



12 / CONCEPTUAL VISION OF A STILL LARGER PROCESS

In a larger project the overall procedures become still more complicated. To illustrate what I mean, I shall briefly summarize my work on the Mary Rose Museum, in England. I shall try to show how my conception of the building, its first sketch design, the plans for construction, organization of construction, the construction operations and management structure, and detailed human organization for the final implementation, went forward.

PROCESS 1: ESTABLISHING THE PROJECT CONTEXT: LORD NELSON'S FLAGSHIP, HMS VICTORY

The Mary Rose Museum, was originally to be built for \$16 million, in Portsmouth. It was designed to house the *Mary Rose*, Henry VIII's warship, which sank 450 years ago, in 1554, off the coast of Portsmouth, with 700 men on board. In 1989 the ship was recovered from the bottom of the sea, and brought to dry dock #3 in Ports-

mouth dockyard for restoration. Since 1990 the ship has been under continuous conservation under a temporary tent — a task that will not end until about 2020. In 1992, I was commissioned as the architect to build a museum enclosing the ship where it sits today, in dry dock #3.

The task of building the museum in this location is not only inspiring and daunting because of the importance of the archeological remains. It is also a great challenge to place a building hardly more than a few yards from *HMS Victory*, in such a way as to enhance, not reduce, the emotional impact of the *Victory* — already one of the most beloved of British naval monuments.

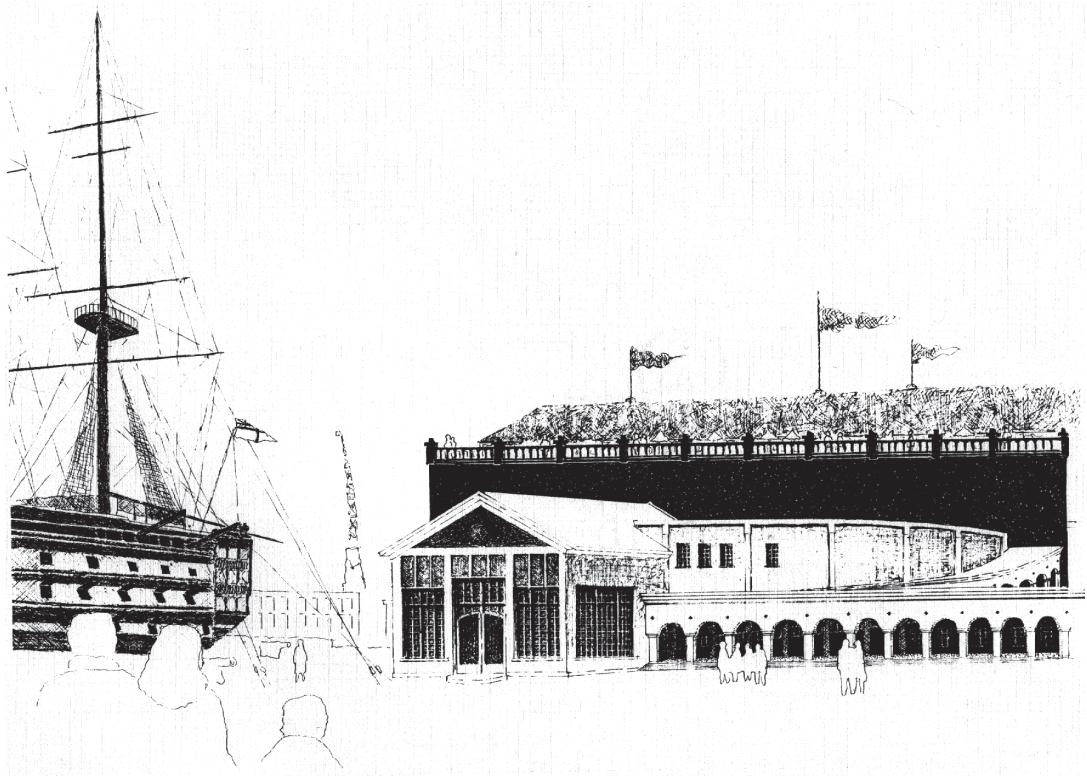
PROCESS 2: THE PROCESS OF DEFINING A WORD-PICTURE OF GENERIC CENTERS

The word-picture was built from a series of interviews with Margaret Rule, the ship's chief archaeologist, and others directly concerned with

