that the total direct project cost has been

calculated at *21,308 NU*. The bidder has decided to make an overall risk allowance of 4 per cent, since in this case it is not worth trying to estimate the risk on each item separately.

So the risk allowance = 4 per cent of 21,308 NU = *852* NU.

Some risks can be covered by an appropriate insurance policy and therefore may be included in the preliminary costs. If you feel that extra precautions should be taken to cover any kind of special contract risk that is not covered elsewhere, this should be included in the risk allowance.

# C. Company costs

Every contracting firm is faced with certain company costs every year, whatever the level of contracts awarded and undertaken. These simply represent the basic cost of being in business, and they must be covered by the money earned from individual contracts.

Each contract must therefore carry its share of the company costs. As a general principle, the bigger the contract, the larger the proportion of the company costs it has to cover. However, very complicated contracts should be required to bear more than the standard percentage if you need to use the company resources to a disproportionate extent.

Since the level of company costs can make all the difference between running the business at a profit and running it at a loss, it is worth looking carefully at some of the components of these costs. Here they are presented and considered in detail with advice on how to take these costs into account when preparing your bid. After that, under the heading "Calculating company costs", the company costs of a typical small construction company are prepared as a worked example. These calculations are linked to the other calculations for our typical project.

The company costs are presented under these headings:

- ☐ Staff salaries
- ☐ Property
- ☐ Vehicles
- ☐ Loan interest.

## STAFF SALARIES

Staff salaries cover *all* the costs of employing the company's full-time staff. It includes the salary for the contractor (and partners, if

any), site managers and foremen who are employed on a permanent basis, secretaries, accountancy staff, guards and so on. Foremen and supervisors can also be directly charged to a project as in our example (see "Calculating preliminary costs").

The additional cost to basic salaries and wages includes taxes and any benefits paid for by the company, such as housing allowances.

If foremen or supervisors are hired for a specific job and are not part of your permanent staff, their costs can be included in the direct project costs.

## PROPERTY

Property costs are the expenses connected with renting or owning premises such as an office, a fabrication yard or storage sheds. If the property is rented, the property costs per year are simply the rent you pay every year plus any related direct costs.

If you take a property on a long lease, then the cost of buying the lease should be spread over a number of years. For example, if you buy a ten-year lease on a property for 10,000 NU, then the basic property cost will be 1,000 NU per year (assuming it is written off in equal annual amounts).

If you buy a property outright it is necessary to make some provision for depreciation, but this need not be very high if you expect the property to keep most of its value. However, you may decide to make an additional charge to represent the interest you might have earned on your money if it was not invested in property for your business.

In addition to the basic cost of having the use of the property, proper allowances must be made for related charges such as maintenance costs and electricity, water and telephone. These can usually be estimated reasonably accurately on the basis of past records plus an allowance for future inflation.

## VEHICLES

The cost of running company vehicles includes buying the vehicles, maintenance, spare parts, insurance and fuel. The cost of buying the vehicles is a one-time investment every five to ten years, depending on the type of vehicle and how much it is used.

Every time you use the vehicle it loses a little bit of its value since it gets one step closer to the moment when it needs to be replaced. When that moment arrives you must have enough

money to buy a new vehicle, so you need to make all your projects "pay" a little sum to ensure that funds are available.

The technique used to ensure this is known as depreciation, where the cost of buying a vehicle is spread over the number of years it is expected to last.

For example, suppose you buy a car for 5,000 NU and you assume, based on previous experience, that it will last five years. The easiest way to calculate the depreciation over these five years is to say that the car loses the same value every year, 1,000 NU (5,000/5 = 1,000). The cost for you is 1,000 NU per year in depreciation and all the projects you have during that year should contribute to covering this sum.

This example is based on what accountants call "straight line depreciation", because it is assumed that the loss of value runs in a straight line from the cost price to zero. It is the simplest way of calculating depreciation, but you should understand that this is not the only way. For example, some assets may lose a lot of value in the first year and then only gradually lose the rest of their value until they are sold (with what is called a residual value).

The use of depreciation in bookkeeping and when making financial forecasts is dealt with in more detail in Handbook 3.

You will also have to make a forecast of the cost of maintenance, repairs, fuel, insurance and spare parts on the vehicle during a year. These costs must be borne by all your projects according to their share of the total.

## LOAN INTEREST

This can be expensive, since money often has to be borrowed to get the contract under way. The contractor normally has to take up short-term loans which have a high rate of interest.

For example, if you borrow 10,000 NU at 15 per cent interest, you will have to pay 1,500 NU a year in interest charges.

Paying high interest charges on loans has put many contractors in financial difficulties, so try to avoid large loans where the interest eats up what could have been your profit.

A cash flow forecast tells you how much cash you need to run a project and also when it starts to give you a net income, i.e. when a loan can be paid back. This is presented in great detail in Handbook 3 where three chapters are dedicated to this very important issue.

# Calculating company costs

The following is an example of the annual cost of running a company:

| | |
|---|---|
| ☐ Director's salary | 9 000 NU |
| ☐ Secretary's salary | 1 200 NU |
| ☐ Office rent and running costs | 900 NU |
| ☐ Lease of director's vehicle | 4 000 NU |
| ☐ Bookkeeper/auditor | 600 NU |
| ☐ Interest on bank loan | 800 NU |
| Total for one year | 16 500 NU |
| So monthly average cost | 1 375 NU (16 500 divided by 12) |

Now that we know the company costs, the next step is to distribute them fairly over our different projects. One way of doing this is as a percentage of the overall annual turnover estimated on the basis of past performance. For example, if the estimated turnover of the company is 100,000 NU and the company cost is 15,000 NU, a 15 per cent charge on all projects should be sufficient to recover all company costs.

The trouble is that it is often difficult for a small construction business to forecast its turnover accurately. If you have this problem, an alternative way is to try to calculate the contribution according to the contracts that you are carrying out on a month-to-month basis.

The idea behind this method is that effectively all your contracts belong to a "club" (your company). They get certain benefits from belonging to the club, so they have to pay a fair subscription to cover the costs of providing these benefits. By calculating each contract's contribution on a monthly basis, you charge less to projects that are completed quickly and more to those that drag on for too long.

For example, suppose that our company expects to have two other contracts under way while the project we are bidding for (Project A) is in progress:

Project A 3 buildings, fence and car park: 21 308 NU (5 months)

| | |
|---|---|
| Project B | Office block for insurance firm:<br>100 000 NU (12 months) |
| Project C | Various small maintenance jobs:<br>20 000 NU (total 12 months) |

To share out the "subscription cost" according to the value of the projects, we start by adding all the project values.

| | |
|---|---|
| | 21 308 NU |
| | 100 000 NU |
| | 20 000 NU |
| Total | 141 308 NU |

Then we share out the costs according to the value of each project (either using proportions or percentages). We have calculated that the monthly cost of running the company is 1,375 NU, so;

Project A has to contribute 21,308 divided by 141,308 or about one-seventh of the total cost:

1/7 x 1 375 NU = 196 NU per month

Project B: (100 000/141,308 = 5/7)
5/7 x 1 375 NU = 982 NU per month

Project C: (20 000/141,308 = 1/7)
1/7 x 1 375 NU = 196 NU per month

So projects A and C should each contribute 196 NU per month while they are running, but project B should contribute five times as much, or 982 NU. This means that we will recover almost exactly the 1,375 NU that we need (196 + 982 + 196 = 1,374).

