

Introduction

The journey that I embarked upon with the first *Be Your Own Architect* Course has so far taken 18 years. One of the most interesting discoveries along the way has been the fact that our homes engage us on a physical as well as on an emotional level. This is a function of the architecture which acts to separate the inside from the outside. This delineation of inner and outer allows us to engage outwardly with the physical outer world and inwardly with our emotional, or, inner world.

By including both inner and outer worlds in the design equation one activates what I refer to as *the sheltermaking gene*. This stimulates both our rational as well as our intuitive faculties allowing for the balancing of physical/material considerations with emotional/psychological need, nourishing both aspects of our lives. This offers one the opportunity to live more deeply and harmoniously, the essence of a sustainable life.

The doctrine of 'sustainability' and its working document, UN Local Agenda 21, encourages change in the mechanism of our survival activity in order to sustain life and to safeguard the choice mechanisms of future generations. This demands a radical restructuring of our current way of life. Sustainable house design is critical to the realisation of this, facilitating, as it does, profound lifestyle choices.

Traditionally, information on house design was drawn from the body of freely available common knowledge. Reference to the mystery of life was invariably included in this, borne in myth across the threshold separating inner and outer worlds. In the move away from an agrarian way of life to a job-focussed one, the design of basic shelter changed from the traditional dwelling to what we now refer to as *the modern home*. Because the industrial age work ethic demanded the surrender of a person's time in exchange for a wage, a reliance was placed on third parties to undertake this sheltermaking activity. These new dwelling types made no reference whatsoever in their design or construction to a deeper reality. Emotional nourishment had to be sought elsewhere, done without, or, ersatz satisfaction sought through material consumption.

The loss of cultural identity suffered in the rural to urban shift, reflected in the lifeless architecture of the modern home, was compounded by a downgrading in the role of the home as the foundation of survival activity. The transference of this function to a time consuming 'job' effectively consigned male territorial identity to the shopfloor. With women naturally assuming control of the home, previously shared with the man, the displaced male was consigned to battle for territory with other men in the workplace, the new pivot of survival activity. The fact that men continue to be the prime creators of homes, while at the same time being marginalised in regards to the occupation of the home territory, has had a profound negative effect on house design and construction activity.

practice where the plan is the first thing that is created. This can lead to insurmountable problems, as can be witnessed in many professionally designed homes. It is important that you accept the common sense of the *Design Programme* at this point and to trust that it will lead you safely to your objective. When you do this your creative energies will be freed to tackle the real work in hand. Information from external sources can easily be integrated into any of the *Steps* of the *Design Programme*.

It is a good idea to spend some time on your project every day. This will keep everything fresh in your mind and will keep the project moving. Your greatest ally will be the good feeling and excitement generated by the creative process. There will be moments when it might all seem too much for you to do. This is why it is important to focus on the work in hand, confident of how it fits into the overall picture. Work steadily and enjoy yourself. Try to work at a table or desk rather than sitting in an easy chair. As you progress keep your equipment, books, files and so on where you can reach them easily, so that when you decide to work you can begin with the minimum of fuss.

Individual students can decide how deep they wish to enter into the Course material. This can range from *Fastrack* to *Full Immersion*. A *Fastrack* approach would require 40 hours part-time work, spread over a period of two or three months. *Full Immersion* naturally requires more time input, spread over a six month period. This 'spread' of input is important because it allows time for for contemplation and reflection which contributes greatly to the design process.

It can be useful to work in groups, either family groups or groups formed around a common interest in sustainable shelter and living. Group energy can be a great motivator, though it is best that individual design solutions are developed rather than everyone trying to agree on a single one.

As you progress through the *Design Programme*, mark off the *Steps* you have completed, thus ...

Completed



Design Programme Steps

Steps 1-7 Introduction & The Brief

Articulating your objectives, needs and resources

Steps 8-12 Measurement, Drawings & Models

Expressing yourself in the language of architecture

Steps 13-15 Space Mock-Ups

Estimating floor area and cost

Reconciling floor area and budget

Steps 16-19 Structure

Understanding how buildings stand up

Steps 20-27 Environment, Heating & Ventilation

Creating a healthy internal environment

Heating/cooling the building and providing it with fresh air

Steps 28-32

Timberfile, Materials, Products & Construction

Choosing building materials and a means of assembling them

Steps 33-35

Plumbing, Drainage & Electrical Services

Getting water in and out of your building

Disposing of waste

Providing electrical power in your building

Steps 36-37 Planning & Building Regulations

Implications of the various regulations on your design

Steps 38-39 Site Selection & Analysis

Assessing and selecting sites

Steps 40-42 Layout

Assembling your design

Step 43 Costing

Estimating building cost before finalising the design

Steps 44-49 Planning & Working Drawings

Finalising your design

Getting permission to build

Preparing information for building

Building

Living in your architecture

Introduction

The desire to create shelter is an expression of the human will to survive. For thousands of years people have created shelter without recourse to professional architects. The style of buildings produced in this way is known as vernacular architecture *figs 1-2*. Vernacular styles of building exist all over the world. These styles are characterised by their simplicity, by their use of local materials and by the ease with which they can be constructed. The knowledge required for the creation of such buildings was long regarded as being common knowledge and freely available to all.

The decline of the vernacular tradition with its simple forms and its accessibility to people has resulted in the loss of the knowledge and skills needed to design and construct small buildings, especially the buildings in which people live – their homes. This loss has resulted in the involvement of professional architects and other building designers in the housing field. It has also resulted in the application of a more formal approach to the cre-

ation of such buildings than was previously the case with the vernacular tradition. The widespread frustration that has resulted from this is now so common that it has become the accepted state of affairs.

Professional architects are currently the only people who are trained to design buildings. This academic training is based on a formal approach to architecture and is very much biased in favour of large and complex projects that take little account of people or of individual need. Because house design is so closely related to people and to their day to day needs, the application of this formal approach has failed to produce houses that satisfy people in the way their vernacular counterparts did in the past.

Formal architecture is characterised by its scale and grandeur and is quite different from the simple forms of the vernacular tradition. Where the vernacular style is an expression of the human instinct to survive, the formal tradition is more expressive of the will to triumph *figs 3-4*.

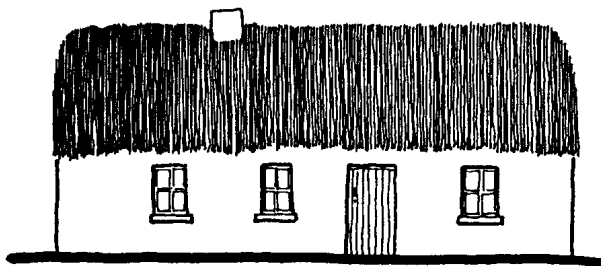


fig. 1: Traditional Irish thatched cottage.

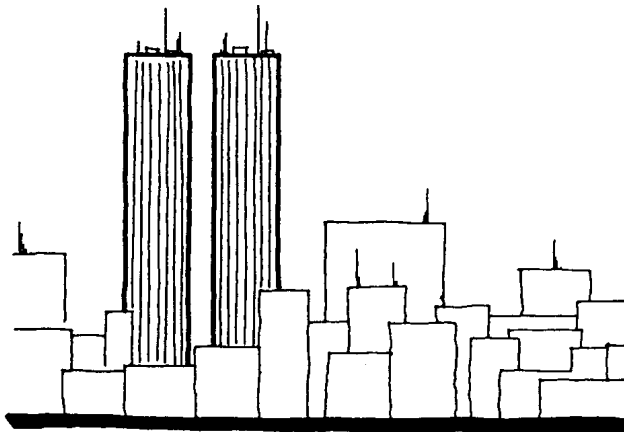


fig. 3: World Trade Centre, New York.



fig. 2: Traditional farmhouse.

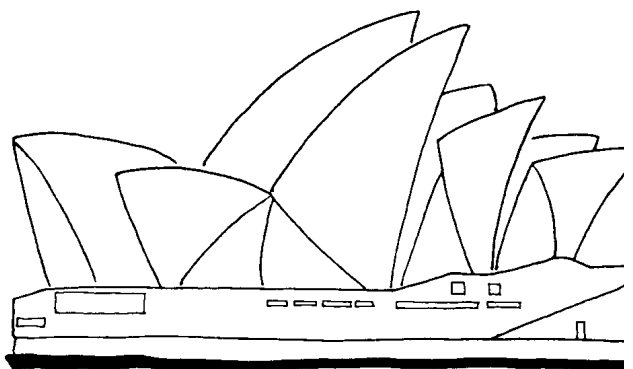


fig. 4: Sydney Opera House.

Historically, architects were craftsmen themselves and the word 'architect' is derived from the Greek for 'chief carpenter'. The early professional architects were in fact craftsmen and were directly involved in the creation of buildings. In contrast, the modern professional architect is academically trained and does not create buildings directly but rather creates designs in an office environment and relies on others to realise their construction. The practice of formal architecture has always existed alongside the vernacular tradition and concerned itself mainly with the creation of large formal buildings.

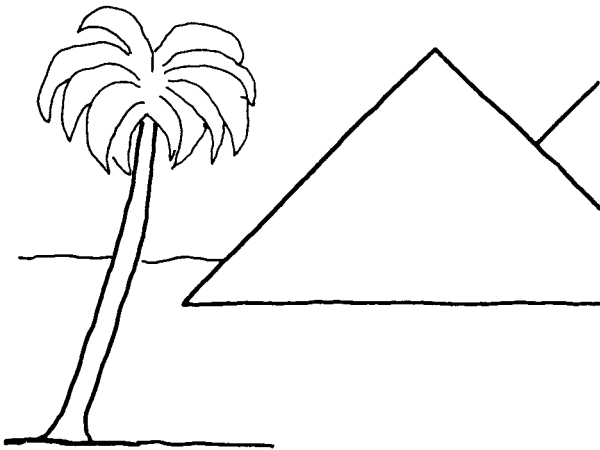


fig. 5: *The Pyramids of Egypt.*

Where the vernacular architectural tradition can be seen to have been available to all, the formal architectural tradition is characterised by secrecy. This tradition stretches back to Ancient Egypt and to Greece, where priests applied their secret knowledge of proportion and form to the design of sacred buildings *figs 5-7*. In the Middle Ages, knowledge of building form and technique was passed down through the Crafts Guilds, especially the Stonemasons Guild. Such knowledge was regarded as being secret knowledge. This was in contrast to the vernacular tradition where the information needed to build was freely available to all.