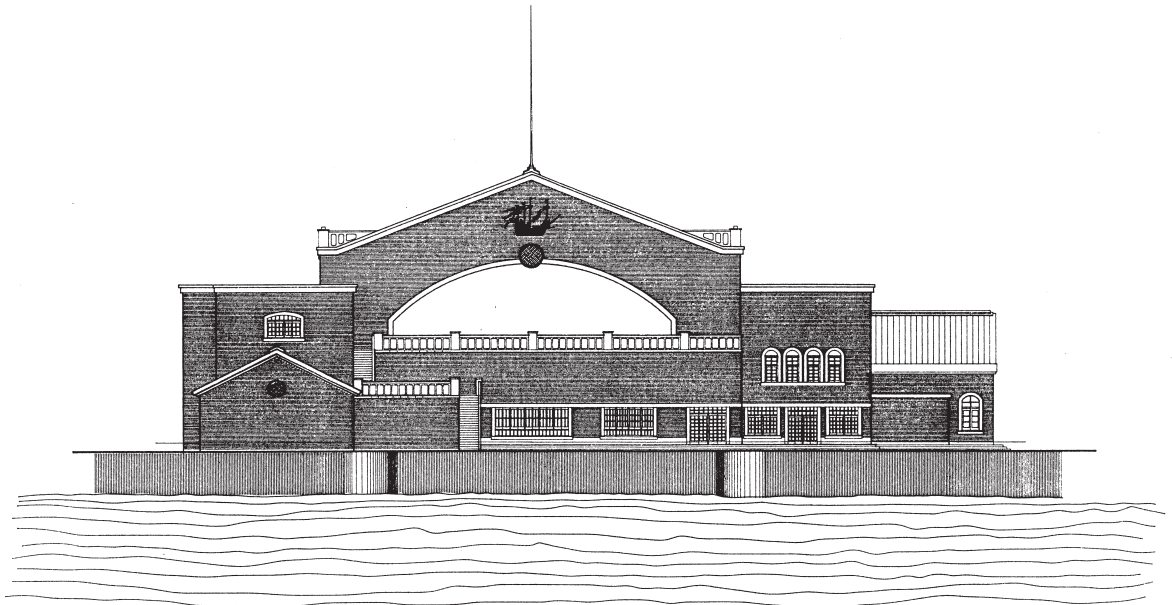


Lord Nelson's flagship, HMS Victory, and the building site in the background

LARGE PUBLIC BUILDINGS



The Mary Rose Museum, as seen alongside HMS Victory, looking across the new Victory arena. Christopher Alexander with Gary Black, Miyoko Tsutsui, Annie der Bedrossian. 1992



The Mary Rose Museum, as seen from the harbor and the water

the preservation of the ship, including Prince Charles, the Admiral of the Portsmouth dockyard, and visitors to the museum. It describes the human experience of the new museum, placing emphasis on ordinary, deep feelings which make sense to ordinary people.

Why is this different from the process one would have expected in a large museum of the late 20th century? In answer, consider, for instance, the 700 men who died when the *Mary Rose* went down. It was Margaret Rule who told me that she had personally found nearly a hundred skeletons and human remains in the underwater mud. I suggested, as you will see in this word picture, that we build 700 stone tablets forming a memorial way into the Museum, to bring the deaths of these men sharply into focus.

Margaret refused. She understood, at once, the emotional impact the 700 stone tablets would make, each with a carving of an archer on it. In the dry consumer-oriented character of 20th-century museums, such a direct appeal to human experience and human feeling — she believed — would have been inconsistent, and out of place. I believe she was wrong.

Using the fundamental process made me focus on the individual centers that arose out of the real situation, hence even on the men who died, their loss, and the knowledge that, having been brought to shore, they needed fitting burial. Throughout the process of constructing the word picture, I made appeal (as far as I was able) to the potential deep feeling of the user, and you may find this attitude in most of the paragraphs which follow.

This word picture is the first necessary step in making something beautiful.

THE MUSEUM FROM A DISTANCE

As you come around the bow of HMS *Victory* from the south, the Mary Rose Museum stands to the north, directly ahead. The long nave of the ship hall rises high, with the *Mary Rose's* four masts rising from it. The volume of the nave is 80 meters long, and about 21 meters high. The masts rise to perhaps 30 meters. Although the building is imposing, it is somber and straightforward,

reflecting the atmosphere of the dockyard. This somberness is reflected in dark materials and in a sparseness and simplicity of line.

Visible in the upper part near the roof are windows of colored glass, in which emblems from the *Mary Rose*, and flags and banners are depicted. One sees these windows from the outside — the sun glistens on them, and shines on the glass. At night especially, the banners and emblems glow darkly.

In front of the main volume, to the left, is the entrance to the building. The entrance rises up high, though not high enough to hide the march of roofs and masts of the building behind. From this entrance, a long colonnaded ramp rises gently toward the right — toward the eastern end — of the museum.

VICTORY ARENA

A SMALL PUBLIC SQUARE BETWEEN THE MARY ROSE MUSEUM AND HMS VICTORY

In the space between the *Victory* and the Mary Rose Museum is a roughly square open space. This square, filled with seats, cobblestones, and paving, is really itself the main building, as important as the Museum itself. It is a focal point in the dockyard.

In summer weather this square may be filled with people waiting, some eating, some enjoying the sun. There are seats, benches in the shade where people may lie down, rest, sit, children can play, and families can relax between visits to the two ships.

Occasionally there are midsummer concerts there, and other informal performances. The Arena is arranged so that as many as 300 people can sit there to enjoy a concert.

THE SEATS AROUND THE SQUARE

Victory Arena is bounded on two sides (south and east) by a wide colonnade. An iron railing that forms the back of the colonnade separates it from the security area of the dockyard.

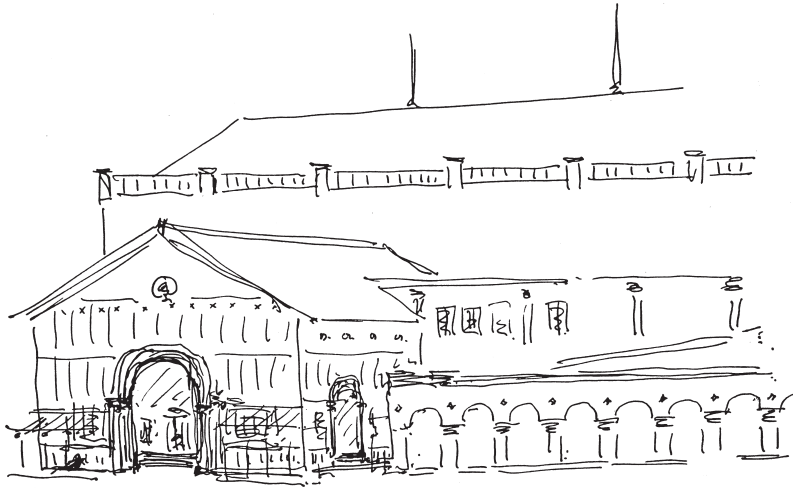
The third side of the square is the front of the Mary Rose Museum; it is also approached by a wide colonnade. The fourth side (west) is formed by HMS *Victory*.

In the middle of the arena is a formal center, a stone meeting place with benches, partly secluded, partly shaded, partly in full sunshine.

The layout of this square is plain, made of straight lines and simple shapes. It is consistent in feeling with the historical dockyard buildings and their plain arrangement.

THE MEMORIAL CHAPEL AND MEMORIAL WALK

On the east side of the square, opening off the colonnade, is a tiny memorial chapel no more than a few square feet in size. This chapel is made in remembrance of the 700 men who died in the *Mary Rose*. It is dedicated to those who have no known grave other than the sea.