Since project A has a contract period of five months, the total company cost that we should allow for in the bid is:

5 months at 196 NU per month, or 980 NU (5 x 196 = 980).

Always make sure that your company cost recovery calculation is based on a realistic estimate of future workload. If you obtain less work than you expect, there will be fewer "club members" to contribute and you will either have to try to cut company costs or lose money.

## TOTAL INDIRECT PROJECT COST

In summary, the total indirect project costs for our project are:

| | |
|---|---|
| Preliminary costs<br>(see page 60) | 3 175 NU |
| Risk allowance<br>(see page 62) | 852 NU |
| Company costs<br>(see page 66) | 980 NU |
| Total | 5 007 NU |

This means that the total indirect project costs in this case represent an addition of approximately 25 per cent of the direct project costs.

## How to include indirect project costs in the bid

As mentioned earlier there might be a "preliminaries" bill within the bill of quantities, in which case preliminaries can be priced directly. There is, however, rarely a set of bill items to cover the other indirect project costs (risk allowance and company costs). This leaves two ways to include indirect project costs in the bid document or quotation that you submit to your client:

- ☐ as a single separate lump sum
- ☐ as a percentage addition to all the items in the bill of quantities.

Although a single lump sum is easier to calculate, it has certain disadvantages. The most important of these is that there will be no specific item in the bill of quantities to cover it, so the bid will effectively be altered from the form proposed by the consultant or "qualified".

Qualified bids create extra work for the client and the consultant since they make it more difficult to compare one bid with another. Sometimes qualified bids are automatically rejected. Even if you are preparing your own quotation, explicit mention of "risk allowance" and "company costs" can make the client suspicious that the contractor is overcharging and can lead to arguments when certificates are submitted.

So the second alternative is usually best, letting each item bear a fair share of the overall costs of carrying out the work. The advantages are:

- ☐ avoidance of a controversial lump sum provision;
- ☐ possibility of varying percentage addition to take account of the risk and/or to obtain quicker recovery by increasing percentage on early items like groundworks and reducing it on finishings;
- ☐ by spreading the costs, you provide yourself with a set of figures which will be useful during the whole of the contract period, and can also be used as a basis for negotiating claims;
- ☐ indirect costs are easier to recover if the value of work increases due to design changes or additional requirements.

On the other hand, the method of spreading the costs over individual items is more complicated because each has to be calculated separately. For our sample contract:

| | |
|---|---|
| Direct project costs | 21 308 NU |
| Indirect project costs | 5 007 NU |

So the direct project costs have to be increased by 23.50 per cent (or approximately 24 per cent) to give the total project costs. If we are to spread the indirect project costs evenly amongst all the items, this means that each item must now have its direct project cost increased by 24 per cent.

On the following page there is a total project cost calculation showing the indirect project costs spread evenly over the items and added to the direct project cost.

*Table 7.* Total project cost calculation

| Item No. | Description | Direct project cost | Add 24 per cent | Total project cost |
|---|---|---|---|---|
| 1. | Clear site | 30 | 7 | 37 |
| 2. | Excavate top soil | 125 | 30 | 155 |
| 3. | Excavate foundations | 375 | 90 | 465 |
| 4. | Steel reinforcement to foundations | 863 | 207 | 1 070 |
| 5. | Formwork to foundations | 284 | 68 | 352 |
| 6. | Concrete to foundations | 477 | 114 | 591 |
| 7. | Steel reinforcement to columns | 814 | 195 | 1 009 |
| 8. | Formwork to columns | 572 | 137 | 709 |
| 9. | Concrete to columns | 770 | 185 | 955 |
| 10. | Concrete block walls to floor level | 1 565 | 376 | 1 941 |
| 11. | Return fill and ram excavated material, found | 117 | 28 | 145 |
| 12. | Hardcore fill | 727 | 174 | 901 |
| 13. | Mesh to floor | 484 | 116 | 600 |
| 14. | Concrete to floor | 1 264 | 303 | 1 567 |
| 15. | Concrete block walls above floor level | 1 658 | 398 | 2 056 |
| 16. | Soffit forms to ring beam, openings | 95 | 23 | 118 |
| 17. | Soffit forms to ring beam, infill panels | 92 | 22 | 114 |
| 18. | Sideforms to ring beam | 329 | 79 | 408 |
| 19. | Steel to ring beam | 556 | 133 | 689 |
| 20. | Concrete to ring beam | 669 | 161 | 830 |
| 21. | Fabricate roof trusses | 1 065 | 256 | 1 321 |
| 22. | Fix roof trusses | 210 | 50 | 260 |
| 23. | Roof tile battens | 184 | 44 | 228 |
| 24. | Tile roof | 3 138 | 753 | 3 891 |
| 25. | Timber to gable ends | 215 | 52 | 267 |
| 26 | Form eaves | 226 | 54 | 280 |
| 27. | Supply and fix ceiling boards | 624 | 150 | 774 |
| 28. | Fix prefabricated window panels (incl glazing) | 1 008 | 242 | 1 250 |
| 29. | Fix prefabricated door panels | 354 | 85 | 439 |
| 30. | Terrazzo floor | 442 | 106 | 548 |
| 31. | Bagwash walls and columns | 249 | 60 | 309 |
| 32. | Paint | 546 | 131 | 677 |
| 33. | External paths and parking | 574 | 138 | 712 |
| 34. | Spread topsoil to landscape site | 60 | 14 | 74 |
| 35. | Perimeter fence | 418 | 100 | 518 |
| 36. | Dispose of surplus material off-site | 129 | 31 | 160 |
| | Totals | 21 308 | 5 112 | 26 420 |

# SUBMITTING A BID 8

Now that we know the cost of the project, we have to decide on how much profit to add. When we have the price that we are going to offer to the client, we also have to consider the way in which the bid is to be submitted. Presentation is important. If there is a small difference in the price quoted by two contractors, the client will probably choose the quotation that *looks* the most professional because it probably means that the contractor who prepared it is more professional in the whole range of business practices.

## How much profit?

It is tempting to try and add as large a profit as possible, but then there is a danger of losing in the competition for the contract. How big a profit you should add to the estimate depends on your judgement of the market and the state of your business. If there are few jobs available you may decide to accept a low profit margin to get a contract which will help to cover your overheads (company costs), but if there is a good demand it may be possible to increase the profit margin and obtain additional funds to invest in expanding the business.

### HOW TO CALCULATE PROFIT

The following is an example of calculating or assessing profit:

As in the "risk allowance" example, we will base our calculations on a direct project cost of 21,308 NU. Let us suppose that this job can be fitted in easily with our existing workload and it will help to employ some of our currently underutilized plant and artisans. The job market is quite tight and we know that a lot of other contractors will tender, so we decide to keep our profit allowance down to 8 per cent.

The profit allowance is calculated on the project direct cost since that is the service we are offering to our clients. The calculation is quite simple:
Profit allowance = 8 per cent of 21 308 NU = 1 705 NU

## HOW TO INCLUDE PROFIT IN THE BID

The same arguments that were valid in the section on how to include indirect project costs in the bid are, of course, also valid in the case of how to include profit.

As was done when including indirect project costs the profit allowance is being spread evenly over the items, adding 8 per cent to each of them.

In table 8, this calculation has been done. The sum of all the items with the percentage (8 per cent) added to them will be the final price that we propose to the client for carrying out the work.