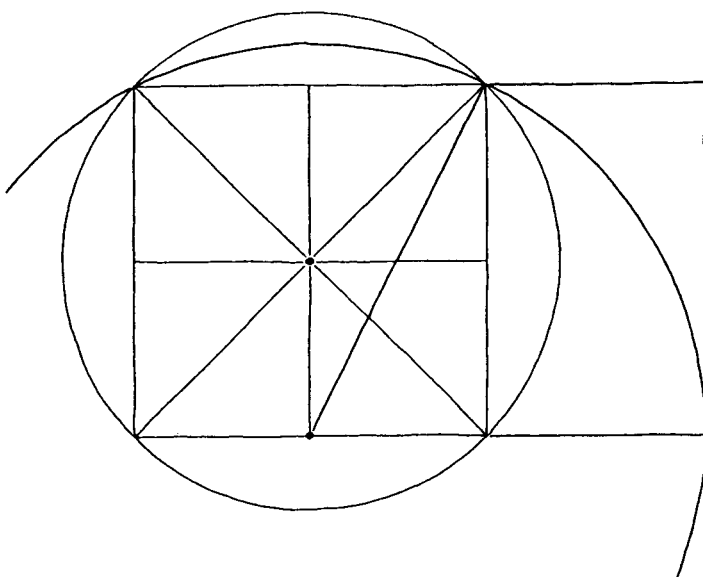
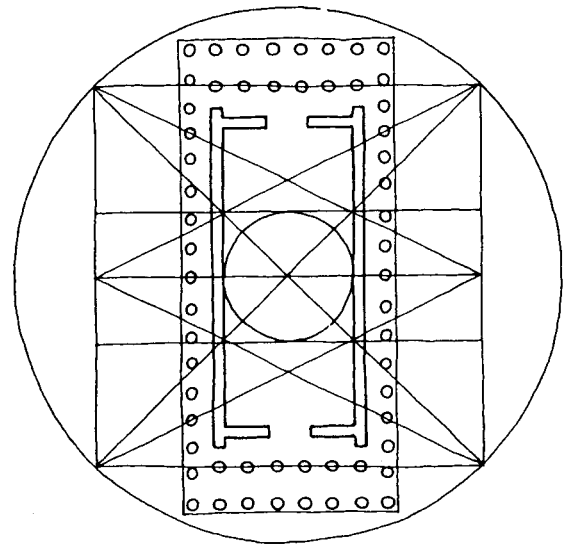


fig. 6: *The creation of Golden Section proportions based on the use of the circle and the square.*

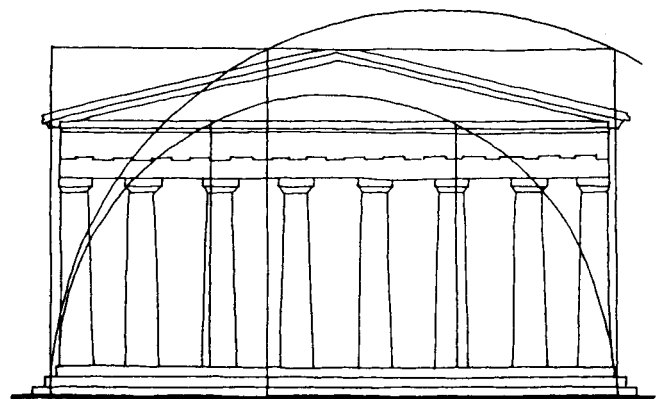


fig. 7: *The Parthenon of Athens. This building is constructed in accordance with Golden Proportions, mathematical relationships based on spiritual values.*

The modern professional architect, being academically trained, is very much removed from the actuality of making buildings. This contrasts with his historical counterpart who was a craftsman *figs 8-9*. This detachment has had a severe effect on the quality of all professionally designed buildings. Where at one time the architect was a carpenter or a stonemason and so could be relied upon to have an intimate knowledge of his materials and the actuality of their use, the modern professional is neither a carpenter nor a stonemason but an academically trained person. Despite this obvious limitation, architects

control the design process, select materials and direct their assembly by the building team. The shortcomings of this approach to building design and construction results in regular conflicts between architects and the builders who must follow their directions. It has also resulted in the creation of buildings very much lacking the qualities of their earlier counterparts, both in terms of space as well as craftsmanship. This is a direct result of the relinquishment by the 'architect' of his tools, and his insistence on leading the construction team despite the limitations of a purely academic training.

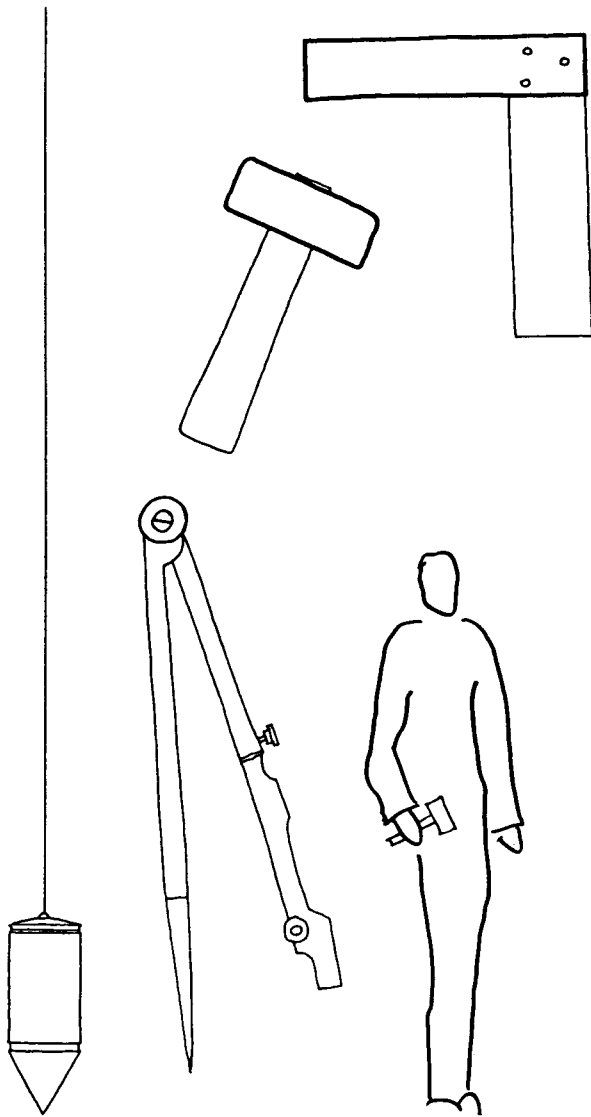


fig. 8: Craftsman's tools.

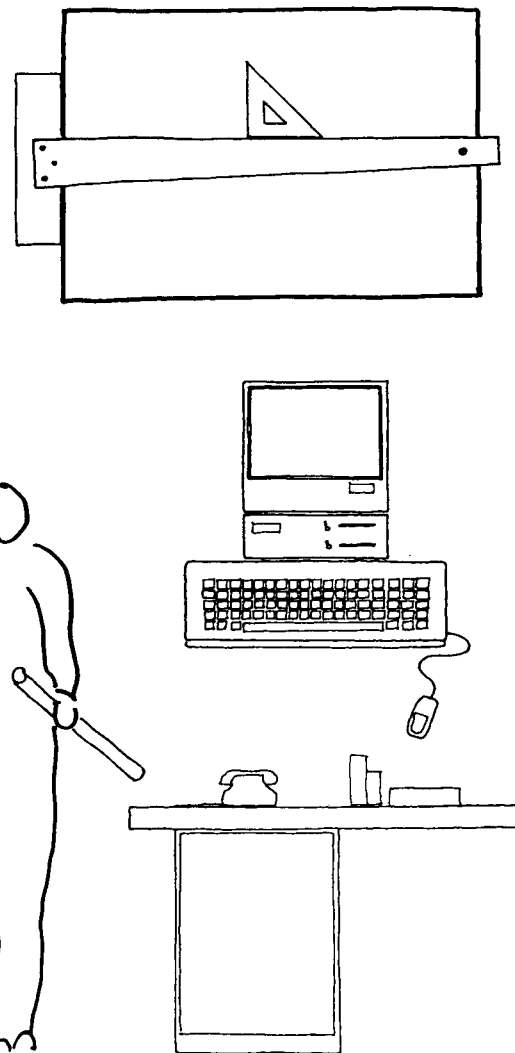


fig. 9: Architects' tools.

All modern building design involves the use of drawings that communicate ideas and information to those involved in the construction process. The limitation of drawings in illustrating space are very severe in that only two dimensions can be displayed in relationship to each other at any one time. What can actually be drawn on paper are the flat surfaces of walls and floors *fig 10*. The nature of the space – the architecture – formed by these surfaces cannot be seen on paper. Instead, the spaces so formed must be imagined in three dimensions and it is not until the spaces within the design are actually constructed that they can be experienced. The effect of this limitation of drawing technique has been to emphasise flat surfaces at the expense of highlighting space and it has caused the meaning of ‘architecture’ to be redefined as the outward appearance of a building rather than the quality of the spaces within it *fig 11*. A reliance on drawings in the creation of architecture is very much in contrast to the experience of creating space in three dimensions – in other words, building.

From a building point of view, the limitations of two-dimensional drawings in representing three-dimensional objects and space are very severe. While it is very easy to draw a concrete block in two dimensions on paper, the reality of a concrete block is that it is cold, heavy and unwieldy. Similarly, damp-proof courses, which can be represented on paper as a line and as such can be expected to pre-

vent water penetration, are in reality rolls of plastic which are difficult to insert into any construction. Concrete, which again is easy to draw, is in fact a heavy, wet and cumbersome material to use *fig 12*. From the building operatives point of view these materials are very different from the architect’s perception of them.

While two-dimensional drawings are a very necessary means of communication between architect and builder, the idea that what is shown on paper is a reflection of three-dimensional reality, is false. This fallacy is the basis of the architectural style usually referred to as the ‘modern movement’. This style is characterised by flatness and a lack of decorative effect, a consequence of the belief that two-dimensional drawings allow one to see what something will look like in reality. A reliance on drawings has also led to a decline in craftsmanship and a restriction of the natural inclination of craftsmen to embellish their work. Because such decoration is essentially three-dimensional, it is difficult to represent on paper *fig 13*. Because of this, it has been eliminated from building design and the appearance of the resulting flat surfaces has been promoted as being a ‘style’. A failure on the part of professional architects to properly appreciate the realities of the building operative’s world and to value, utilise and encourage craftsmanship has engendered resentment, suspicion and mistrust and has led to an unfortunate decline in standards of workmanship.

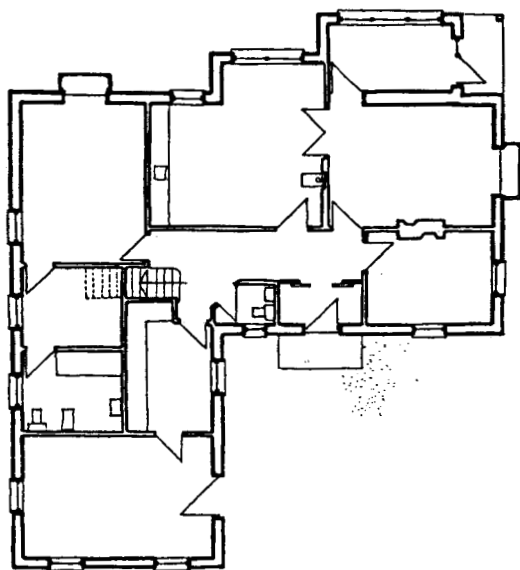


fig. 10: The limitations of drawings in illustrating space are very severe. What can actually be drawn on paper are the flat surfaces of walls and floors.

The Brief

The first step in the process of designing your own home is to set down in words the sort of house you wish to create. This is the foundation of the design and so requires careful consideration. Nothing more than pencil, paper and thought are needed to begin. It is best to use plain sheets of A4 paper for writing things down *fig. 1*.

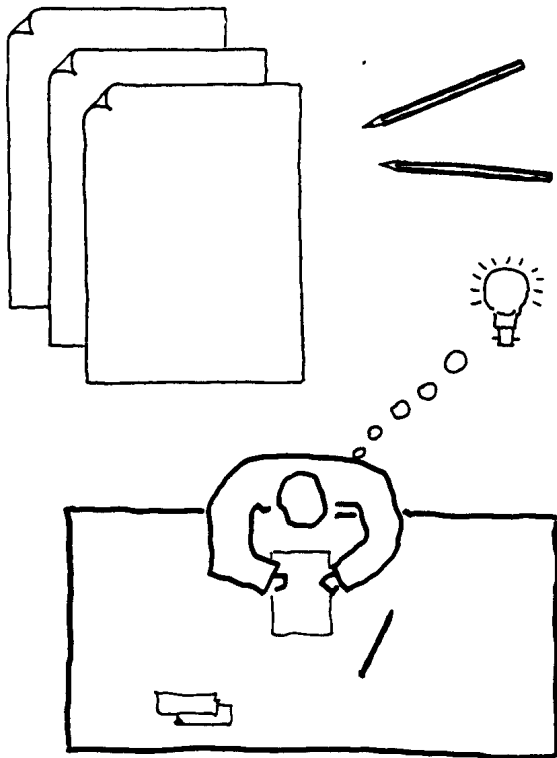


Fig. 1: Nothing more than pencil, paper and thought are needed to begin your house design. It is best to use plain sheets of A4 paper for writing things down.

As the design process unfolds, all manner of things will be considered and written down, allowing you to gain an objective view of the job you are undertaking. This written information, considered as a whole, is known as The Brief for the project. This, in effect, will comprise of files of written information describing all aspects of the building. Each individual file will be dedicated to a particular aspect of the project, for example a Heating File, a Drainage File, a Materials File.

Buildings are made by following the directions set out in words and drawings. These drawings are made by following the directions set out in the words of the Brief. This makes the Brief a very critical document in the design process.