An early sketch of the entrance to the museum, showing its dominant position.

The part of the colonnade leading to this chapel is the Memorial Walk. Seven hundred stone tablets commemorating the 700 men are placed along the wall which forms the back side of the colonnade. One passes these tablets in approaching the *Mary Rose* Museum. The tablets are carved in low relief with the figures of archers and sailors of the time.

ENTRANCE AND PROCESSION TO THE INTERIOR

As you approach the Museum from the square, you pass into a major entrance building, which stands high, to the west end of the building's south face.

Inside this entrance, while still at ground level, you see a miniature of the *Mary Rose*: the painting from the Anthony Roll, at actual size, on a parchment.

You then begin to move up a colonnaded ramp which leads to the right. Along this ramp you visit further aspects of Tudor history, in preparation for the shipwreck. You see images of the battle, of the gun battles typical of the time, the ships which were involved — the history of the time, in which the fighting between French and English was continuing.

At the top of the ramp you pass through the Museum and arrive at an outdoor balcony on the north side. The balcony looks down into dry dock #4. As you stand there, looking at dock #4, you grasp the idea and shape of a dry dock, with the complete dock laid out beneath you. It is the clear vista of this dock that prepares the visitor for what will soon be experienced inside the *Mary Rose* Museum.

From the balcony you go into a film theater where you see a twelve-minute film of the raising of the *Mary Rose*. After the film you are left with your thoughts, in darkness, while you collect yourself.

You then move down, in a lift, into the bowels of the earth, to a level about five meters below the ground. You are at this moment, in the very heart of dry dock #3.

ENTERING FROM UNDERWATER

You now pass into an exhibit where you are literally underwater. For the visitor the experience of diving is recreated, so that you pass through seawater, to enter the space where the *Mary Rose* herself is seen for the first time.

INTERIOR OF THE MUSEUM NAVE

After going through this underwater experience, you enter the chasm of the dock which holds the ship, by passing through a tunnel in the back of the dock, and coming out inside the dock.

You are at this moment on a stone platform, which has stone walkways to the left and to the right, running the length of the dock. As you look around, you are aware that you are now inside — and within — a dry dock similar to dock #4 which you saw earlier. Stone walls are all around you. You are walking on stone. You are next to the stone walls. The hull of the ship looms above you.

High above, the great curved trusses of the ship hull loom in the mist. Water is pouring off the hull. Mist and cold and wetness are all around. (If it were possible this would be desirable even after 2020, after restoration is completed, since it contributes to the atmosphere of the ship.)

The almost ghostly experience of seeing the *Mary Rose* itself, wet, glistening, and in the mists of the cold interior, the fact that it lay underwater for four hundred years.

BEGINNING TO GRASP THE NATURE OF THE SHIP

You move forward in the dock, towards the ship, approaching platforms which allow you to get close to the ship itself.

Off to the left there are escalators and stairs which lead to an interior pageant area, a building within a building, where flags are flying, and warmth and light are visible, gleaming in the darkness.

Close to the ship's timbers, you see the physical beauty of the ship, and the blackened individual pieces of wood which form the carcass of the ship. It looms above. You may then pass from the dock to the museum.

THE PAGEANT OF THE MUSEUM

The pageantry of the time (expressed in the tiny miniature from the Anthony Roll), the beautiful and inspiring color and flags, the extraordinary power of the guns, the dress, materials, belongings, are now woven together in a splendid interior, which is black, gold, and red, with touches of other color among the red and gold, that conveys in literal terms the character of this ship in the time and presence of King Henry VIII.

Inside the building there are all kinds of displays — artifacts from the actual ship, reconstructions of interiors like the barber-surgeon's cabin, experiments which show guns, bows, etc., working or partially working, music, musical instruments, dress, clothes-making and so on.

The individual displays are connected by a series of bridges and scaffolding that moves away from the pageant, to hover in space in the black void of the *Mary Rose* nave. At the end of each bridge there is a small platform that literally hangs in the void, at some position near the ship — in two places it actually passes within the space of the ship itself.

THE SHIP IN THE DOCK

The first approach is to the starboard side. You are at this moment standing high in the interior of the nave, approaching the ship from the stern, looking down the length of the hull. This scaffold is curved, following the curved line of the hull. As you walk along it, you can touch the outside timbers, see in through the open gun ports.

The second approach is high above the ship, looking down the starboard from the stern. From this position you are also able to see the stern of the ship rather close to you, with a full view of the sterncastle.

The third approach is from the port side, amidships, at the level of the main deck, looking at the barber-surgeon's cabin to the left and the carpenter's cabin to the right.

The fourth approach is to the main gun deck, at M4 and M5 positions. Here the emphasis is on the guns themselves. They are on display in the neighboring gallery in the place where access to the ship occurs.

The fifth approach is low, at the hold level, amidships, where you see the stepping of the mast and storage arrays. The visitor's main experience consists of going back and forth between the beautiful items in the pageant

building, and the places in the hull of the ship, so that one gradually builds up a picture of the living ship, as it was with its full complement, in 1546.

The idea is that you see not only the dead, glistening hull and timbers of the ship itself, but by the time you have been through all this, you feel as though you have seen the living sixteenth-century ship, as it was, in 1546.

EXHIBITS AND RECONSTRUCTIONS OF THE MARY ROSE

The pageant part of the Museum, in the south building, contains a series of small low-ceiling rooms separated by walls and columns, where the columns, beams, and walls are "illuminated" by paintwork similar to that visible in a sixteenth-century miniature. The spaces are small, and passage from space to space is exciting and pleasant.