*Table 8.* Total project calculation

| Item N°. | Description | Direct project cost | Total project cost | Profit 8% on Dir. cost | Total amount |
|---|---|---|---|---|---|
| | | | Direct + Indirect | | |
| 1. | Clear site | 30 | 37 | 2 | 39 |
| 2. | Excavate top soil | 125 | 155 | 10 | 165 |
| 3. | Excavate foundations | 375 | 465 | 30 | 495 |
| 4. | Steel reinforcement to foundations | 863 | 1 070 | 69 | 1 139 |
| 5. | Formwork to foundations | 284 | 352 | 23 | 375 |
| 6. | Concrete to foundations | 477 | 591 | 38 | 629 |
| 7. | Steel reinforcement to columns | 814 | 1 009 | 65 | 1 074 |
| 8. | Formwork to columns | 572 | 709 | 46 | 755 |
| 9. | Concrete to columns | 770 | 955 | 62 | 1 017 |
| 10. | Concrete block walls to floor level | 1 565 | 1 941 | 125 | 2 066 |
| 11. | Return fill and ram excavated material, around foundations | 117 | 145 | 9 | 154 |
| 12. | Hardcore fill | 727 | 901 | 58 | 959 |
| 13. | Mesh to floor | 484 | 600 | 39 | 639 |
| 14. | Concrete to floor | 1 264 | 1 567 | 101 | 1 668 |
| 15. | Concrete block walls above floor level | 1 658 | 2 056 | 133 | 2 189 |
| 16. | Soffit forms to ring beam, openings | 95 | 118 | 8 | 126 |
| 17. | Soffit forms to ring beam, infill panels | 92 | 114 | 7 | 121 |
| 18. | Sideforms to ring beam | 329 | 408 | 26 | 434 |
| 19. | Steel to ring beam | 556 | 689 | 44 | 733 |
| 20. | Concrete to ring beam | 669 | 830 | 54 | 884 |
| 21. | Fabricate roof trusses | 1 065 | 1 321 | 85 | 1 406 |
| 22. | Fix roof trusses | 210 | 260 | 17 | 277 |
| 23. | Roof tile battens | 184 | 228 | 15 | 243 |
| 24. | Tile roof | 3 138 | 3 891 | 251 | 4 142 |
| 25. | Timber to gable ends | 215 | 267 | 17 | 284 |
| 26 | Form eaves | 226 | 280 | 18 | 298 |
| 27. | Supply and fix ceiling boards | 624 | 774 | 50 | 824 |
| 28. | Fix prefabricated window panels (incl. glazing) | 1 008 | 1 250 | 81 | 1 331 |
| 29. | Fix prefabricated door panels | 354 | 439 | 28 | 467 |
| 30. | Terrazzo floor | 442 | 548 | 35 | 583 |
| 31. | Bagwash walls and columns | 249 | 309 | 20 | 329 |
| 32. | Paint | 546 | 677 | 44 | 721 |
| 33. | External paths and parking | 574 | 712 | 46 | 758 |
| 34. | Spread topsoil to landscape site | 60 | 74 | 5 | 79 |
| 35. | Perimeter fence | 418 | 518 | 33 | 551 |
| 36. | Dispose of surplus material off-site | 129 | 160 | 10 | 170 |
| | Totals | 21 308 | 26 420 | 1 704 | 28 124 |

The price for the contract to be offered to the client is thus: 28,124 NU.

# Presentation of the bid

## THE CLIENT'S POINT OF VIEW

The professional contractor will try to see things from the client's point of view. How can this concern for the client's interests be demonstrated at the bidding stage? A good way is to ask yourself three questions. Has the client asked for exactly what is needed? Have any important considerations been forgotten? What would it cost to deal with any problems that you have identified?

For example, when you look carefully at the drawings again following the site inspection, you notice three possible sources of trouble or opportunities to improve the usefulness of the project to the owner:

- ☐ On the basis of past experience and local knowledge, you believe that there is a danger of flooding in wet weather.
- ☐ Standard microconcrete tiles have been specified and priced for. More attractive coloured tiles are now available at a slightly higher cost and can enhance the value of a building.
- ☐ There is no provision for a gate at the entrance to the car park, which could cause security problems if vehicles are parked overnight.

If the client employs a consultant, a responsible contractor would draw the consultant's attention to these problems or opportunities, and the bill of quantities may already include a general "contingencies" item to cope with unexpected matters of this kind.

In the present case, we are assuming that the bidder has simply been presented with the project drawings and asked to submit a price for the job. So the bidder can decide on the form in which the bid will be presented. In this chapter we will decide on the form of presentation to cover our ideas and concerns about the contract, and prepare a covering letter to explain this to the client. This means we have to look at two ways of dealing with contractual uncertainty:

- ☐ a provision for contingencies
- ☐ qualifications.

## CONTINGENCIES

The inclusion of a provision for contingencies is a way to help both client and contractor by giving an opportunity to:

- ☐ cope with any problems that may arise, and
- ☐ enhance the value of the job by improving the specification or adding minor items that may be required by the client.

We have calculated that the price for this job should be 28,124 NU. This figure does not allow for any of the three items identified on the previous page, or any other possibilities that may arise as the contract gets under way.

We certainly cannot afford to make a present of the additional work to the client, and we may lose the job if we increase our prices to cover work that our competitors have ignored. The answer is to persuade the client or consultant to add a percentage or a lump sum to the basic price on all bids to set up a contingency fund. It can be dangerous to add a contingency sum without consultation, since many clients just look at the figure on the bottom line.

A provision for contingencies does not affect the basic contract price, since contingency items must be specifically authorized by the consultant before the contractor is entitled to carry them out. If the client decided not to ask for any work additional to that shown on the drawings, then the total amount payable will remain at the basic sum of 28,124 NU. This point should be emphasized in the covering letter to the client. The existence of a contingency fund will not necessarily lead to any extra payment to the contractor. It is there for the client to use if and when desired.

So what is the point of providing for contingencies? Essentially it benefits the client by offering additional flexibility in getting the project completed in a way that will be fully satisfactory to the client's needs without holding up the work while additional funds are obtained. This can be important when the client has to obtain funds based on a fixed estimate, as is often the case with small contracts.

For example, suppose a client obtains a bank loan to build a house. If the architect has inadvertently left some details off the drawings, or if the client wants to change the specification, more money will probably be required to pay the contractor for the variation. If the work has to stop while the bank makes a decision on committing extra loan funds, the contractor will lose money and the client will face a claim.

In our typical project the architect has not shown a gate at the access to the car park. As a result the contractor has not

included for it in the quotation, so if the client wants a gate this would be a variation that could be paid for out of the contingency fund.

## QUALIFICATIONS

When the bidder is presented with an incomplete set of drawings, it may be necessary to qualify the bid to make clear that certain risks are not covered and would be the subject of a claim for extra payment. In our example a possible source of trouble is the pond to the north of the site as seen on the site layout plan. In times of heavy rain this pond may flood and fill the ditch shown in the sketch plan. This could be serious, since one of the buildings is sited over the ditch.

Besides being a potential source of worry to the client, this could lead to a dispute that would be costly for the contractor. So it is wise to discuss this with the client or consultant before submitting the bid. After discussing this risk you may decide to include a qualification in the letter accompanying the quotation such as:

"The contractor takes no responsibility for delays or damage caused to the contract works by overflow and flooding from the pond to the north of the site or from the ditch running through the site."