Whether you are designing a new building or an extension to an existing one the initial approach is the same – a clear Brief must be formulated allowing you to articulate your objectives. Essentially, the Brief is a seed that will grow into a complete building.

The Brief is a written description of the building you wish to design. It is a word picture that covers all aspects of the building, from the sense of space you wish to create, to location, orientation, size, cost, heating, insulation, construction and so on. A Brief allows you to see all these things individually as well as in relationship to each other. Balancing the various considerations that you express in your Brief is the process of design.

The creation of a building such as a house can be a very rapid process – a matter of weeks in fact. Organisation is the key to building quickly and efficiently. A clear Brief will allow you to get organised so that you can design the building you want in as short a time as possible. Building a building should always be about just that – building. If critical design decisions have to be made as the building work progresses the construction process will become muddled and the work will drag on. A Brief allows the building process to be examined beforehand, it allows potential problems to be uncovered, it allows advice to be sought and choices to be made. In short, it allows you to plan out the sort of house you want and decide how best to get it.

Starting A Brief

Start with a simple list of all the spaces you want to have in your building *fig. 2*. Include everything you can think of including circulation and storage space. This list can be more generous or ambitious than you need or can afford but that does not matter. The Brief is a working document. You will be adding to it and changing things as you go along. What is important is to write things down, to look at them, think about them, make decisions and to keep the project moving. As long as you are working with paper and pen you can easily change your mind about any aspect of the design by crossing things out or adding things in.

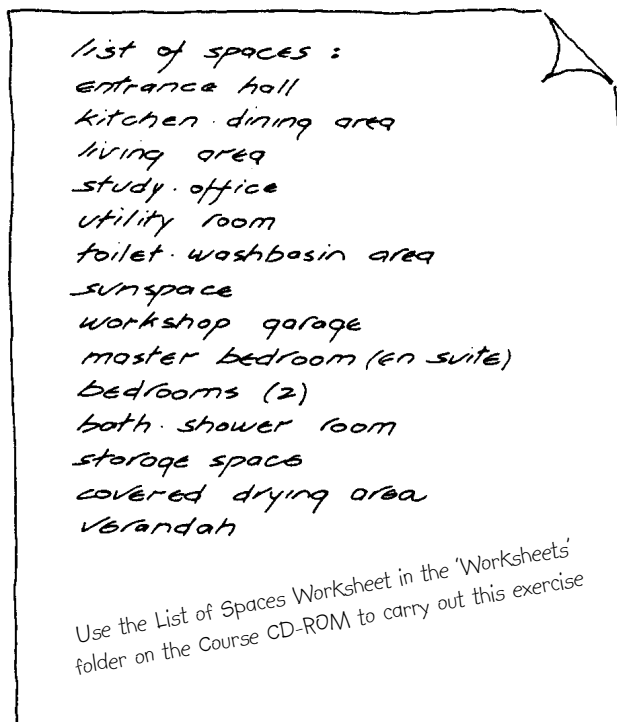


Fig. 2: Start your Brief with a simple list of all the spaces you wish to include in your design.

Spaces

Your list of spaces will contain some of the following: *Front porch. Front Entrance Hall. Cloakroom. Kitchen. Dining Area. Living Area. Kitchen/Dining Area. Pantry. Scullery. Study/Office. Toilet with washbasin. Utility Room. Back Porch. Sitting Room. TV Room. Music Room. Library. Workshop. Garage. Fuel Store. Boiler Room. Conservatory. Sunspace. Bedrooms. Bathroom. Shower Room. Hot Press. Storage Space. Circulation Space. Sauna. Snooker Room. Games Room. Granny Flat. Swimming Pool. Wine Cellar. Verandah Space. Outdoor Space. Gazebo. Summer House.*

The consideration of how much and what type of workspace you include in your design is very important. Workspace can be provided in the form of a Study/Office or it can be in the form of a general Workshop Space. Providing these types of spaces in a house will provide options to the occupants about how they might spend some of their free time or how they might earn a portion or all of their living by carrying on a home based business. This type of flexibility within a design can make owning a house a very economical proposition.

A Sunspace can be used to grow plants, vegetables and fruit as well as contributing to the heating of the building by gathering and storing solar heat. Circulation space is the space which connects the individual rooms together and is itself connected to the outside. This space can also provide easily accessible storage space within the house.

It is important at this stage of the design exercise to include everything you can think of in terms of spaces and rooms. It does not matter if this list gets too long. You can easily rationalise it by combining several activities in a single space. For example, if you put down on your list a Garage and a Workshop space you might in the end decide that to provide a single space to cater for both activities might be the most economical solution. What is important at this stage is to think what your house can do for you in terms of freedom, for example, making a house that you can work as well as live in.

Any future needs that you can envision should be considered at this stage also. If you can foresee a need for extra accommodation at some stage in the future put this down on your list. This extra accommodation will have to form part of the overall design. When the initial building project is undertaken this extra space will not be built, but any provisions necessary to make the future building work easy to carry out might be completed. For example, drains or foundations for the future extension might be installed initially to allow the future building work to be easier and less disruptive to carry out.

Any accommodation that is required which is likely to be external to the main house should be included in your list of spaces. A separate garage or workshop, for example, a greenhouse, a gazebo, a folly or any other construction that would be located away from the main building needs to be made part of the overall design.

If the building you are designing is something other than a house, for example a workshop, a studio or a playhouse for the children, the procedure is the same – you make a list of the space or spaces that will be contained within your building and proceed from there in the same way as you would for a house design. Proper regard should be paid to any buildings already existing on the site to which your design should relate.

If you are designing an extension to an existing house you should make a list of all the existing spaces in the house and add to this the additional spaces you wish to make.

Expanding The Brief

The next stage of the design process is to expand the initial Brief. This is done by analysing each space individually under several headings. These headings are – *Activities; Furniture & Equipment; Abstract Qualities; Location and Surfaces*. This work should be done on A4 plain paper. Each page should carry the name of the space to which it refers and the relevant headings. For example, the page containing information on the Activities that will be carried on in the Utility Room should be headed 'Utility Room – Activities'. Similarly, the page or pages containing information on the Furniture & Equipment for the Living Area should be headed 'Living Area – Furniture & Equipment'. This level of organisation will make the job of filing and retrieving information very straightforward. Individual files for each space in your building should be created to store this information.

Activities are the things that will normally happen in a space. For the Kitchen these would be cooking, possibly eating and perhaps baking or preserving. For a Studio/Office they might be operating a computer, a telephone and a fax machine, meeting clients, writing, typing and so on. For a Bedroom the activities would be sleeping and also maybe studying, reading and relaxing *fig. 3*.

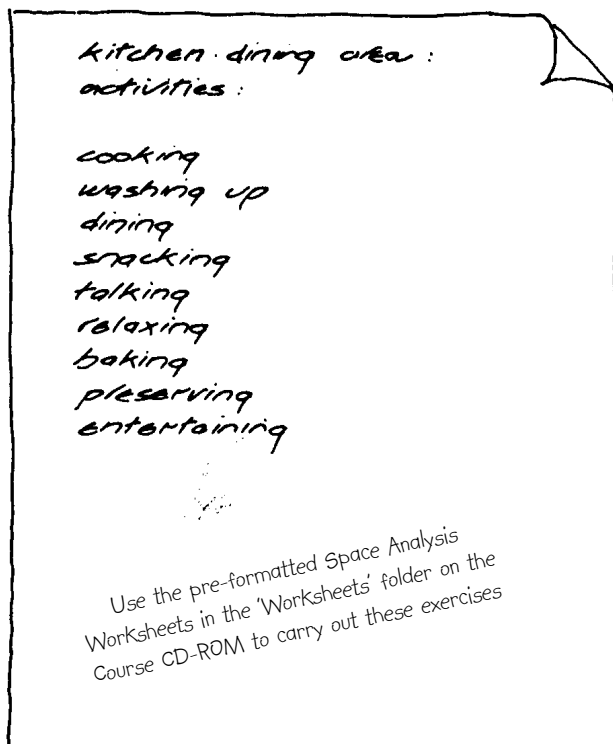


Fig. 3: Analyse the Activities that will be taking place in the various spaces in your design.

Furniture & Equipment is literally everything you want to put into the spaces you are going to design. For a Bedroom this might be a bed, a bed-side table, a study desk and chair, bookshelves, clothes storage and general storage space. For the Utility Room it might be a washing machine, work-top space and shelving. For a Living Area you might include sofa, armchairs, coffee tables, TV/video, a music centre as well as any other furniture, paintings or art objects in your possession *fig. 4*.

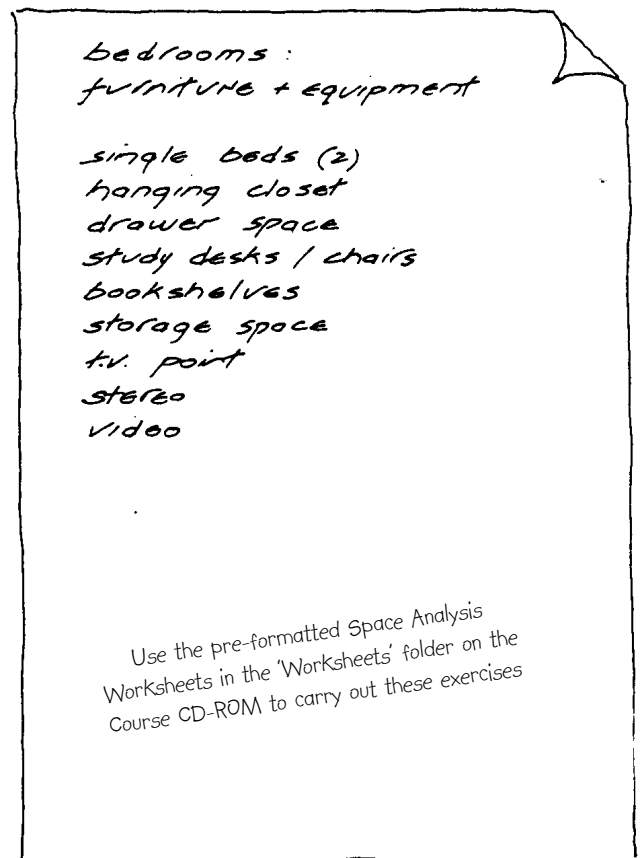


Fig. 4: List the Furniture & Equipment you intend to have in each of the spaces in your design.

The Abstract Qualities of the spaces you wish to design are very important to think about at an early stage. Light is a critical one of these. For a Living Area one might consider evening light desirable while in a Kitchen you might want to enjoy the sun whenever it shines. Morning or evening sun is pleasant in bedrooms. All rooms should get sunshine at some time of the day. Other abstract qualities you might like to write down are things like spaciousness, warmth, peacefulness, security and healthiness *fig. 5*.

Measurement

Many aspects of building design and construction are concerned with the sizes things are. For example, the height of the lofty ceiling you might want in your living room will have to be decided sooner or later, as will the sizes of all the furniture, rooms and circulation spaces. Similarly, all the doors and windows in your building will need sizes applied to them, as will the heights of the worktops and other items of built-in furniture *figs. 1 & 2*. In order to accurately communicate information about the sizes things are, measurements are used.

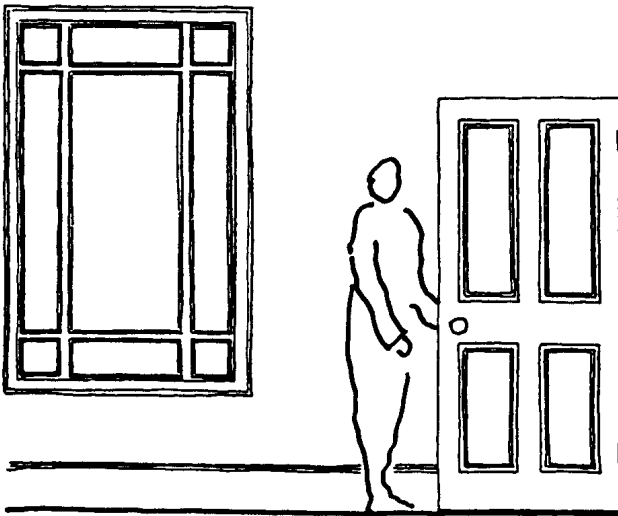


fig. 1: As the design exercise progresses the sizes of the various parts of your building will have to be decided, including the sizes of windows and doors.