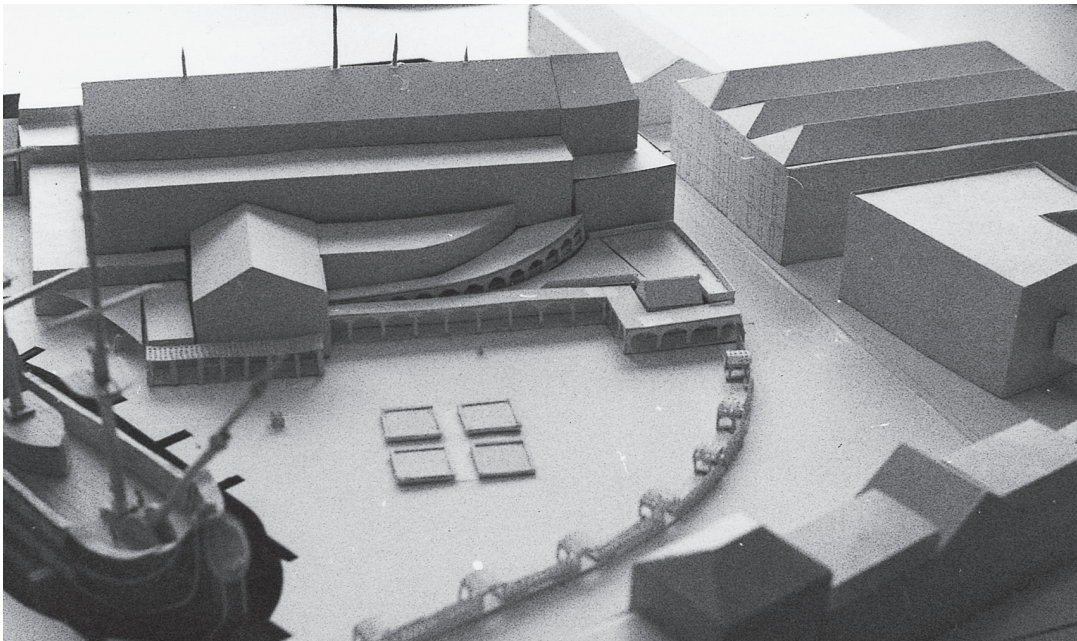
The whole feeling in this section is similar to the feeling of sixteenth-century England, in scale, color, space, and detail.

Inside, the exhibits themselves are in small groups. Each one has explanations in sound, film, and written word. In as many cases as possible there is a way of experiencing and touching and manipulating the things, so that you actually experience them, not only look at them through a glass case.

Some of the exhibits are complete reconstructions like the barber-surgeon's cabin. Others are experiments where, for instance, you can flex a bow, or load a breech-loaded gun. Others involve participation of other immediate kinds, in painting, weaving, listening to or playing music. Yet other examples: Exhibits where you can buy food and drink of the period; stowage of barrels, cooking. These exhibits are linked to the orlop deck (the lowest main deck in the ship).

Sailing and navigation are on display high up — a place from which the lines of ship can be appreciated, and where talk of masts and rigging is appropriate. Exhibits showing social material and leisure. This display incorporates sound, light, texture and movement. What was it like between decks when the men weren't fighting? The Museum has good domestic and social material which requires low light to preserve it. The feeling of low light recreates the atmosphere which really did exist in the decks of the *Mary Rose* at the time it sailed. The men: their health and stature. Putting flesh on the bones of history. Many of the men were carefully selected and of fine physique. They were not social dropouts press-ganged from the nearest pub. The exhibits contain data on physique and general health and some new evidence about bone deformation caused by occupational stress.

How the ship was sailed and navigated. This can be linked to the great voyages of discovery and exploration. War at sea. The weapons and military equipment. Here the visitor will have a full-scale experience. Light will be used to paint the scene. Temperature and air movement (cold, fresh air through gratings and gunports) plus movement of the decks implied by lighting rather than induced by complicated mechanics, can all help. This experience must lead the visitor to a good view of the main gundeck of the ship itself.



*Process 3: The structure-preserving emergence of volume from the urban landscape:
Formation of the space of Victory Arena, by the building.*

Each time, after one of these experiences, you can pass along the suspended scaffold, and reach some point within the *Mary Rose* itself where this particular activity actually happened. So you visualize the two combined: a spot in the physical ship as it now is in the dock; the reconstructed detail you have seen in the Museum gallery; and the bridge connecting the two in space, tying together your knowledge of the reconstruction, linking the two.

EXTERIOR MATERIALS AND COLOR

The outside of the Museum is black, dark red, blackish gray, a lighter rose red, light gray. These are the colors of the industrial brick and concrete of the Portsmouth dockyard. They are also reminiscent of the colors which appear in the portrait of Henry VIII's sister, Mary Rose herself, black clothes, red accents, white and grey touches.⁴

The colors are realized in natural masonry materials. Cast stone and concrete are partially blackened, like the mortar mixed with soot that is used in the old dockyard brickwork.

The cast stone is offset with courses of brick; the brick being a deep rose-red. Tiles of soft pink color are also used throughout the walls and facings.

Plaster rendering, in an off-white and light grey, has the same color it has on other brickbuildings of the dockyard. White painted woodwork is used for colonnade details, windows, and doors.

Paving is low budget asphalt, offset with stone paving in ribbons and bands. Roof tiles are heavy grey slate.

Occasional details, bas-reliefs and incisions, are visible in the concrete and brickwork. These reliefs and incisions add to the feeling of detailed work. They are inexpensively produced with concrete casting techniques — and are colored off-white, black, and rose.

INTERIOR MATERIALS

The intricate main trusses which form the interior of the ship hall are made of smoothly surfaced reinforced concrete similar in texture to cast stone. The trusses are lace-like, with arches and Tudor roses cut into the concrete, all working structurally together. Although these trusses are of the highest modern technology, in feeling they may also touch the spirit of works of sixteenth-century architecture like the Henry VII chapel in Westminster Abbey.

Within the museum, the visitor walks on the stone-work of the dry dock.

The interior of the pageant area is painted woodwork, mainly red and gold, with accents of light yellow and black.