It should, however, be stressed that the inclusion of such a clause does not necessarily exclude liability for the contractor and also that excess use of such exclusion clauses may make the client uneasy about accepting your bid.

# Sample letter and quotation

Suggested drafts of the quotation and covering letter are shown on the two following pages, and the standard list of conditions on pages 79 to 80.

**A. BIDDER & COMPANY**
**BUILDING AND PUBLIC WORKS CONTRACTORS**

To: A. Client, 15 July 1993
Anyplace

Dear Mr. Client,

*Quotation for three buildings, fence, parking area and paths as described on the contract drawings*

1. We would like to draw your attention to our enclosed standard list of conditions, together with one additional clause that arises from our inspection of the site.

2. The site layout shows a pond to the north of the site and a ditch running through it. We feel that there is a danger of flooding which could affect both our site operations and the finished buildings. The former consideration leads us to attach the following additional clause to our bid:

"The contractor takes no responsibility for delays or damage caused to the contract works by overflow and flooding from the pond to the north of the site or from the ditch running through it."

3. We feel that this is the responsibility of the client, and the necessary culverting should be completed before the successful tenderer starts work on the site.

4. Alternatively this work could be carried out as a part of the main contract through the provision of a contingency fund to be spent at the discretion of the client's professional representative.

5. You will note that our quotation includes a contingency sum which could be used to cover these and any other costs that might be required. Below are examples of the sort of expenditure that you might like to consider:

Standard microconcrete tiles have been specified and priced for. More attractive coloured tiles are now available at a slightly higher cost and can enhance the value of a building.

There is no provision for a gate at the entrance to the car park, which could cause security problems if vehicles are parked overnight.

6. Thus our basic bid is 28,124 NU subject to the condition set out in paragraph 2 above, and the additional contingency sum of 2,812 NU which we suggest would be for use solely at your discretion. If you agree, the overall contract sum will thus be 30,936 NU.

7. This quotation is valid for 30 days.

Yours faithfully,

A. Bidder and Company

*Table 9* Quotation for three buildings, fence, parking area and paths as shown on contract drawings

| Item | Description | Unit | Quantity | Rate | Amount |
|---|---|---|---|---|---|
| 1. | Clear site | | | | 39 |
| 2. | Excavate top soil | $m^2$ | 300 | 0.55 | 165 |
| 3. | Excavate foundations | $m^3$ | 75 | 6.60 | 495 |
| 4. | Steel to foundations 12 mm | lin. m | 900 | | 1 139 |
| | 8 mm | lin. m | 216 | | |
| 5. | Formwork to foundations | $m^2$ | 54 | 6.94 | 375 |
| 6. | Concrete to foundations | $m^3$ | 12.0 | 52.42 | 629 |
| 7. | Steel to columns 12 mm | lin. m | 693 | | 1,074 |
| | 8 mm | lin. m | 228 | | |
| 8. | Formwork to columns | $m^2$ | 147 | 5.14 | 755 |
| 9. | Concrete to columns | $m^3$ | 11.1 | 91.62 | 1 017 |
| 10. | Concrete block walls to floor level | $m^2$ | 96 | 21.52 | 2 066 |
| 11. | Return fill and ram excavated material | $m^3$ | 51 | 3.02 | 154 |
| 12. | Hardcore fill | $m^3$ | 51 | 18.80 | 959 |
| 13. | Mesh to floor | $m^2$ | 153 | 4.18 | 639 |
| 14. | Concrete to floor | $m^3$ | 20.4 | 81.76 | 1 668 |
| 15. | Concrete block walls above floor | $m^2$ | 102 | 21.46 | 2 189 |
| 16. | Soffit forms to ring beam, openings | $m^2$ | 9 | 14.00 | 126 |
| 17. | Soffit forms to ring beam, panels | $m^2$ | 7 | 17.29 | 121 |
| 18. | Sideforms to ring beam | $m^2$ | 54 | 8.04 | 434 |
| 19. | Steel to ring beam 12 mm | lin. m | 432 | | 733 |
| | 8 mm | lin. m | 162 | | |
| 20. | Concrete to ring beam | $m^3$ | 7.8 | 113.33 | 884 |
| 21. | Fabricate roof trusses | No. | 33 | 42.61 | 1 406 |
| 22. | Fix roof trusses | No. | 33 | 8.39 | 277 |
| 23. | Roof tile battens | lin. m | 636 | 0.38 | 243 |
| 24. | Tile roof | $m^2$ | 243 | 17.04 | 4 142 |
| 25. | Timber to gable ends | $m^2$ | 18 | 15.78 | 284 |
| 26. | Form eaves | lin. m | 108 | 2.76 | 298 |
| 27. | Ceiling boards | $m^2$ | 126 | 6.54 | 824 |
| 28. | Window panels | No. | 12 | 110.92 | 1 331 |
| 29. | Door panels | No. | 3 | 155.67 | 467 |
| 30. | Terrazzo floor | $m^2$ | 132 | 4.42 | 583 |
| 31. | Bagwash walls and columns | $m^2$ | 144 | 2.28 | 329 |
| 32. | Paint | $m^2$ | 270 | 2.67 | 721 |
| 33. | Paths and parking | $m^2$ | 146 | 5.19 | 758 |
| 34. | Spread topsoil to landscape site | $m^2$ | 300 | 0.26 | 79 |
| 35. | Perimeter fence | lin. m | 115 | 4.79 | 551 |
| 36. | Dispose of surplus material off site | $m^3$ | 65 | 2.62 | 170 |
| | Tender bids to complete the works = | | | | 28 124 |
| | Plus 10 per cent for contingencies (if required) = | | | | 2 812 |
| | FINAL QUOTATION SUBMITTED | | | | 30 936 |

## STANDARD LIST OF CONDITIONS

- ☐ This quotation is open for a limited time only. The quotation should be accepted and possession of the site given within one month of the date of the quotation. Otherwise the quotation is subject to revision.
- ☐ Accounts shall be submitted on completion of the works or, where the duration of the works is longer than one month, interim accounts shall be submitted monthly. Such interim accounts shall include the cost of work completed and materials on the site not yet fixed in the works. Payment for work done shall be due within one week of the submission of the account.
- ☐ Where possible the value of extra works or variations from the original order shall be costed and agreed before the work starts. In any case the value of extra works shall be added to the original quotation. Where the variation is an omission, the cost shall be deducted from the original quotation.
- ☐ Where "provisional sum" is used in the quotation, this is to indicate that the cost of the item specifically requested by the client was not exactly known at the time of the quotation. Should the amounts payable to the supplier exceed or be less than this provisional sum, then the quotation shall be increased or reduced accordingly.
- ☐ Where the client provides or requires materials to be fixed in the works which, in the opinion of the contractor are unsuitable, the contractor shall so notify the client in writing. Should the client still insist on their inclusion in the works, then the contractor will accept no responsibility for any subsequent loss or damage to the works due to the use of such materials.
- ☐ The maintenance period shall extend for six months from the date when the consultant issues a certificate of practical completion of the works. Any defects appearing in this period arising from workmanship or materials inferior to the quality specified in the quotation will be made good by the contractor and at the contractor's own expense. The defects should be notified to the contractor before the expiry of the maintenance period.
- ☐ The client shall indemnify the contractor against any claims for damage by fire or any other reason of the existing buildings and contents, the new works undertaken under the contract, and unfixed materials and equipment.