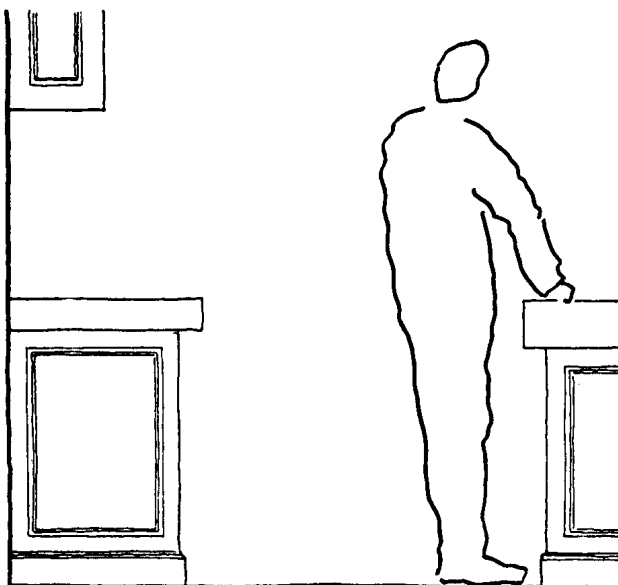


fig. 2: The sizes of the worktops and other built-in units will also have to be decided.

Human Scale

The dimensions or measurements of the human form have always influenced the sizes of buildings and their furnishings. The most obvious example of this influence is in the size of tables and chairs *fig. 3*. Beds are another good example *fig. 4*.

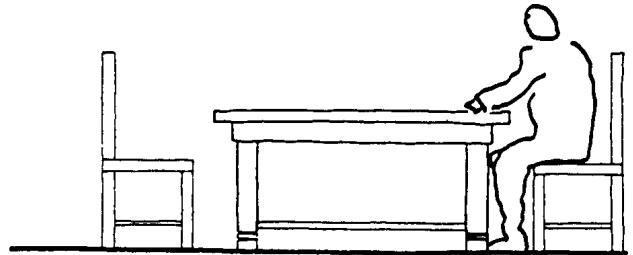


fig. 3: The dimensions of the human form have always influenced the size of buildings and their furnishings. The most obvious example of this influence is in the size of tables and chairs.

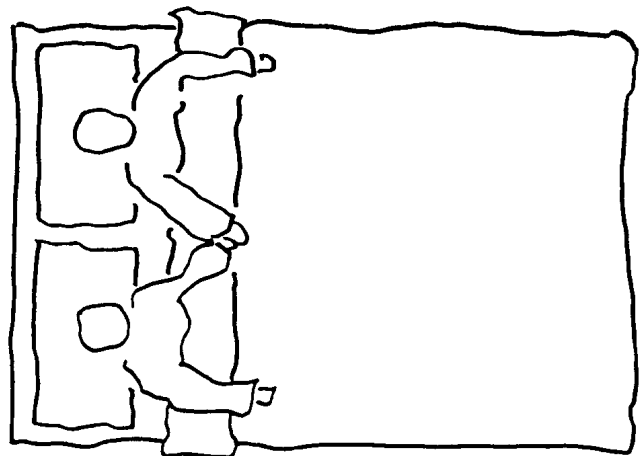


fig. 4: The size of a bed relates directly to the dimensions of the human form.

Room sizes are related to the activities carried on by people within them and stair gradients are set according to the ease with which people can negotiate them. Also, the heights and widths of doorways are determined by the space needed by people to pass easily through them. Windows are usually positioned to enable people to see out of them whether sitting or standing *fig. 5*.

The overall effect of taking the size of people into account in building design is to provide buildings with a human scale *fig. 6*.

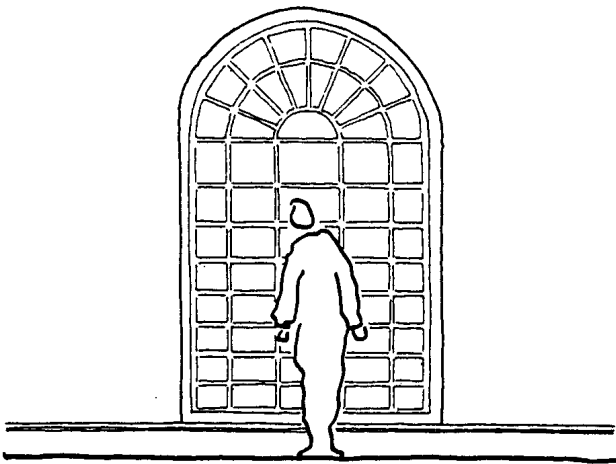


fig. 5: Windows are usually positioned to enable people to see out of them whether sitting or standing.

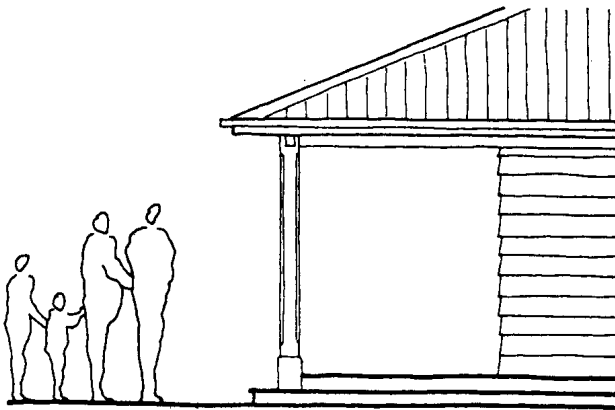


fig. 6: The overall effect of taking the size of people into account in building design is to provide buildings with a human scale.

Body Measurements

The human body is the original measuring device fig. 7. Simple measurements are afforded by using the hands, the feet and the eyes to judge distance figs. 8 & 9. The outstretched arm can be used to judge height and depth. Both long and short distances can be measured by using the body as a ruler.

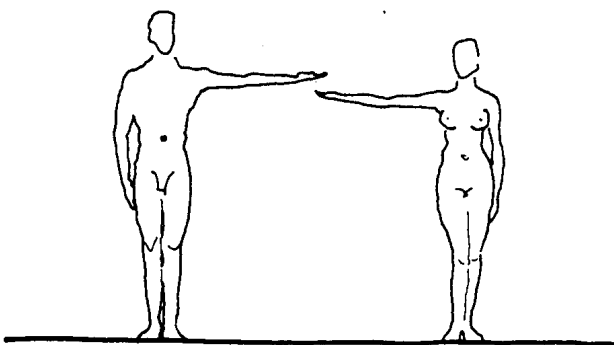


fig. 7: The human body is the original measuring device.

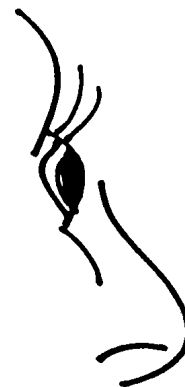
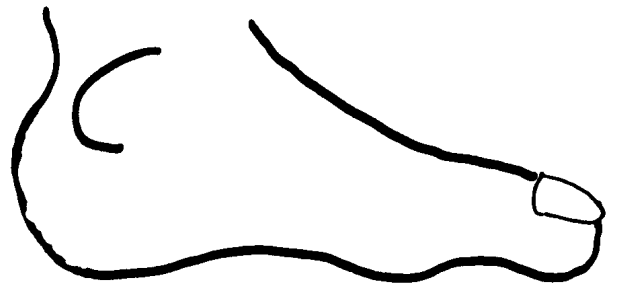


fig. 8: Simple measurements are afforded by using the hands, the feet and the eye to judge distance.

Drawings and Models

Drawings are simple pictures. They communicate much more directly than words and they allow you to visualise an item without it being there in front of you. Drawings are also invaluable when you are communicating your ideas to others *fig. 1*.

When you are collecting measurements, if the item you are measuring is drawn and dimensions of it are written against the drawing, you will not end up with a jumble of words and numbers that might be hard to interpret at some later date. These kind of drawings can be done very easily and they make the job of collecting measurements very straightforward.

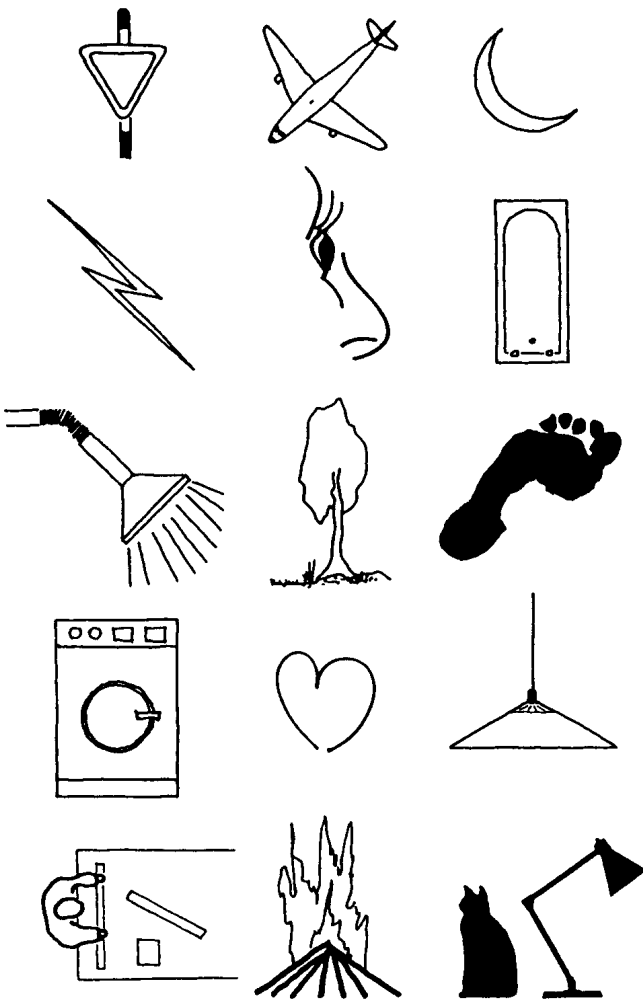


fig. 1: Drawings are simple pictures. They communicate much more directly than words and they allow you visualise something without it being there in front of you. Drawings are invaluable when you are communicating your ideas to others.

Pencils and Pens

Drawings can be done either in pencil or in pen. Pencil has the advantage that it can be erased easily. Pencils are made from wood with a core of crystalline carbon called graphite or lead *fig. 2*. Graphite is made in a variety of softnesses and hardnesses ranging from a very hard lead, a 9H, to a very soft lead – a 6B. A hard lead – like the 9H, leaves very little graphite on the paper and so produces a very sharp, faint line. A 6B on the other hand is very soft and leaves lots of graphite on the paper making a fuzzy, dark line. Middle of the range leads like the H and the HB give the best results for general use. The secret of using pencils is to keep them sharp.

A sharp point makes an even line. When a pencil has been pared too much it gets very short and unbalanced, making it difficult to use *fig. 3*. When this happens a pencil needs to be thrown away.

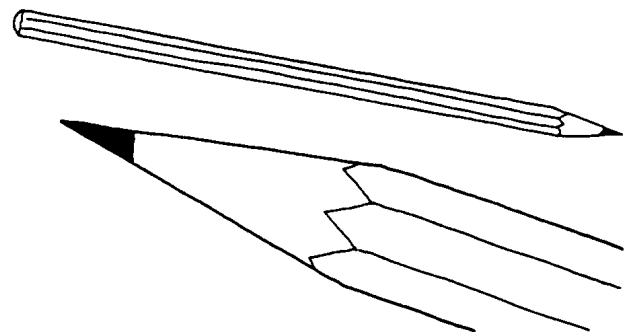


fig. 2: Pencils are made from wood with a core of crystalline carbon called graphite or lead. The secret of using pencils is to keep them sharp.