PROCESS 3: STRUCTURE PRESERVING EMERGENCE OF THE BUILDING VOLUME FROM THE URBAN LANDSCAPE

Most unusual about the volume defining process is the determination — inherent in the

process — to find a volume which contributed to the deep feeling of the space next to it: in the case of the Mary Rose Museum, the place called Victory Arena.

Victory Arena — up until that time an undistinguished and almost formless place in the middle of the dockyard — would be given its life by proper attention to the volume of the Mary Rose Museum. It was just this which also had the capacity to create feeling in the building!

The building volume did not merely sustain something good which was already there — it was an active force which would create life in the space. Its considerable mass and height were the necessary ingredients of the effect.

So, in that place where the Mary Rose Museum was to be built, one could then imagine that the museum — dark, brooding, pink and black — would bring life to the dockyard, to the Victory, to those sullen roads.

Most important of all, it was the space (more than the building) which was being formed. That flies against 20th-century awareness, which places too much emphasis on buildings. What mattered about the building is the contribution it makes to the formation of shaped, coherent, public space. That was where the inspiration came from, and it was that — later — which made it possible to make the building beautiful. At each step in the creation of the volume, a new center was defined: and how, even when I was only groping for the form of the building, progress was being made through the formation of new centers.

Here is the sequence of steps:

1. LOOK AT SITE TO GRASP ITS ESSENCE. Understand that the quality of the building itself as a center, rising in relation to Victory, and Victory Plaza, is the main thing.

2. GRASP SHIP IN DOCK. Understand the dark center at the core of the whole project: dark, wet, gloomy, like a ghost in a dark cavern.

3. GRASP EXTERIOR SPACE OF VICTORY. To embellish Victory Plaza itself, as a center, begin to see this plaza as a surrounded enclosed whole.

4. GRASP CHARACTER OF DOCKYARD. Get the darkness of the building. Pink, black, dark

grey, red, pink. Related to the soot-blackened brickwork of older dockyard buildings. Hence — a dark thing looming up out of the dockyard.

5. HEIGHT OF BUILDING AS JUDGED FROM VICTORY ARENA. Standing in Victory Arena, looking towards the place where the building will be, one senses, and feels, a necessary height of about 19–20 meters.

6. HEIGHT, CHARACTER, AS JUDGED FROM ACROSS THE WATER. Check the view from across the water from the security area where the aircraft carriers tie up. Standing over there, one has a clear feeling of the necessary height of the building. I can put my thumb, in front of my eye, at just the height the building must have in order to feel right. When I measure it off against nearby buildings, I again see that it is about 19 meters. In addition, it feels as though it must be a symmetrical entity, high between two lows, seen from across the water.

7. THE FORMATION, SHAPE, CHARACTER OF VICTORY ARENA. To fix its shape, a colonnade around part of the arena. Relation to larger space formed by old dockyard buildings. A transparent or semi transparent barrier, to enclose the smaller space.

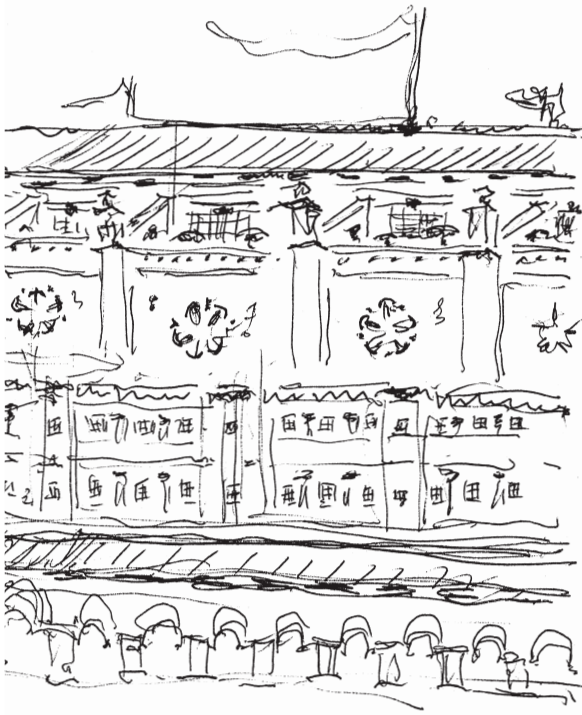
8. MAGNIFICENT FEELING BECAUSE OF THE MARY ROSE SHIP INSIDE. Going back to the Victory Arena, there is a sense of magnificence which I feel, and begin to experience as embellishment of encrusted detail: I think of the small drawing from Henry VIII's book of ships, and try to imagine something with this particular feeling of magnificence.

The work of finding this "magnificent" volume was done on the site, by looking, pacing, holding up one's hands to judge the effect of different possible ridge lines on the Victory plaza. It was also supplemented by the use of rough paper models (mainly at 1:200 scale). Very little of this work was done on drawings, because there is little that a drawing can tell you about such a problem. What drawings were made, were made only to record what had been worked out on the site, or in the models.

PROCESS 4: THE ROUGH SKETCH DESIGN

The first sketches show how the fundamental process drew us — the architects — to an early multi-levelled pattern of centers, capable of containing deep feeling. To have feeling, it had to have a hierarchy of parts, coupled with a simple centeredness in each of the parts.

Unusual was the fact that the search for such a pattern, being a nearly abstract process, was an attempt to create a pure harmony between the building and the place, establishing it in its setting, as a completion of the unfinished form and ambience of the surroundings. This process was — at this early stage, almost separate from functional considerations, bubble diagrams, and



Process 4: Early sketch of the structural idea: exterior buttresses and brickwork. Think about this together with the sample brickwork and concrete work on page 146.

plan features, which would typically have dominated the early design stages of a major building in the late 20th century.

The effect of this “whole-oriented” pattern-awareness was strong, and immediate. Even in the very early sketches, the building looks, in its physical character, like buildings built 2000 years ago, or 200 years ago, or perhaps as buildings may appear in some future era 200 or 2000 years from now. This was not stylistic. It is simply a mark of living structure that a hierarchy of distinct, and well-formed levels must exist in which coherent centers occur at every level of scale. Emphasis on the fundamental process typically brings such a character into existence, because it puts a focus on emerging centers (large, middle-sized, small, and very small). It sounds commonplace. Yet it has the power to create beauty. Today’s system of design rarely gives schematic designs this character.