- ☐ The agreed date for completion of the work may be subject to alteration on account of extra work ordered, or due to inclement weather, strikes or events beyond the control of the contractor.
- ☐ Any disputes arising during the carrying out of the work may be resolved by the appointment of an arbitrator, mutually acceptable to both parties, whose decision shall be binding.

## A FINAL THOUGHT

Before sending the letter and quotation, look through them both again to make sure there are no mistakes. It is easy to make mistakes when working under pressure, so remember that this is your last chance to check, alter or qualify your bid.

Once the tender has been adjudicated and the contract awarded it is very difficult and often very costly for the successful bidder to get out of the obligations entered into, and once the contract has been signed it is almost impossible!

## THE CLIENT'S DECISION

The bidder recommended to the client as "the most suitable contractor" may not necessarily be the one with the lowest price. There are several criteria that may be taken into account by whoever is responsible for awarding the contract, not least being the bidder's financial viability.

So make sure that you have sufficient funds to carry out the contract before submitting your bid. If necessary, you should have a preliminary discussion with the bank manager to explain any needs you may have for working capital in order to cover the initial costs of mobilizing staff, materials and equipment.

# REFERENCE SECTION

# THE CONTRACT DOCUMENTS 1

The contract provides the business link between client and contractor which should work in the interest of both parties. The contract documents set out the rules and regulations that govern a particular contract. Once they have been signed by both the contractor and the client, they govern the rights and responsibilities of each. You need to be fully aware of the meaning of the terms used in contract documents if you hope to survive and prosper in the highly competitive construction industry.

This reference section is a source of basic information, where you can look up words and expressions that are not completely familiar. Since contracts and the conditions stipulated in them influence every part of the construction process the content of this section relates to almost every chapter in the three handbooks. In the first part of this section we go through the contract documents in detail explaining all common expressions used, while the second part, the contract glossary, is a brief dictionary with short explanations of words concerning contract parties and contractual rights. While in Part 1 the entire setting is explained, Part 2 can be used for easy reference if you understand the basic concept but have forgotten the exact meaning of a word or expression.

The contract is a legally binding agreement between the contractor and the client. On most construction jobs, the contract is usually described in formal documents:

- ☐ Plans and detailed drawings.
- ☐ Specifications.
- ☐ Bills of quantities.
- ☐ Articles of agreement.
- ☐ Conditions of contract.

The first three have been described in previous chapters (Contract drawings, Chapter 3; Specifications, Chapter 4; Bill of quantities, Chapters 5-8) so we will now look at the last two of

these in more detail, since they represent the law on any particular project as far as the client and the contractor are concerned. As in national law, "ignorance of the law is no excuse" and the contractor who fails to understand the articles of agreement and conditions of contract could make costly mistakes *and* miss opportunities for legitimate claims.

## Articles of agreement

The articles of agreement state who is the client, who is the contractor and who will be the client's representative for running the job. The articles will list the various contract documents, which describe the work to be done, and state how much the client will pay the contractor for completing these works, in accordance with the conditions of contract. The articles of agreement are signed by both client and contractor.

The client's representative (or consultant) will usually be either an architect or an engineer who runs the job for the client. Consultants must always be allowed onto the site and also into any workshops where the contractor is making components for the job. Their duty is to inspect the work at all stages to ensure that it is up to specification. If it is not, they can order the contractor to break it out, and do it again.

## Conditions of contract

The conditions of contract describe the terms and conditions under which the work is to be done. They describe the rights and responsibilities of the parties to the contract. Contractors should make sure that they know their rights and responsibilities, so that they can claim their due entitlement.

The conditions of contract impose strict legal and financial obligations on the contractor. Bureaucratic supervision and delays in payment can result in additional risk. As a contractor or manager of a contracting firm, you need to understand and evaluate these risks before submitting a bid for a contract. Some contracts are just not worth bidding for. Others are only worth having if the risk allowance in the contract price runs into double figures. You cannot measure risk unless you have a clear understanding of your rights and responsibilities under the contract.

This reference section has been added to help you to understand who is who and what is what.

In many countries, a standard form of conditions of contract is used. Standard contracts should be prepared in consultation with the contractors' association and associations representing professionals such as architects and engineers. Where such a standard form is used the bidders can be sure that their interests have been safeguarded (at least to the extent of common practice).

If you are tendering for a contract where the standard conditions are not used, you should read the contract carefully. The following pages show some of the points to look for.

## CHECK-LIST ON CONDITIONS

- ☐ Contract period.
- ☐ Method of payment.
- ☐ Retention money.
- ☐ Payment for materials on site.
- ☐ Payment for extra work or variations.
- ☐ Price fluctuations (= changes in wages or cost of materials).
- ☐ Giving notices or paying fees to local or service authorities.
- ☐ Insurance and indemnities.
- ☐ Conditions under which bad workmanship or materials can be condemned (sometimes used to delay payment by unscrupulous clients).
- ☐ Liquidated damages.
- ☐ Conditions under which extension of time may be granted.
- ☐ Conditions for termination of contract.
- ☐ Arrangements for arbitration.

All of these could give rise to trouble and expense, so we will look at each of them more closely.

## CONTRACT PERIOD

There is usually an appendix to the conditions of contract. In this, the starting and completion dates of the contract are written. The starting date is sometimes given as "date for possession of site". This can often be agreed at the time of signing the agreement.

The best starting date, if you have labour, equipment and material readily available, is usually two to three weeks after the

contract is signed. This will give time to organize labour, equipment and materials for the job. That way construction time is not wasted. There is usually a clause (liquidated damages) which could result in considerable losses if the contractor finishes a job late.

## METHOD OF PAYMENT

In the standard conditions, a contractor is normally entitled to interim payments for work done. These can be made at monthly intervals, provided enough work has been done in the month to make it worthwhile to calculate and process a certificate.

The procedure for preparing interim and final certificates is explained in detail in IYCB Handbook 3, but in principle it is the responsibility of the contractor to prepare an account for the cost of work done. The consultant will check this, and within a reasonable time a certificate stating the amount should be issued. The client should pay the certified amount within the agreed period.

As you know, it is important to be paid on time. Many contractors have gone out of business because their clients did not pay on time. If the client delays too long in paying these certificates, you could in theory determine (= cancel) the contract, and recover all costs and losses from the client. But this is never easy, and if your client is the government, such action might destroy your business. Would they give you another contract if you made trouble? The best thing to do is to get your contractors' association to plead your case.

## RETENTION MONEY

Generally 10 per cent is deducted from the value of interim certificates, and held by the client as a retention fund. This continues until a limit is reached, which is usually 5 per cent of the total contract sum. The object of the retention fund is to safeguard the client against any problems arising during the course of the contract.

When the work is finished, the consultant should give a certificate of practical completion. Presenting this to the client should release one half of the retention fund. The balance is released at the end of the defects liability period (sometimes called period of maintenance).

The defects liability period may be three months or one year or even longer, depending on the size and nature of the contract.

This period starts from the date of practical completion. Any defects due to bad materials or poor workmanship that appear during this period must be repaired at the contractor's expense. It therefore pays to get the certificate of practical completion as soon as possible.

Within 14 days of the end of the defects liability period, the architect (or engineer) should issue a schedule of defects, covering repairs which are still to be carried out. When these faults have all been put right, the architect (or engineer) will give a certificate confirming that all the items on the schedule have been dealt with. When this is presented to the client, the balance of the retention fund should be paid. If the contractor does not carry out these repairs, the retention fund can be used to pay for someone else to carry them out.