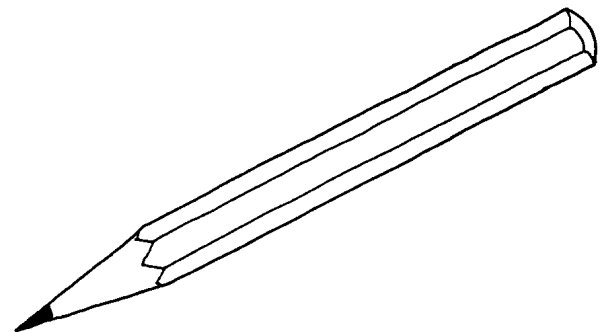


fig. 3: When a pencil has been pared too much it gets very short and unbalanced, making it difficult to use. When this happens a pencil should be thrown away.

Heating and Ventilation

Heat is an abstract, but nonetheless physical, concept. We speak of things being 'hot' or 'cold' and we measure these physical states in 'degrees of temperature' called Centigrade. Temperatures are normally written as °C and sometimes simply as 'K'.

Heat always tries to move to somewhere colder than where it is. For example, air that has a temperature of 23° C will automatically try to go somewhere that is cooler than 23° C. You can experience heat movement if you put your hand on a block of ice. Heat will immediately leave your hand and go into the ice which will begin to melt from this transfer of heat. This transfer will occur so rapidly as to be painful after a short time. Similarly, if you stand on a cold floor in your bare feet you will experience severe heat loss.

Heat moves in a number of ways. These types of heat movement are called *convection*, *conduction*, *radiation* and *evaporation* fig. 1.

Convection heat movements rely on air in order to take place. In other words the heat moves in the air on its journey to somewhere colder – warm air always moves to where there is a lower temperature.

Conduction heat movements rely on a solid or liquid in order to take place – a poker placed in a hot fire will rapidly conduct the heat of the fire along the poker. Metals are generally good conductors of heat. Materials such as timber are not so good. Water is an especially good conductor of heat.

Evaporation heat movements rely on a combination of water and air in order to take place. This happens, for example, when so much heat has been applied to water that it boils. Boiling water is water that is shedding excess heat in the form of a gas – water vapour. This hot gas, a mixture of water and air, then moves to somewhere colder. Towards the kitchen window, for example, where the water vapour cools down – releasing its heat – and promptly turns back into water. This process of water vapour cooling and turning back into water is called *condensation*.

Radiation heat movements are more mysterious than any of the other ways in which heat moves. This is because no actual physical medium is needed to accomplish the heat transfer from a warm place to a cooler place. The best example of radiant heat

movement is the way in which the sun radiates heat to the earth. This is achieved by waves of heat energy crossing through the vacuum of space from the hot sun to the cooler earth. When this radiation strikes something – for example the tar on the road – the radiation changes its wavelength and in the process releases its heat. This is the heat we feel on our skin when we expose ourselves to direct sunlight.

The sun is not the only source of radiant heat. Almost any material that can be warmed up – a metal poker, for example – will radiate out some of its heat to the cooler objects in the vicinity. An open fire will warm your hands because it is sending out heat radiation which releases its heat when it strikes your hand. Radiant heat waves travel in straight lines and radiate out in all directions from a warm surface to a cooler one.

While it can be accepted that heat always moves from a warm place to a cold one in these certain ways, it is a curious question to ask 'what really happens to the heat – where does it eventually go?' The answer to that is simply that it is absorbed into the ground, radiated off into space at night, or absorbed by the many cold regions that exist across the planet.

Heat is a form of energy and much of this energy has its origin in the sun. All fossil fuels were formed by the action of the sun on the earth. The heat energy in wood is also derived from the growing tree absorbing sunlight. Usually heat is released from fuels by burning.

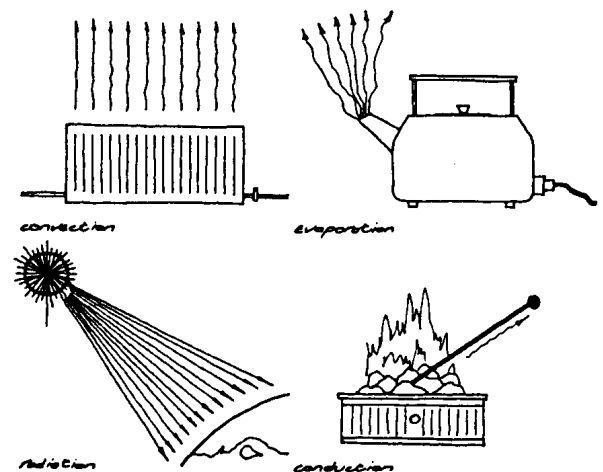


fig. 1: Heat moves in a number of ways – by convection, evaporation, radiation and conduction.

Body Heat

The amount of heating and ventilation that a building requires relates primarily to the needs of the human body and the way in which it functions. The human body, like a car engine, produces heat while it works *fig. 2*. This excess heat must be constantly expelled from the body to prevent overheating and to maintain an even body temperature.

Our bodies strive to maintain an even temperature at all times by shedding the excess heat that they produce. This shedding of excess heat must happen in an orderly way and at a reasonably steady rate for the body to feel comfortable.

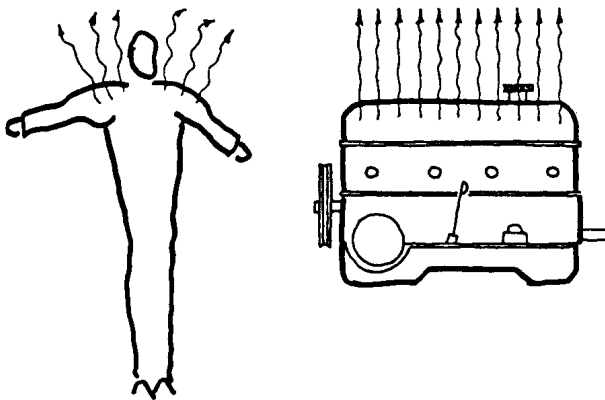


fig. 2: The human body, like a car engine, produces heat while it works.

Air plays a major role in removing excess heat from the body by convection. In other words, the excess heat is carried away on the air. Because of this fact, and because air is in other ways essential to life, the heating requirements of any building are always considered together with the fresh air requirements of the building. In other words Heating and Ventilation is regarded as a single question in building design and not as two separate subjects. This is normally referred to simply as 'H&V'.

Normally, clothing is used to control the rate of heat loss from the body's surface *fig. 3*. Clothes do this by protecting the body from direct exposure, especially to cold air and cold surfaces. Even warm air passing over a body will carry away heat by convection. If the amount of heat carried away like this is too great, the body will lose heat too rapidly and will be made cold. By adjusting the amount and type of clothing we wear we can protect the body, maintain an even body temperature and so be 'comfortable'.

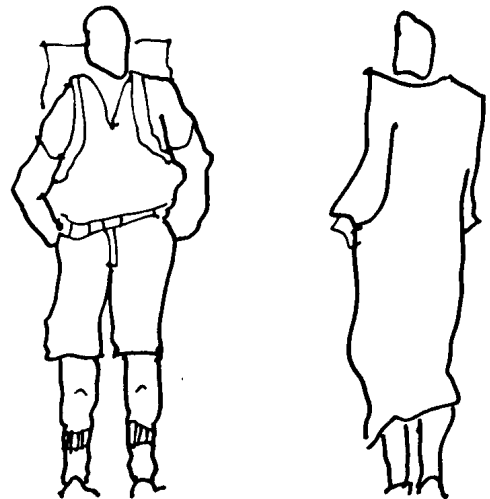


fig. 3: Normally, clothing is used to control the rate of heat loss from the body's surface.

Clothes that work well in respect of controlling the flow of air to and from the body surface are usually natural fabrics like cotton, silk and wool. Such fabrics 'breathe', allowing air to pass through them, as well as holding within their fibres a certain amount of heat. Non-breathable fabrics such as nylon or plastic cause the body to overheat because they restrict the flow of air to the skin. Because the fibres of synthetic fabrics do not hold any heat within them, we regard them as being 'cold' to the touch.

Apart from carrying away excess heat, air also plays an important role in removing waste matter from the body. Skin particles, carbon dioxide, microbes and so on, are all carried away from the body by the action of air movements.

Heat is also radiated out from our bodies, especially from the top of the head *fig. 4*. Our hair controls the rate of heat loss from this part of our bodies. Hats and headscarves, when they are worn, work to minimise these radiant heat losses. Gloves work in a similar fashion for the hands.

Heat is also lost from the human body by evaporation. When we breathe we exhale warm moist air. This air is carrying water vapour and heat and on a cold morning we can see this moisture 'condensing' when it comes in contact with the cold air around it. Evaporation also occurs from the surface of the skin, especially in very hot conditions. Perspiration is moisture that has been expelled from the skin carrying excess heat with it. Such moisture is then evaporated away on the air.

Materials & Products

Small buildings are best made from materials that are freely available locally. It is a good idea therefore, to go to a local builders supplier at an early stage in the project to see what they stock and to become familiar with building materials and products in their unbuilt state. Many of the items you will see will look awfully crude and raw and some you will not even know what they are! None of this matters particularly. You are just looking and feeling and sensing what these things are like. Does something feel good? Does it look good? Does it smell good? These are the responses that you must entertain in order to narrow down the field of materials and products that you are willing to surround yourself with in your home. Sensing materials in this way will allow you to organise a file entitled *Materials & Products* which will comprise catalogues, notes and even samples along with the relevant prices of these things. It should be borne in mind when assembling price information, that building costs are made up of two elements - material costs and labour costs.

The range of materials used today has changed very little from that used for building purposes throughout history - wood, stone, clay, sand, metal, cloth. Of course the modern products made from these materials would be quite sophisticated in comparison to their former counterparts. Plastic would be a significant modern addition to this range.

With the exception of wood and cloth, all these materials are derived from the earth itself, including plastic. While all materials are of natural origins they cannot all be considered to be natural materials as the process of their manufacture into products may alter them in such a way that their original natural qualities are radically altered.

What materials are available locally ?

Do these materials

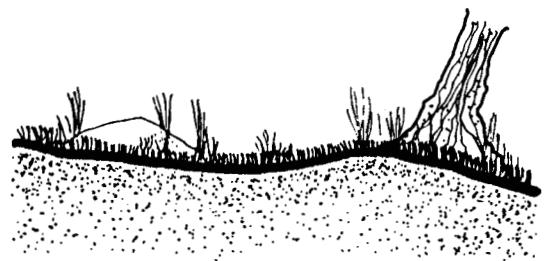
Look good ?

Smell good ?

Feel good ?

Sound good ?

Taste good ?



*Many building materials originate
in the earth*

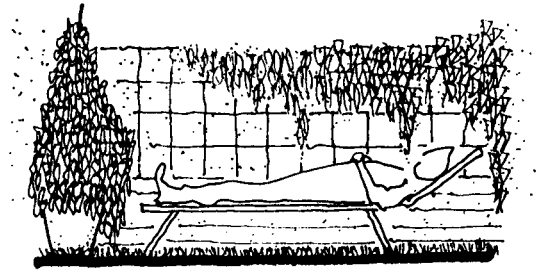
Clay, Stone, Lime, Oil, Sand, Metal

*But beware of what might happen to
these in a factory!*

The use of man made chemicals in modern manufacturing processes can oftentimes introduce dangerous substances into otherwise benign materials as well as producing quantities of waste that cannot easily participate in the earth's natural recycling process. Manmade chemicals can be particularly dangerous in this respect as they generally do not recycle naturally and so cause an imbalance in the environment. This type of imbalance can be extremely hazardous to life. Because of this, all the materials and products that one chooses to use in a building project should be scrutinised from their raw material state to their finished state in order to make a reasoned assessment of their likely effect on one's health as well as their effect on the wider world.

A house is an enclosure that excludes the outdoor climate while creating an indoor one. The materials and products from which this enclosure is made - the building fabric - will effectively surround the inhabitants, isolating them from the outside world. What this means is that the indoor climate, or environment, must be carefully made to ensure that the occupants will be safe inside it - that they have sufficient air to breath, that their bodies are kept at a pleasant temperature, that the effects of benign natural radiation can reach them, that they are not subjected to dangerous substances and so on. In short, what you want to achieve is an internal environment that is pleasant, safe and natural. The creation of this type of environment in large part depends on the materials you choose to make your building with and how these are put together.