The problem is aggravated because schematic design is too often done by people do not

know how to build with their own hands. If they do not know (with their own hands) how to build, they can have no authentic sense of what hierarchy of details is probable, or possible.

In our case, even the earliest sketches came from a sensibility that relied on use of real materials, on the basis of our construction yard where experiments could be made. Physical and material experiments were made, even in the first three weeks of conceptual design. From the earliest days, we were trying bricks, stones, concrete, building small walls, looking at the real character, or real material, on the site. That changed the mental process — and the actual process — which then led to the creation of these sketches. We began to develop a conception of the building’s physical character.

We were concerned with the whole — that means with the impact of the building on the surroundings — not — at this stage — with details of plan or organization.

We looked for the elementary repetitions which could embody the volume that had been defined in relation to the site, and we began to see a continuous interplay, back and forth, between the creation of new centers that established “points” in space, and the differentiation of these centers with further repetition of differentiated pieces, that then established further, and smaller, centers.

This was a pure pattern process, almost like designing a carpet, in which space-filling geometry and color had to enhance the volume structure that was — by now — there in our conception.

First we had a center located at dock #3. This center needed first to establish its size, its *extent*: that means its rough volumetric mass, height, length, width, and height. This was established according to its impact on the surroundings and on its capacity, therefore, to create a larger living center in the area of Victory Arena.

Next we had the spanning of the dock, a structural task, which would require a certain repetition of members and structural bays — arches, capable of carrying the weight of a further building above.

Next we had some sense of the exterior of the building, showing this structural repetition in a way which established a rhythm of the exterior, harmonious in that place.

Next we had the position of the entrance and the physical character of the entrance, one that would make sense in context with other buildings round about, and with *HMS Victory*.

Then we had the ramp, the entering path to the exhibit, established by the vision of the way one enters the museum.

Then differentiation of the ramp volume into bays which repeat openings and columns, varying slightly according to their positions in the ramp, and formation of the colonnade itself—white or off-white plastered columns—and its repeating bays.

PROCESS 5: OBTAINING THE STRUCTURAL DESIGN

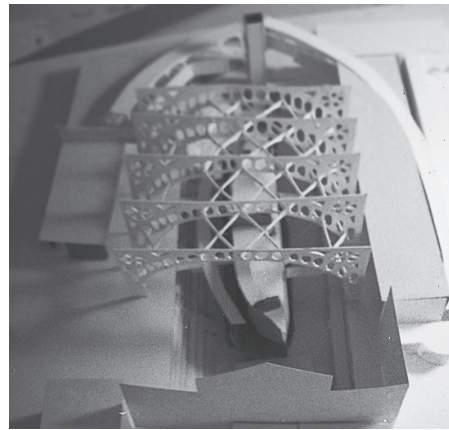
From the point of view of process, it was highly unusual to bring engineering and architecture together, at such an early stage.

Yet it is, I believe, only when these two work together, that deep feeling or life can be attained in a building. A building is, above all, a configuration of mass, and the distribution of mass which forms the building is almost the most basic thing of all about it. When you also include money, as must be done, it can be seen that the initial conception of the building had to be an engineering-money conception, from the very first day, all the way until completion.

Here the need for an integrated process created some pitfalls. In the conventional profes-



First sketch of deep pile foundations on either side of the dry dock, to carry the arched trusses without loading or damaging the weak stonework of the ancient dock construction.