You should check the appendix to the conditions of contract to see the:

- ☐ percentage retention money
- ☐ limit of retention fund
- ☐ defects liability period.

## PAYMENT FOR MATERIALS ON SITE

The value of materials delivered to the site can be included in the interim payment certificates only if:

- ☐ you have not brought them on to the site too soon
- ☐ they are properly stored and protected against weather and breakages
- ☐ they are covered by insurance.

Once paid for, these materials become the property of the client.

## PAYMENT FOR EXTRA WORK OR VARIATIONS

The client often asks for extra work to be done, or alters the original design. This is acceptable as long as the contractor is notified in good time, and does not have to break out work already done. In any case, extra payment for this work will be required.

All instructions should be in writing. Oral instructions should be confirmed in writing as soon as possible, and certainly within one week. If a written confirmation is not given, then write to the architect or engineer yourself, to confirm the instruction. Never leave anything like this to memory. Also, as the extra work is carried out, keep detailed records such as time sheets for labour

and equipment, invoices and lists of materials. Get the architect/engineer to initial them as the work is done.

The cost of extra work and variations can be high. Unless proper records are kept, you will have a great deal of trouble at the final settlement and may quite possibly not be reimbursed for the full cost.

## PRICE FLUCTUATIONS

Where there is severe inflation, the rise in costs of wages and materials during the contract period can be crippling. Some conditions of contract may have a "rise and fall" clause to allow the contractor to recover the cost of such increases. Remember always to check whether a clause like this exists. If it does not you have to include an allowance in your tender for inflation during the period of the contract.

## NOTICES AND FEES DUE TO LOCAL AUTHORITIES

During the work, it will be necessary to give notices and pay fees to local authorities for such things as:

- ☐ building site inspections
- ☐ water main connections or diversions
- ☐ electric main connections/diversions
- ☐ sewerage connections.

Check your contract documents to see if you have to pay for these, and how you recover the cost.

## INSURANCE AND INDEMNITIES

You will normally have to insure yourself and indemnify (= secure or protect) your client against any claims arising out of the contract. These claims could be due to death or personal injuries, or damage to property. Clients and consultants often want to see your insurance policies to make sure their interests are properly protected.

You will also need to insure the new works against damage from any cause. If the work is for an extension to an existing building, then the client will generally extend the existing insurance policy. But you should check this to make sure, and obtain written confirmation.

If you employ subcontractors, make sure they are properly insured, and that their policy indemnifies you.

## BAD WORKMANSHIP OR MATERIALS

The quality and standards of workmanship and materials are defined in the contract documents, in the drawings and in the specifications. It does not pay to cheat on these. Any gains from using inferior materials or methods are soon lost if breaking out and rebuilding are necessary.

Concrete requires extra care, since it will have set hard by the time the test cube results are available. By then it will be very expensive to break out and rebuild:

☐ Do not cheat by using too little cement.

☐ Do not use too much water. Even though that makes the concrete easier to pour, too much water weakens the concrete.

## LIQUIDATED DAMAGES

If you do not finish the contract by the agreed completion date, you may have to pay compensation to the client. In the standard form of contract, this is called "liquidated damages" and is a fixed sum payable for every week (or month) that the contract is delayed. The amount payable will be stated in the conditions of contract.

The damages represent the financial loss caused to your client by late completion of the work, such as loss of business of a new shop or loss of rental on a house. However, if the work has been delayed through no fault of your own, it is sometimes possible to get an extension of time. This will set a new, later completion date.

## EXTENSION OF TIME

You are usually entitled to claim for an extension of contract time if the delays were caused by any of the following:

☐ failure by the client to give prompt possession of the site

☐ exceptionally bad weather

☐ damage caused by earthquake, storms, floods, riots or similar factors

☐ errors or omissions in drawings supplied by the consultant

☐ extra work, variations or omissions to be rectified

☐ delays caused by the architect/engineer's failure to issue necessary instructions or details (provided you requested them in good time)

☐ delays when the architect/engineer requires part of the project to be uncovered or tested due to suspicion that work or

materials are substandard, but only if the work or materials are then proved to be satisfactory

- ☐ where delivery of imported goods or materials is delayed through no fault or lack of foresight of the contractor
- ☐ where the work is held up by specialists employed directly by the client and doing work which is not part of your contract.

If work is held up for any of the above reasons, you should put in a written claim for a reasonable extension of time. Also, if the delay has actually caused you to lose money you can try to claim it back. Both of these claims should be fairly assessed by the consultant, but you will need to make a good case–so keep careful records and submit your notice of claim promptly.

## TERMINATION OF CONTRACT

Either the client or the contractor can terminate the contract if the other party does not keep to the contract conditions.

Termination by the *client* is possible if the contractor:

- ☐ stops work without a good reason
- ☐ fails to carry out the work with reasonable diligence
- ☐ persistently refuses to carry out the consultant's written notice to remove defective work or materials
- ☐ sublets the whole or parts of the contract to another firm without prior permission.

If the contract is terminated by the client for a reason acceptable under contract law, the client is entitled to get someone else to move onto the site to finish the job using any equipment or materials left on site by the original contractor. The original contractor would have to pay the client any costs over and above the original contract sum, plus any costs due to delayed completion.

Termination by the *contractor* is possible if:

- ☐ the client fails to pay certificates within the time allowed, or tries to stop any certificate being given
- ☐ the work is stopped for a long time (six months in many contracts) for any of the reasons given above under extension of time
- ☐ a private sector client goes into liquidation (if a limited company) or bankruptcy (if an individual).

Where the contract is determined by the contractor, the client would owe the contractor for:

- ☐ works done to date
- ☐ materials delivered or made up and not used
- ☐ expense of moving contractor's equipment from the site
- ☐ any other loss or damage caused to the contractor.

Determination of a contract is a very serious step to take. It will almost certainly result in a financial loss, and could damage your reputation with other clients. It is definitely a last resort, and before doing anything about it you should seek advice from a lawyer or your contractors' association (or both).

## ARBITRATION

Sometimes there is a dispute between the contractor and the client or the consultant which is impossible to settle by friendly discussion. To take the matter to the law courts is usually expensive and leads to long delays. Often it is better to ask a reputable person, known and acceptable to both parties, to consider and pass judgement on the dispute.

If included in the conditions of contract, a section on arbitration usually states that, in the event of dispute, either party can ask to appoint an arbitrator. The decisions of this arbitrator are binding on both parties to the contract.

# A CONTRACT GLOSSARY 2

This glossary presents a dictionary of words linked to contracts and contract parties. It does not try to tell the whole story, but we hope it will be a useful and understandable introduction. Like any other dictionary, it is in alphabetical order.

ARBITRATION
Settling disputes between the contractor and the client by appointing a reputable person who will study the problems and pass judgement.

BOND
A guarantee for the client that the contract will be completed even if the contractor fails. Bonds are normally provided by insurance companies, and have to be paid for by the contractor.

CLERK OF WORKS
On large and many medium-sized construction projects, it is common to have a clerk of works as the resident superintendent of the works. The clerk of works is responsible for checking the quality of the construction work, and is employed either by the consultant on behalf of the client, or directly by the client.

CLIENT
The agency or individual requiring the construction project. Where the government sponsors a project, the client is usually one of its ministries.