The outlines for the type of internal environment you wish to create within your building will be described in your *Brief*, particularly in the *Abstract Analysis* for each space and your stated requirements in regards to *Heating & Ventilation*. *Internal Environment* includes everything from the quality of space, to the quality of light, to the quality of air within the building. Because we perceive these qualities through our senses it is vital that the materials and products chosen to emulate these qualities are selected by using our senses also. It is all too easy to select items on the basis of cost or by succumbing to sophisticated advertising or pressure. In other words it is easy to allow our heads to make the decisions while ignoring what the heart has to say in the matter.



Choose building materials and products that will be good for your health!

Making a healthy and safe internal environment depends on the materials and products you select to make your building with.

Use your senses to guide you.

Good ventilation is essential in creating a healthy home.



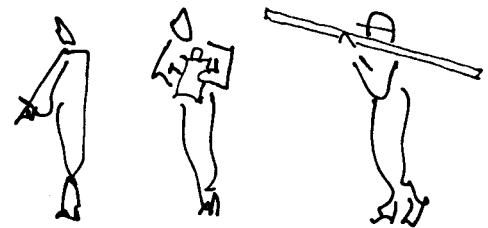
The earth has always provided people with the raw materials with which to create their homes.

Construction

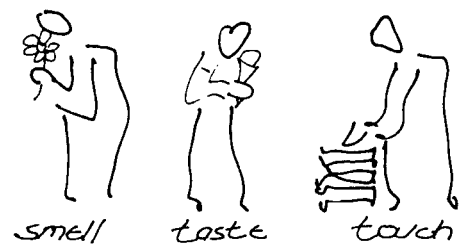
Construction is the process of deciding how your chosen building materials will be joined together to form foundations, walls, floors, roofs, chimneys, doors, windows etc. This process has several functions. Firstly, these materials must be assembled so that the building will stand up and, secondly, this construction must be made warm, dry and weatherproof. A further aim of the construction process is the health and safety of the building occupants. These aims - structural stability, warmth, dryness, weather-tightness, health and safety - are covered by Building Regulations which all new buildings and extensions have to meet. Apart from the need to comply with the Regulations it is assumed that the designer shares the aim of building safely, and healthily.

The topic of construction is revealing in terms of what our homes really mean to us - a particular attitude will have already been declared by selecting particular types of materials from which to make your home. This selection process will in itself have been indicative of the types of internal surfaces that you wish to surround yourself with. In other words, the selection of a particular construction system for your home will stem from choices that are rooted in the sensuous attitude you have towards your home. If you want warm, natural materials as internal surfaces then you have to select a construction system that will allow that. Similarly in terms of heating and ventilation, you have to select a construction system that will allow you create the type of internal environment that will be healthy, warm and clean.

It is vital that construction is seen in the context of particular materials that one wishes to choose and particular design aims that one has declared previously. Otherwise, a decision will be made based on a purely mental approach to the problem and the building that will result will inevitably be dissatisfying when one tries to live within the construction. Homes are for living in and living is a sensuous experience.



The aim of studying the construction process is to decide how your selected Materials & Products can be assembled to meet your design aims and to create a structurally sound, warm, weather-tight, dry and healthy building.



smell

taste

touch



hear



see



feel

By selecting particular Materials & Products with which to construct your home, your sensuous attitude towards the type of building enclosure and internal environment you intend to create, will have been made clear.

Plumbing

A safe and reliable source of fresh water is essential to any home. Sources of water for domestic use include the public mains supply, springs, wells, and, boreholes. Plumbing is the word used to describe matters dealing with the supply, distribution and use of water within buildings.

Most of the world's water cannot be used because it is saline or locked in glaciers and ice sheets. Only a very small percentage of the remaining water is present in rivers and lakes or in the ground - groundwater.

Water contains such things as minerals, salts, trace metals, nutrients, bacteria and organic matter. Groundwater chemistry depends mainly on rock type. Limestone makes water hard with high concentrations of calcium and bicarbonate. Such water is referred to as being 'hard'.

Public water supplies are sterilised - using chlorine or chlorine and ammonia - before being passed on to the consumer. Flouride may also be added.

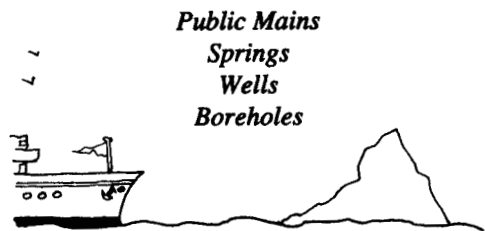
Water from a spring or well that is intended for domestic consumption should be subjected to biological and chemical analysis before consumption. It might also be advisable to have any piped-in water supply so analysed.

The main chemical indicators of water pollution are ammonia, nitrates, chloride, potassium and manganese. Bacteriological examination tests for the presence of faecal bacteria in the water.

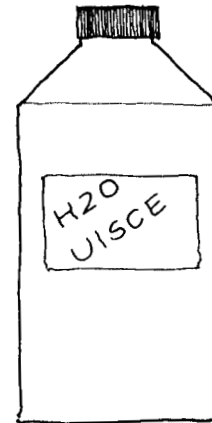
Some purification is oftentimes necessary to remove impurities and to reduce the hardness of water from springs and wells. Filters can remove lead, aluminium, and other metals as well as chemicals from the incoming supply, though to get inert, chemical free water, a battery of filters would be needed

Filters, if used, need to be well maintained as bacteria can reproduce within them. Silver is oftentimes used for this purpose as it inhibits bacteria growth.

Domestic Water Supply Sources:



Most of the world's water is saline or locked in glaciers and ice sheets.



Water Can Contain:

- Minerals
- Salts
- Trace Metals
- Nutrients
- Bacteria
- Organic Matter

- Chlorine
- Ammonia
- Flouride

- Potassium
- Manganese

Water filters need to be well maintained otherwise bacteria can reproduce in them!

Drainage

Drainage systems take the waste water from a house and dispose of it via pipes either to a public drain or more likely to a septic tank. The outlet from the septic tank is then either connected to a percolation area, a reed bed system or some form of treatment plant.

The drainage requirements of sinks, wash-hand-basins, showers, washing machines, baths etc. usually involves connecting these units to a two inch waste pipe. This pipe incorporates a simple trap to prevent smells from the drain escaping back into the building. Toilets are normally connected to 4in. pipes.

Drainage systems always have a vent pipe which protrudes above the eaves of the house. This allows smells originating from the system to be vented off at high level.

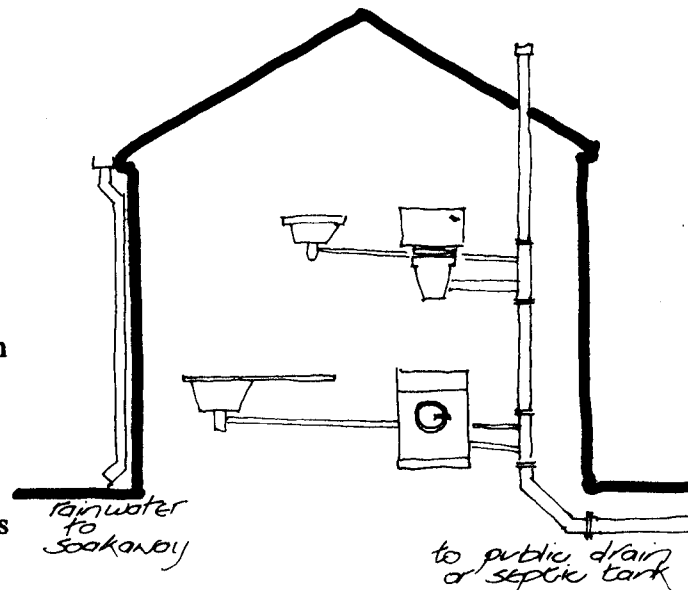
Rainwater is always kept separate from the so called 'foul' system. Caught in gutters and gulleys, rainwater is simply piped to 'soakaways' where it seeps back into the ground.

Soakaways are holes in the ground about three or four feet deep that have been filled back with stones. The pipe from the rainwater system - usually a 4in pipe - will discharge over the top of these rocks and so the water will return to the ground. It is important to ascertain the permeability - the grounds' ability to absorb water - before deciding how deep or shallow the soakaways should be. Their location is also important of course.

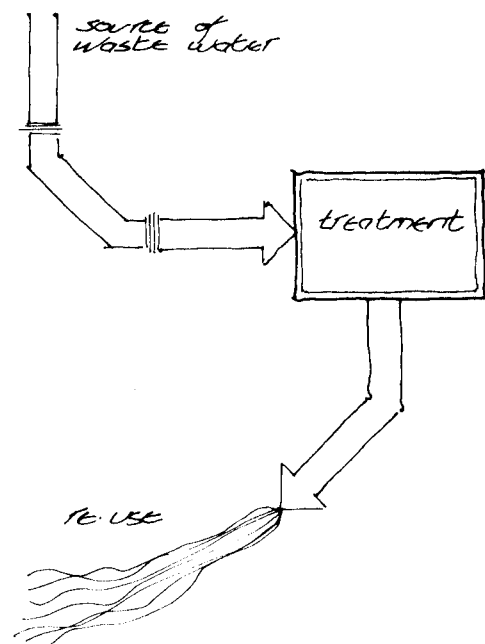
Rainwater can also be held above ground for use in watering plants and for other non-consumptive applications.

Some distinction is usually made between the 'greywater' and the 'foul' elements of drainage waste. Greywater is water flowing from baths, sinks, showers etc, while foul water is that coming from toilets.

The overall aim of any drainage system is to ensure the effective and speedy removal of waste from the house. This aim also includes the disposal of the waste in a way that is non polluting.



Rainwater is always kept separate from the foul drainage system.



The overall aim of a drainage system is to ensure the effective and speedy removal of water-borne waste from the building and to dispose of it in a safe and non-polluting manner.

Electricity

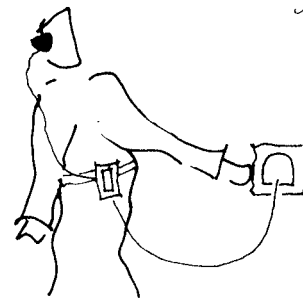
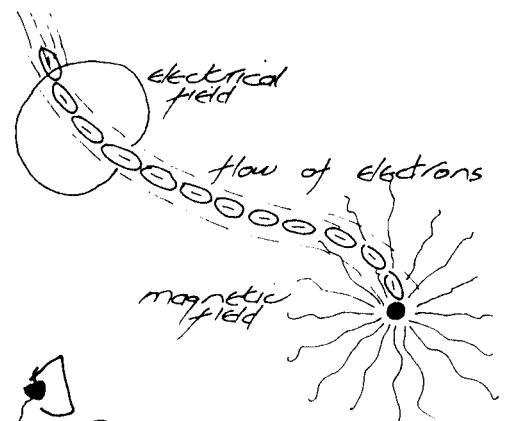
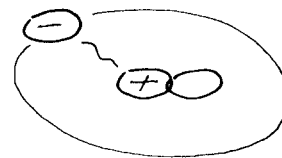
All physical matter is composed of atoms. Atoms are made up of small particles called protons, neutrons and electrons. Electrons and protons are separated by an energy field that holds them apart. These particles are said to be negatively and positively charged respectively.

The separation of positively charged protons and negatively charged electrons within atoms creates a tension within the atom. This tension is known as an electrical field.

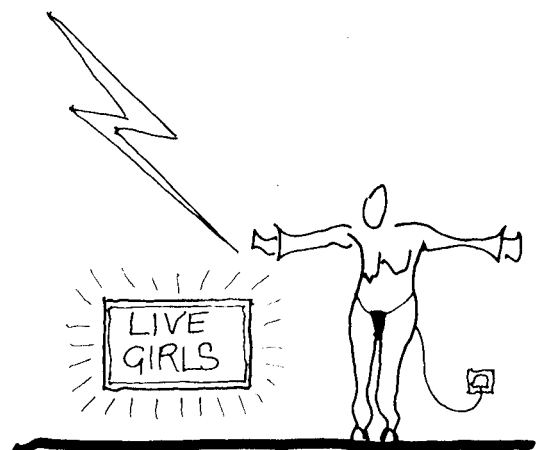
If electrons begin to move within a substance, that is they begin to detach themselves from one atom and grab onto another, that movement is called electricity. Electricity is therefore the flow of negatively charged electrons through a substance. When electrons begin to move, that is when electricity flows, an electrical field enshrouds that flow. A second field also enshrouds such a flow. This field is called a magnetic field. Electrical and magnetic fields, considered together, are called electromagnetic fields.