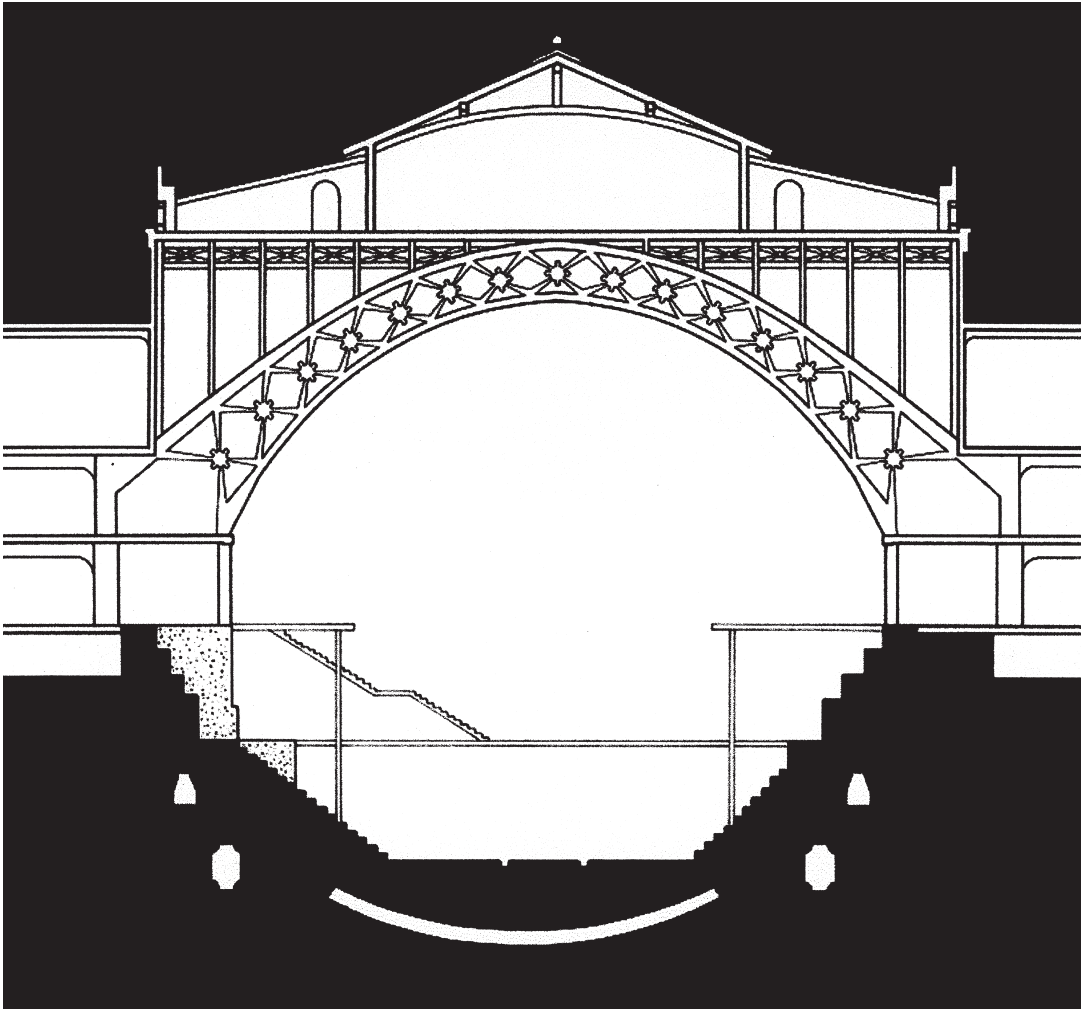


First tiny study model showing, in concept, longitudinal bracing connecting the arched trusses

sional approach engineers are hired after the architectural design, and the engineers are not necessarily under the control of the architect. However, in the situation of this building, if we were to build a great museum building, almost inevitably a heavy one, on the Portsmouth mud with its poor foundation soil, the way the foundation was going to work, and the soil's bearing capacity, would very probably determine the design in all its global aspects.

I therefore had to ask our clients to permit full-scale engineering to start right away (even for preliminary sketch design), and that an engineering contract be awarded to an engineer of my choosing, under my direction. It seems a small thing, but it took enormous effort to gain acceptance of this necessary principle. It is an example of a small but rigid aspect of professional practice, which can cause havoc in the proper unfolding of a building design—yet which was nevertheless entrenched in 20th-century procedures.

In the Mary Rose Museum design, in particular, it was necessary—from the first day of sketch design—to have a real understanding of the foundation design. To place arches as huge as those which I envisaged, in a poor-quality mud, next to a 16th-century dock of doubtful condition and strength, even the foundation design was a major issue from the first day.



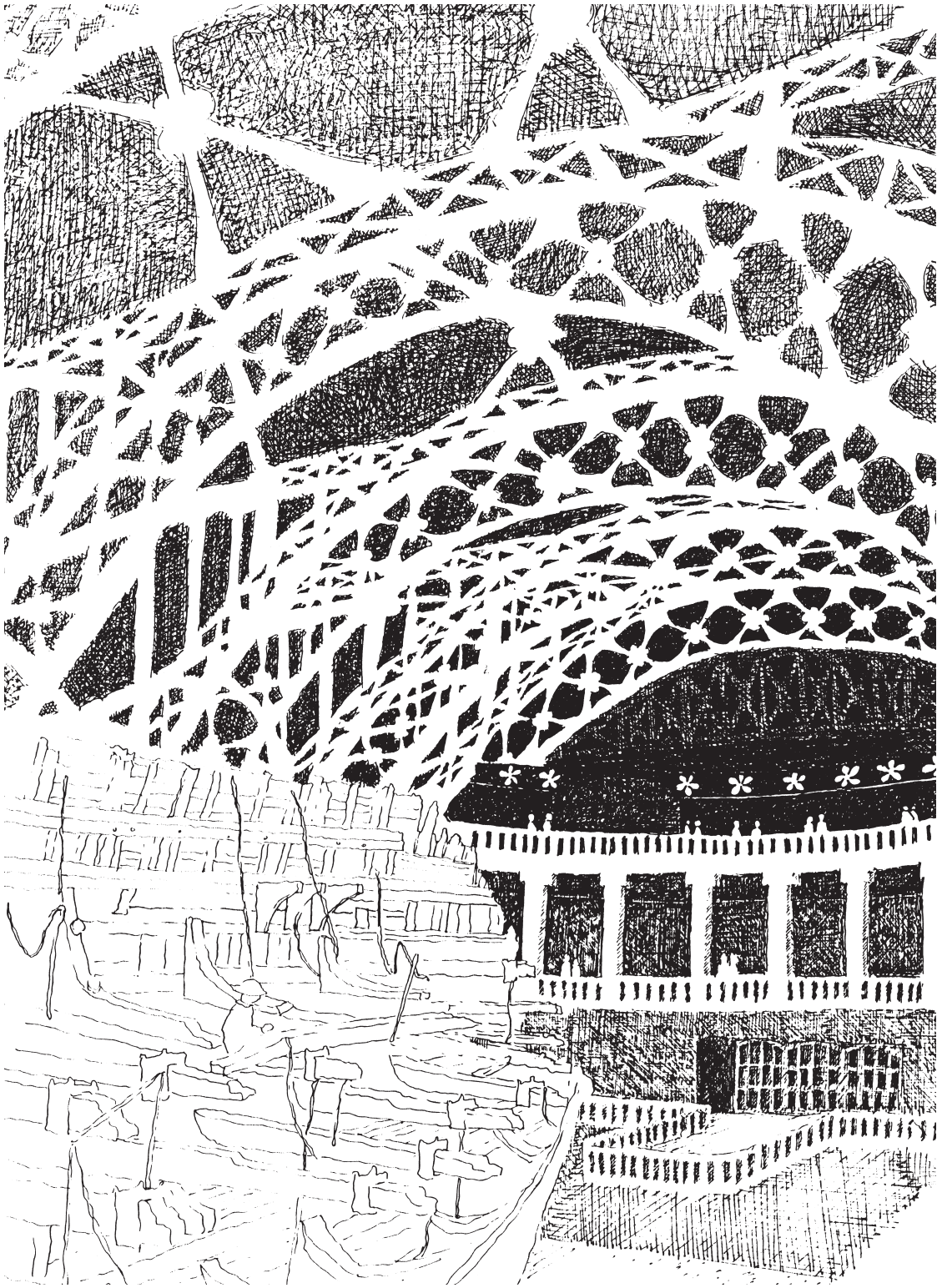
Cross-section of the completed arch. See the next two pages.