CONSULTANT
A professionally qualified specialist, usually an architect, engineer or quantity surveyor, who is appointed by the client but who should also be impartial and ensure that the contractor is treated fairly in accordance with the contract documents.

CONTRACT
An agreement between two or more parties. In building and civil engineering it usually means that a client agrees to pay a certain sum of money to a contractor, providing that specified con-

struction work is completed to an adequate quality standard within a certain time.

CONTRACT AWARD CRITERIA
Describes the grounds on which the winning bid will be selected.

CONTRACT, CONDITIONS OF
Any requirement written into a contract setting out the obligations, rights and liabilities of the parties to the contract.

CONTRACT PERIOD
The time stated in the contract for completing the construction work.

CONTRACT, STANDARD FORM OF
Standard conditions, arrangement and layout of contract documents which are generally used and accepted.

CONTRACTOR/BUILDER
The person or company responsible for the site construction work, or the supply of materials.

CONTINGENCIES
Allowances for costs resulting from unforeseen circumstances.

COST PLUS FEE
A contract under which the contractor gets paid for the verified costs plus a previously agreed additional fee based on either a percentage of costs or a lump sum.

DEFECTS LIABILITY PERIOD (MAINTENANCE PERIOD)
A period following the completion of the project, during which the contractor is responsible for correcting any defects in workmanship or materials.

DIVIDED CONTRACT
A contract for which separate contractors are appointed for different parts of the project, such as earthworks or foundations.

FINAL ACCOUNT
A summary of the final construction cost of the project to the client, excluding fees and interest charges. This account includes the cost of savings, and of any variations to the contract documents or alterations to provisional or prime cost items.

FIXED PRICE CONTRACT
A contract defining precisely the contractor's tasks and for which a fixed price or fee, irrespective of external variations, has been negotiated.

INSTRUCTIONS
Directives issued to the contractor during the construction phase of a project and resulting from variations to, or amplification of, the information contained in the contract documents.

INTERIM VALUATION
An estimate of the value of the construction work completed at certain intervals after the start of the works, usually monthly, which is prepared as a basis for interim payments to the contractor.

LIQUIDATED DAMAGES
A sum specified in the contract to be paid to the client by the contractor if the works are not completed within the contract period. This sum is intended to compensate the client for damages actually suffered; it is not a penalty.

LUMP SUM CONTRACT
A fixed payment for a certain task. The client does *not* have to pay the contractor anything until the job is completely finished. There are also examples of lump sum contracts where the work is split into parts and a lump sum or a percentage of the total is paid when each part is finished (see also stage payment contracts).

NEGOTIATED CONTRACT
A form of contract where a price for the construction works is negotiated by the client with a contractor.

NOMINATED SUBCONTRACTOR OR SUPPLIER
Subcontractor or supplier selected by the consultant on behalf of the client. Once selected the nominated subcontractor is responsible to the main contractor, but the main contractor is entitled to an extension of time if the works have been delayed due to faults of the nominated subcontractor or supplier (the main contractor is responsible for proper coordination of all subcontractors).

PARTIAL COMPLETION
If the client wants to take possession of parts of the works *before* the Certificate of Practical Completion has been issued (see below) the consultant can issue a Certificate of Partial Completion covering the parts that are taken over. This certificate has the same consequences as a Certificate of Practical Completion but covers *only* the parts taken over by the client. The consultant must assess the value of the part taken over to define what percentage of the works has been completed.

PRACTICAL COMPLETION
A Certificate of Practical Completion is issued by the consultant when the works are substantially finished, meaning that the construction is perfectly usable although minor corrections and/or additions could be needed. The issuing of this certificate means that:
a. the defects liability period (maintenance period) starts
b. half (usually) of the retention money is released
c. the contractor ceases to be liable for liquidated damages
d. the client takes possession of the works.

PROVISIONAL ITEM
Item of work, usually given as a provisional quantity or a provisional sum, which may have to be carried out as part of the project but which cannot be determined with certainty before the work commences.

RESIDENT ARCHITECT OR RESIDENT ENGINEER
A professional specialist employed on large construction projects as the client's site representative.

RETENTION MONEY
The money subtracted from the valuation of the work at interim and final payment stages, and which will be kept by the client as a guarantee that the work will be properly completed and all defects rectified. Part of the retention money is released when the contractor is entitled to a Certificate of Practical Completion, and the remainder at the end of the maintenance period.

SCOPE OF WORKS
The extent of the works and the planned period over which it is to take place.

SOURCE OF FUNDS
How the project is financed.

STAGE PAYMENT CONTRACT
An alternative method of payment by valuation of work done, often used for simple projects, where you do not have to measure all work done but get payment when previously agreed steps of the contract are completed. Example: You get one payment when the groundworks are done, the next when you have finished to floor level and so on.

STATUTORY OBLIGATIONS
General rules and regulations at country or regional level that all contractual parties must follow and that cannot be overruled by clauses in the contract.

TENDER DOCUMENTS
The set of documents on which the tenders are to be based and which are sent to the would-be tenderers. The documents usually include the project description, specifications, bills of quantities, plans, elevations and working drawings.

TENDERERS OR BIDDERS
Those parties that submit replies to the invitation to tender, stating their prices and conditions for completing the work specified in the contract documents.

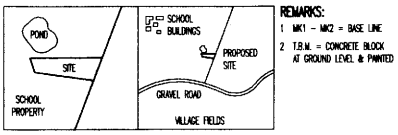
TWO-STAGE TENDERING
A form of tendering used when the early selection of a contractor is desirable and an approximate bill of quantities is taken as the basis for price negotiations.

TORT
Neglect of duty leading to liability for damages.

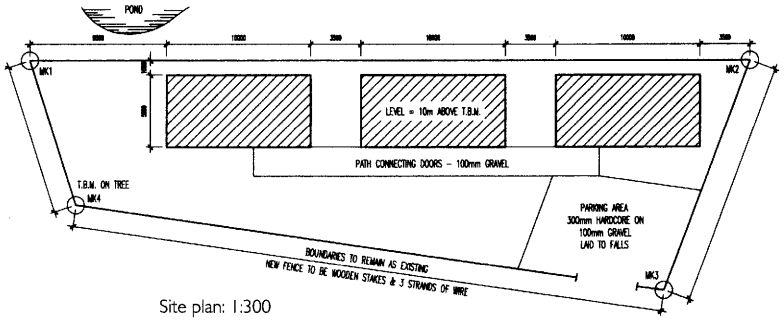
VARIATIONS
Additions to, or subtractions from, the production information after the contract between the client and contractor has been signed. The additional or reduced costs of these variations are negotiated with the contractor either by the client or by the consultant.