Natural electricity occurs in a form known as direct current. Direct current describes the way in which the electrons flow - in one direction only. All matter contains some form of natural electrical charge. Our brains are electrically operated and our cells are all electrically charged.

The natural electricity in the environment is all the time trying to earth itself, that is, it is trying to escape into the ground. Natural electricity can build up in the atmosphere and finally "earth" itself in the form of lightning. Any materials that impede this flow of natural electricity can cause an electrical charge to build up on that material. Clothing made from synthetic fibres oftentimes does this, holding the natural electrical charges produced by the body. Such a build-up is known as static electricity. Generally, the use of synthetic materials will lead to static electricity build-up. Such a build-up can cause disturbance to the balance of natural electromagnetic radiation.



Natural electricity occurs in a form known as direct current - DC



Site Analysis

The design and form of any building will be greatly influenced by its location. The physical conditions of the site will have a major bearing on the way the plan develops and should be assessed and understood from the outset.

If no site exists it is as well to choose one rather than to go through the final design exercise on paper only. Choosing a site in this way allows one a lot of freedom! Such factors as cost and availability can be ignored and one can choose freely without the restrictions these considerations normally impose.

If you have a particular site under consideration for purchase it is desirable to undertake an initial design exercise before the deal is finalised. This will allow you to assess the suitability of the site to the type of building you wish to put on it.

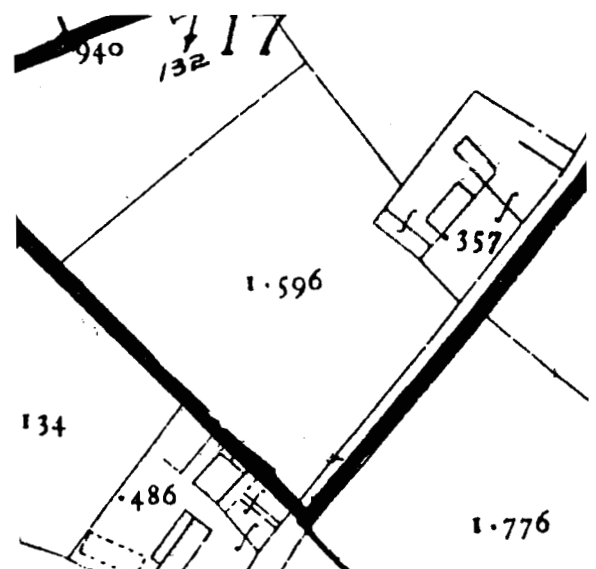
Whether you already own a site or not the process of analysis is the same. This begins by acquiring a map of the property in question. Normally this will be in the form of a scaled Ordnance Survey map. Such maps are usually at a scale of 1:2500 or 1:1250.

A map of this scale will indicate a site of half an acre to one acre as being the size of several postage stamps. North will be at the top of the sheet and usually ground levels will be indicated along the major roads. Bench Marks might be shown by an arrow indicating an actual mark that exists on the side of a building or other permanent fixture. Such Bench Marks and levels are related to sea level at some place within the country. This will be indicated at the bottom of the map as will the date of the survey.

The design of any building is always greatly influenced by its site.



If you are considering buying a site ... carry out a preliminary design exercise before you sign anything.



Layout

You are now at the stage in the design process where you have a comprehensive *Brief*, a detailed concept of each *Space* you want to create, an idea of the kind of *Materials* and *Structure* you are going to use, a clear impression of the *Site* on which the building will be placed, an awareness of the *Planning & Building Regulations*, an overall *Budget* for the project and you have decided on the type of *Services* that will be required. As well as this information you will have developed a clear impression of the design theme/s and the style your building have. Your house at this point has become highly individual.

Within your *Brief* you will have answers to all the questions that are now going to arise. The *Layout* or plan of the house is going to be a balanced mix of answers to all these questions.

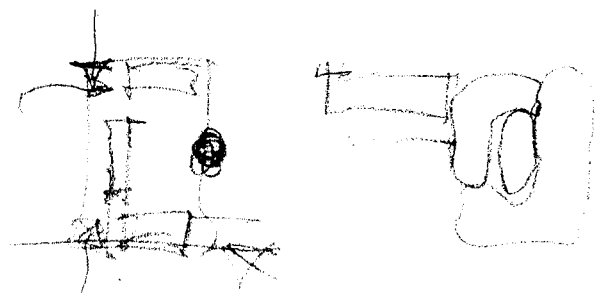
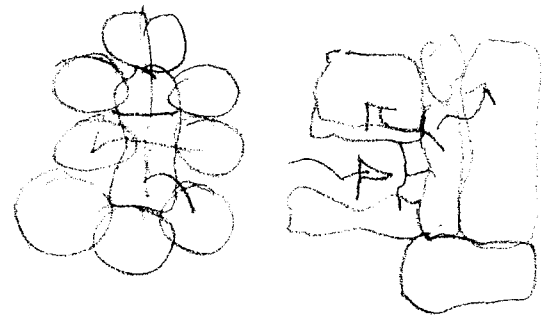
If you do not have a site, either choose one in an area that you would like to live or simply create one on paper. This is a wide-ranging freedom that you can enjoy without actually buying a site. If you are designing a house for a piece of land that is not actually yours you can still get hold of the Ordnance Survey map for it and work as if it was yours. Estate agents usually have photocopies of the relevant parts of the maps for the sites that they are selling. You can obtain one of these easily enough by asking for it.

There is never only one design solution to any building layout. The possibilities are not infinite but they certainly are numerous. It is very easy to follow a particular line of reasoning in a design approach and for this to become final in your mind. If such an approach creates limitations as your work through the design you may become stuck. When you get stuck like this you may not readily see the way out of it. The best thing to do in those situations is to step back and try looking at everything another way. Remember, the *Brief* is a document full of facts and figures about the house you are designing. It is your friend. You can always extract yourself from a tricky design, go back to the *Brief* and start again.

The State of Your Brief

Completed:
Space Analysis & Space Mock-Ups
H&V System Concept
Materials & Products Selected
Construction System Selected
Services Systems Selected
Planning Investigated
Building Regulations Assessed
Site Analysis Completed
Design & Style Selected

Your Brief will now be able to provide all the answers to all the questions that will arise as the Layout proceeds from here on in.



There is never only one design solution to any building Layout exercise.

The importance of assembling a clear *Brief* cannot be overstressed. Everything you can think of has been put in there, you have thought about it all, have made your decisions and you are using it as a guidebook that is helping you find your home. If any changes or insertions have to be made to the *Brief* make them now.

From your *Brief* you should know such things as, what *Materials & Products* are available; what skills and services you can call on and how much you have to spend. These answers should be all there in your *Brief* and you should be able to gain access to them very easily.

The design project will now have a life of its own. It is a good idea to take pause at this point to reorganise your *Brief*. Comb through your *Files* and weed out any irrelevant information. Make sure your information is clear and fill in any gaps or omissions that have not been taken care of yet.

All involved in the project should now get together and the *Brief* should be gone through. This is best done by reading aloud and making alterations as you go. The level of design that you are now embarking on is creative work. Everyone will want to be involved now that much of the drudge work is over. Two is the most people that should work on any design solution together. If there are more people than this involved make two separate designs. Design teams should be balanced to work well. If you are working a design through alone you will need someone to explain your design to occasionally otherwise you will become too involved and will not be able to remain objective.

Creative work of this nature is demanding. You will find that as much time will be spent thinking as designing but this is only as it should be. You are looking for something and if you remain aware of this, answers will present themselves in all kinds of places. Looking at existing buildings and spaces is very important now as well as looking at the details of how your favourite spaces are made. Looking at buildings under construction is very important also.

If insertions or deletions have to be made to the Brief ... make them now!



As the Layout exercise proceeds, you will find that as much time will be spent thinking ... as will be spent designing.

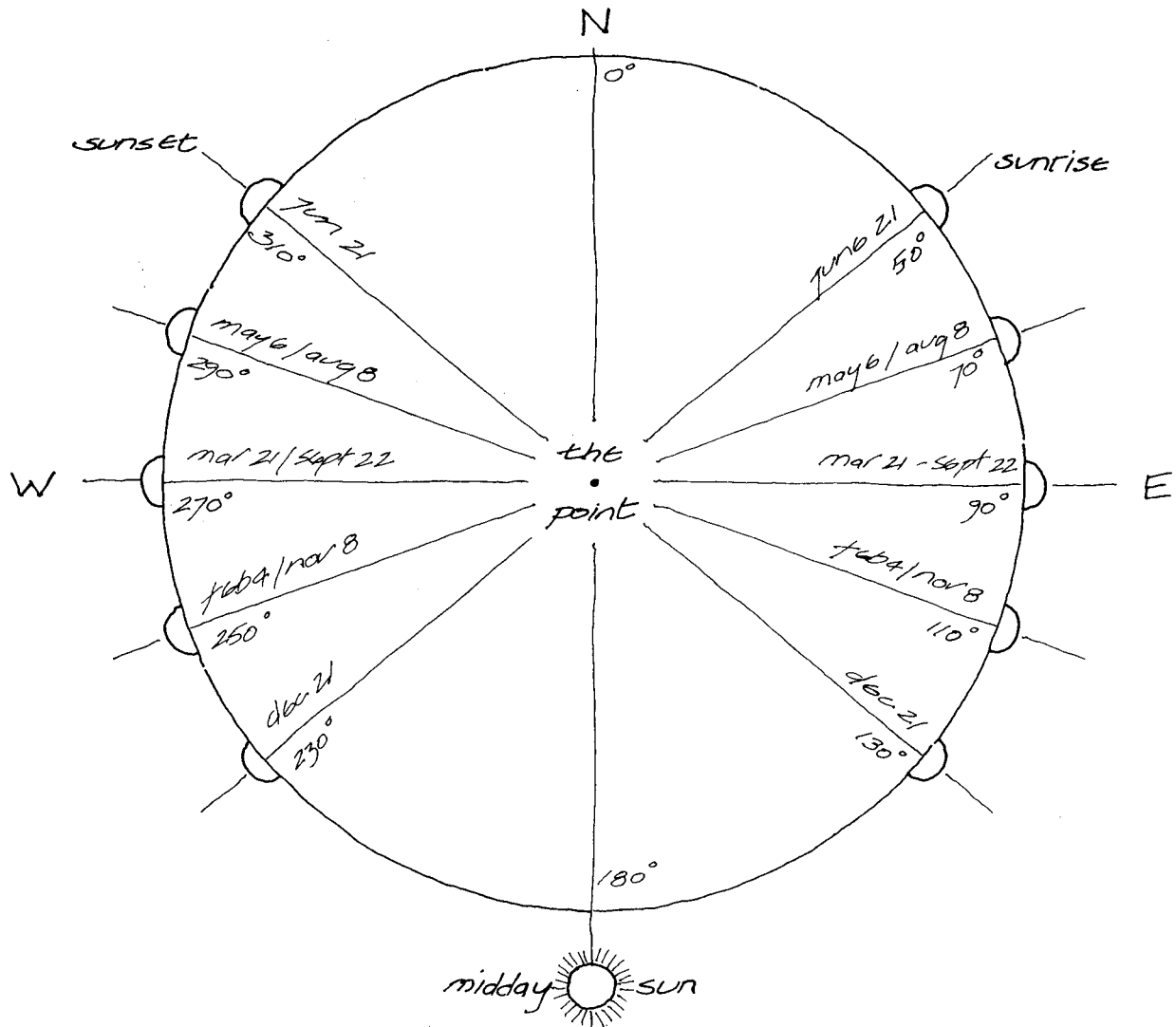
Layout Form

Apart from the raw design information relating to your own particular choices and wishes, the *Layout* or *Plan* of your building will be influenced by the Sun & Moon Paths and by the type of Circulation System you decide to use.

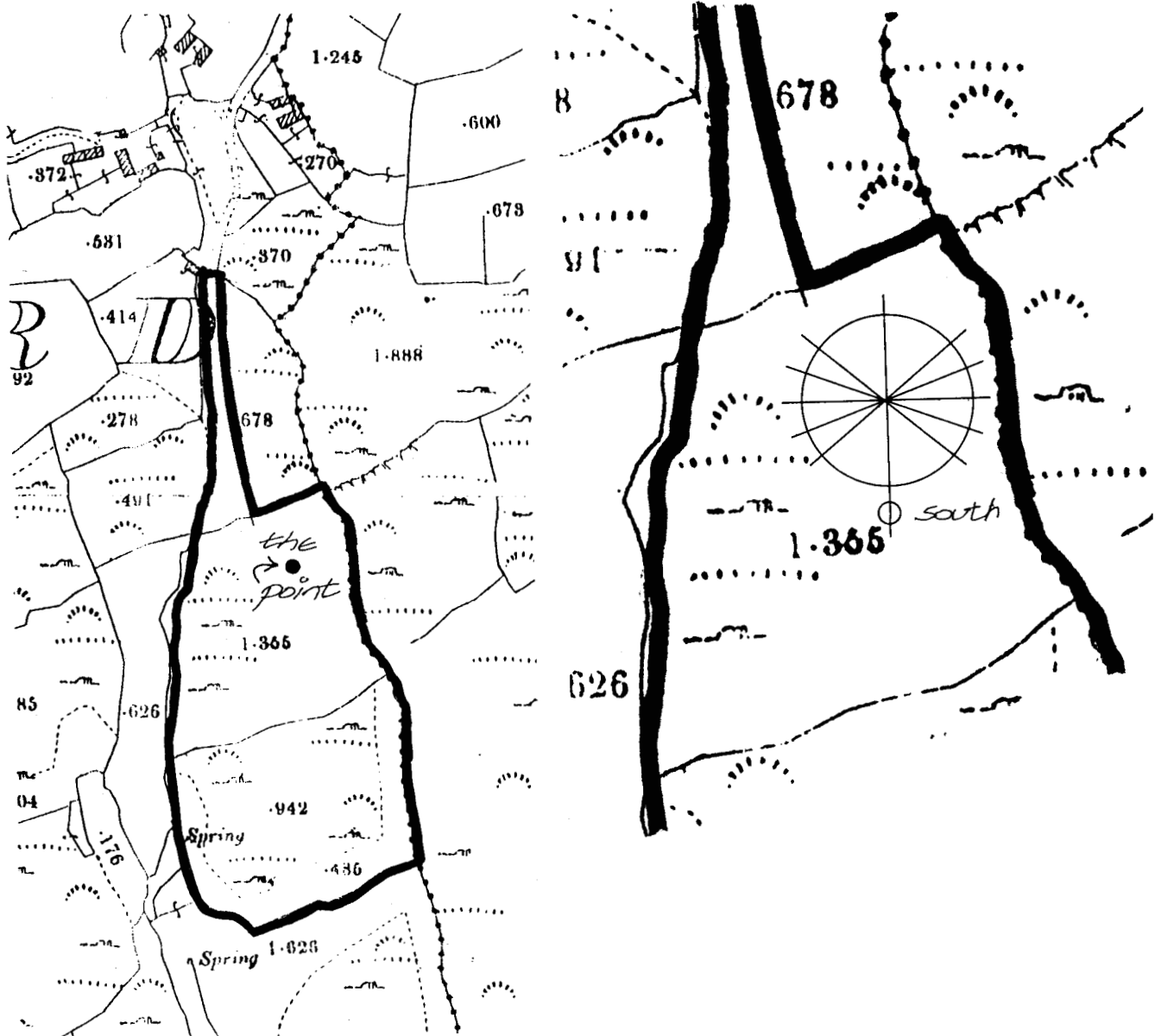


The Sun Path is the primary influencing factor in the *Layout Form* of a sensitively designed building. The Sun Path diagram therefore is an essential part of your *Layout* information. Properly speaking, as with Life itself, the Sun is the source of all *Layout Forms*. The Moon & Planetary Paths, similar as they are to the Sun Path, will then automatically be catered for.

By accepting the influencing force of the Sun on *Layout Form*, one automatically keys in to the source of Life itself. By incorporating this awareness into the *Plan Form* of a home, one creates both a focus and a receptor for life giving energy.



As will be seen from the Sun Path Diagram, it takes the form of a circle. At the centre of this circle is a Point. This Point is the Point from which the *Plan Form* emerges. This keys the individual *Plan* both into the small-scale world of the individual as well as into the infinite world of the Universe. It is this consciously made interrelationship that connects the personal world and the natural world together and makes a home into what it truly is.



In physical terms, the Starting Point of the *Plan Form* of your home is where you yourself choose this Point to be on the physical Earth. That is, the Point you choose on your Site. From this Point the *Plan Form* of your home emerges and is connected to the wider scale of the Universe via the Sun Path that encircles it. This Point can be physically made by marking it with a rock, a stake or a fire.

The Starting Point of the *Plan Form* of your home can also be made on a Site Map. This will, of course, be necessary where no physical site exists, though the limitations of this approach should be carefully considered. These limitations can be compensated for by the physical act of choosing a Point anywhere on the Earth - your existing back garden; the forest; commonage etc. - and in this way the true meaning of creating shelter can be brought home to one.

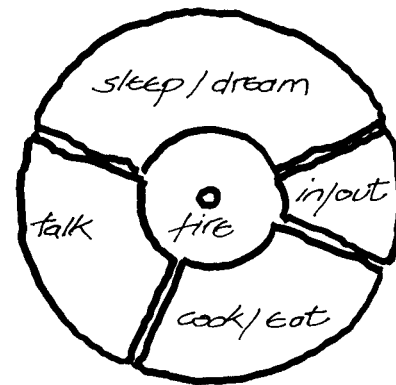
In choosing a Point on the Earth to be the centre of one's world, the Elements of Earth, Air, Fire and Water that characterise Life can be unified and consciously viewed. The chosen Point represents Earth. The element of Air will exist all around this Point and it can be physically be represented with something like a flag. The Sun Path around this Point represents Fire. This can also be expressed by lighting a Fire. The element of Water can be made physically present and if this is done in the form of Water in a clay jar for example, a further unification of the Four Elements can be achieved. Such representation of the Four Elements and one's relationship to the wider world is crucial one to the development of an individual *Plan Form*.

When a Point has been chosen from which the *Plan Form* of your building will emerge, the way in which the Circulation to, from and within that *Plan Form* must be decided on. In its simplest form the home is a single space with the fire at its centre. Even within such a simple *Plan Form*, common in so called 'primitive architecture', a sophisticated *Layout* is employed designating particular parts of the *Plan Form* to eating, sleeping, dreaming, talking and so on. Generally in such single space *Plan Forms* the entrance faces East. The various living activities are disposed around the fire and the entrance according to the relative importance of these. The Circulation pattern follows this. In a more modern *Layout* individual spaces are dedicated to various activities necessitating a more sophisticated and conscious linking of Elements, Entrance and Activities. Nonetheless, the 'primitive' linking of the centre of the *Plan Form* to a single Point will prove to be the most successful and adaptable *Plan Form* that is possible to arrive at, allowing for the unification of the diverse aspects of the design by a central *Circulation* system.

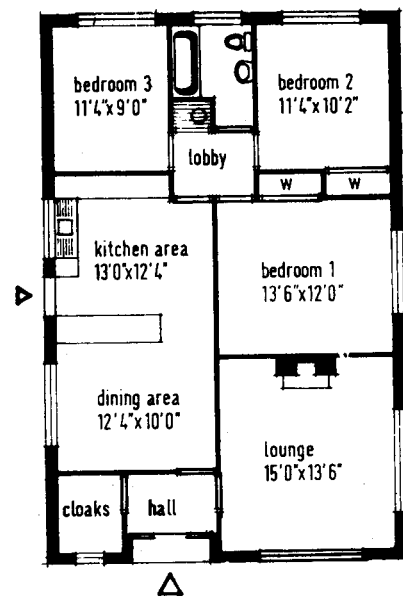
By breaking up the *Plan Form* into individual *Spaces* it is very easy that a 'centreless' design will be arrived at. Extreme care needs to be taken that this is not the case as such a *Plan Form* will not properly relate the inner and outer worlds to each other. While such 'centreless' *Plan Forms* comprise the bulk of modern house designs and such homes provide adequate and comfortable shelter for their occupants, the absence of a proper relationship between the inner world of the home and the outer world of The World At Large can be pinpointed as the missing ingredient in making such house designs whole. Generally it is the absence of a unifying element - for this read proper *Circulation* - that creates this situation within buildings.

Because people are so adaptable and because we all recognise the deep and important need for shelter it is possible to make almost any enclosed space habitable. By creating an individual design however, the need for such extreme adaptability is removed, allowing the *Plan Form* to follow both physical as well as more abstract inner need. In arriving at a workable *Plan Form* it is the need to successfully connect the individual *Spaces* in the design together that holds the key to creating a properly integrated *Plan Form*. This connective tissue can be referred to as *Circulation Space*, that is, the *Space* through which one circulates on the way to and from the individual *Spaces* of the design. Such *Circulation Space* can also host particular activities though its main function is to facilitate the

When a Point has been chosen from which the Plan Form will emerge ... the way in which the Circulation to, from and within the Plan Form, must be decided on.



The creation of a Plan Form around a specific Point will prove to be the most successful and adaptable Layout that it is possible to arrive at.



It is very easy to create a 'centreless' design. Such a Plan Form will not properly relate the Inner and Outer Worlds to each other. Generally it is the absence of a unifying element within a design that creates such a situation.

Costing

Assessing the likely cost of your building is an essential exercise if you wish to realise your design in the real world. In other words, if you want to have your building built it is vital that before construction takes place a clear notion of cost is first determined. This exercise has implications not alone for your financial circumstance but also for the design itself and for the way and by whom it might be constructed. Further, the cost implications of the design will affect any Planning Application that might be made in respect of it and will ultimately decide the nature and content of the *Working Drawings* that must be prepared in order to have the building constructed.

If a proper and detailed *Costing* is not carried out, the implications of excessive cost might be avoided in the short term but the problems associated with this avoidance will sooner or later manifest themselves and will certainly cause greater disturbance than if they were tackled before the project moves into the critical stage of construction.

Like so many aspects of building design, *Costing* will bring to the surface many topics that have to be honestly tackled. For example if you have to borrow in order to build you will have to face the restrictions that Lending Institutions impose on borrowers. If you do not wish to obtain a Mortgage but need Capital you will have to be inventive in how you obtain money. Perhaps you will use the facilities of a Credit Union and so obtain a small loan. If you cannot possibly pay a conventional building firm to make your building for you then you will either have to utilise direct labour or do the work yourself, or at least some of it. All these and other allied matters must be clearly and honestly tackled at this stage in order that your design ambitions can be realised.

If you want to have the building you design erected, it is vital that a clear notion of the cost of doing this is first determined.

The matter of financing your building project will have to be clearly and honestly tackled in order that your design ambitions can be realised.

Planning & Working Drawings

When the *Cost Plan* and the design have been harmonised - in other words when you have arrived at a satisfying design that you can afford to build - the project can move into its final stages. This involves obtaining Planning Permission and producing Drawings with which to effect both the Planning Application and the construction process itself.

Preliminary Planning Assessment

Because it is vital that the design you obtain Planning Permission for is the design that you are going to build, it is important to have a preliminary meeting with the Planning Office before a formal Application is lodged. This will allow for an informal exchange with the local Planning Officer and for any areas of difference to be identified and corrected before the submission becomes formal.

This type of meeting is vital to the smooth flow of the project onwards. Ideally, the Two Month digestion period during which your Application will pass through the Planning Process will be the time for you to organise the construction end of things so that work can begin at the earliest possible date. If this is your aim it is important to know of any likely changes that the Planners will want you to make to your design before you submit the Application formally.

It is vital that the design you obtain Planning Permission for is the design that you are going to build.