# ILLUSTRATIONS OF PROPOSED NEW BUILDINGS AT WARDOBOYO 3

*Figure A:* Site plan, block plan and key plan




Block plan 1:3,000 Key plan: 1:30,000




Site plan: 1:300

*Figure B*: General arrangement of building (scale 1:100)

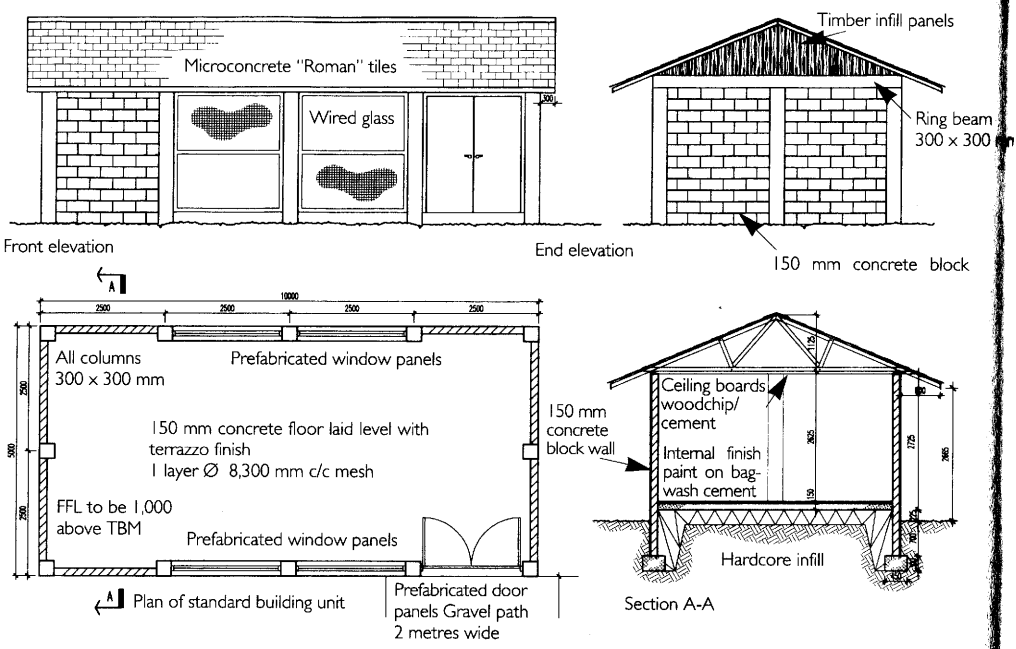



*Figure C:* Roof truss detail (scale 1: 40)

**SCHEDULE OF TIMBER SIZES**

| | | |
|---|---|---|
| A – D | 42 x 112mm | 1⅝" x 4" |
| F – C | 56 x 112mm | 2" x 4" |
| C – E | 56 x 112mm | 2" x 4" |
| B – E | 56 x 112mm | 2" x 4" |
| Ridge Plate (C) | 42 x 224mm | 1⅝" x 8" |
| Wall Plate (A) | 42 x 112mm | 1⅝" x 4" |
| Fascia Board (F) | 42 x 168mm | 1⅝" x 6" |

* Roof trusses at 1 m centres
* 10 No. tile battens each side 28 x 28 mm, 1" x 1"

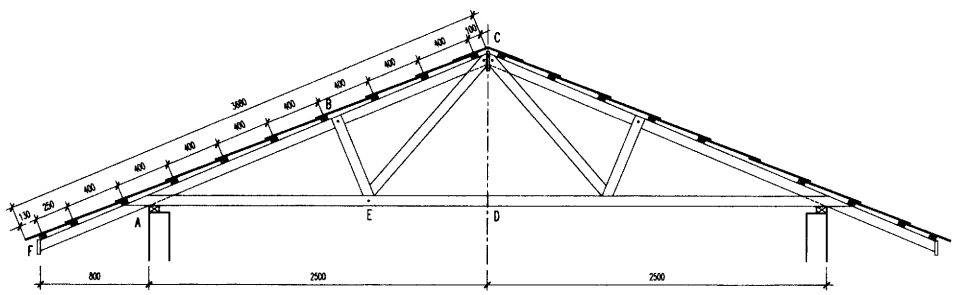
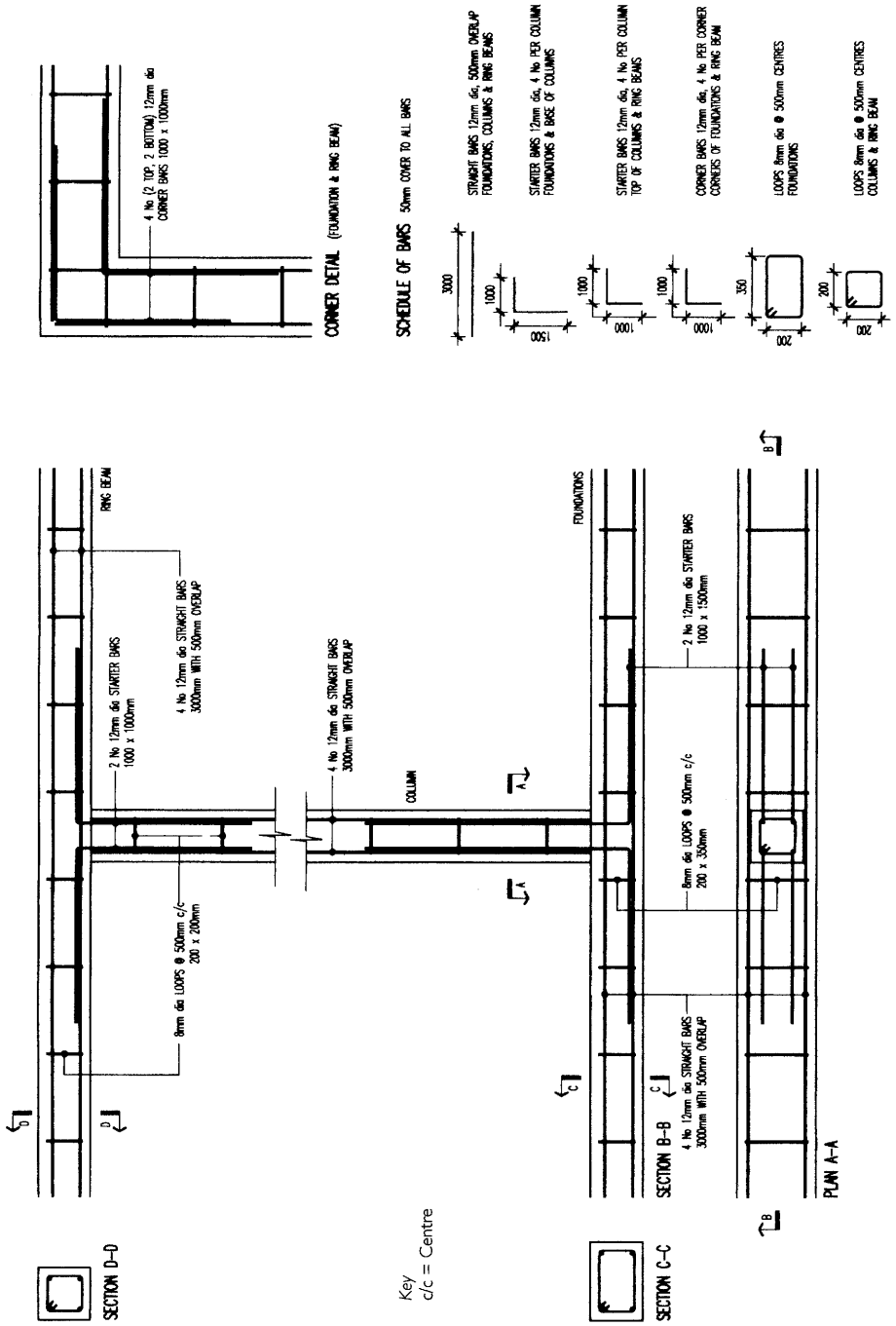


*Figure D*: Reinforced concrete details (scale 1:40)
(Schedule of bars not to scale)



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