Even the most general concept of how the building worked could not be thought out without serious attention to aspects of engineering. Gary Black and I began the early engineering design almost at the same time as the first sketches of the building. From the very first day, we thought of the building as a braced lattice structure. The focus was on the arched support to span the 30-meter wide dry-dock where the *Mary Rose* was permanently housed. The idea that we would suspend a restaurant above this structure, thus creating height and load, over such a flimsy wide-span support, made the con-

ception of the building, as light and strong, fundamental from the first.

The main arches are to be pierced tracery, made of concrete, similar to others we built in San Jose (see pages 211–22), but very much larger. The span of the San Jose trusses was about 9 meters. Here their span is to be 30 meters.

It is unusual to have this level of involvement in engineering and structural design, at this intensity, from the architect. Nor is it usual to have it at such an early stage in the process. Yet it is imperative in order to get real depth of feeling into a completed building.



Lattice work of the trusses from the inside, Christopher Alexander with Gary Black, Miyoko Tsutsui, Annie der Bedrossian, 1992



The arches and their bracing, Christopher Alexander with Gary Black and Miyoko Tsutsui, 1992

PROCESS 6: MONEY DISTRIBUTION

Money is the life-blood of every building. How it is garnered and spent determines the outcome and the artistic life and soul of the finished building. It is the overall global pattern of expenditure which controls the way feeling can occur, because it is this which controls the overall pattern of material, in quantity and quality—just as it is the overall pattern of color which controls the way feeling can occur in a painting.

Usually, in a large building, attention to money, budget, bidding, all come too late. Too often, the project then founders financially, or leads to huge cost overruns.

Starting with the money, and allowing the overview of money to guide the process every day and at every stage of work, help unfolding, because it is only in this procedural atmosphere that one truly has a grasp of the whole at every stage.

The most unusual feature of the money process which we proposed to use on the Mary Rose Museum, and which we did use successfully at West Dean, was program budgeting. In program budgeting, a cost plan is made starting even before design begins. This cost plan is an assignment of budget amounts allocated to different categories of work. To start with, the cost plan is made intuitively, to capture how much one wants to spend in these categories.

It may seem strange to say that a responsible cost plan was based on intuition, but that is indeed so. One guesses and can feel the result of spending 14% on foundations, 22% on roof structure, etc. The purpose is to find a set of numbers which are realistic, and yet create the best possible depth of feeling that can be attained within the given budget envelope. For a team with experience, numbers like these translate directly and intuitively into a sense of how the building will turn out, and whether available money is being spent in the right places, in the right relative amounts to bring the building into harmony, and is likely to have the overall feeling effect which is desired.

Of course the allocations in the first cost plan are subsequently tested and modified continually, as the work goes forward, and finally made sound by later bidding processes. After receiving bids, to see what can be achieved with the allocation initially proposed, further more refined intuitive allocations are made. These, again, become a benchmark for actual expenditure.

The assumption throughout is that the numbers will remain within the framework set. What floats is the design, not the price. One assumes that “something” can always be done for any sum suggested, and the subcontractors and general manager must make do with that so as not to disturb the whole—the whole, in this instance, being the overall budget distribution that has been allocated in the cost plan.

Thus, as the building design develops, each subcontractor is presented with the opposite of the normal situation. Instead of being shown the drawings and asked to bid the work, he is told the sum allocated, and asked what he can do that is best for the project within that sum of money.

This procedure requires extensive negotiation, and the manager must be flexible in his understanding of the reality faced by the subcontractor, so as to maintain a fair and equitable attitude to the work. However, the benchmark of the process is that the allocation which has been made gives the fail-safe distribution: in the best interest of the building overall, and it is unwise for any one operation to be allowed to drive it out of balance, merely because something has been drawn or specified, which is expensive. Rather, one takes the attitude, let this allocated amount be fixed, and—unless exceptional conditions dictate otherwise—whatever can be done for that amount will serve the project well.

This attitude, and this process have repeatedly given us extraordinary control over what can be accomplished with the money available. In West Dean (for a full description see Book 4, pages 118–29 and Book 2, pages 403–6), it allowed us to gain a great advantage over money and to increase enormously what can be achieved

with a given level of resource. One may see a measure of the effect by remarking that the West Dean building was built, finally, for £1,213/m². Yet experienced people who saw the finished building with all the finesse of brick and concrete, stone and flint that went into it, and the enormous attention to detail — calculated that the building had cost £1,800 to £2,000 per square meter. Thus the building we delivered was worth about one and a half times what the client paid, if measured by comparison with conventional bidding and construction practice.

All this was achieved by the extraordinarily subtle, careful, and sensitive manipulation of money under the tight control of our construction manager and chief engineer, John Hewitt.

PROCESS 7: DISTRIBUTION OF THE MAIN MASS
CONCRETE OF THE BUILDING

Our test-bed for the Mary Rose Museum is the West Dean Visitor's Centre, about 20 miles from the Mary Rose. That is where we worked out techniques of highly innovative brick and concrete combinations (see sample on page 146). It seems a small thing to have made concrete that people felt was beautiful. I think it is not too much to say that, by being made with feeling, and having self-like character, the columns, struts, and arches of concrete in the West Dean building have the same feeling-quality that one recognizes in stone in ancient traditional works.

The feeling of a material does not depend on what it *is* — it depends on how it is *handled*. Though modest, the few concrete struts, the occasional concrete arch — all had the internal, careful, felt quality that one has seen in the best ancient stonework. Yet it was cheap to make, and not costly of time, either. It was simply possible, within the process as we administered it, to make the concrete come out like this.

For the clients, the planning officials, and others, it was a revelation that the hated concrete — “that awful stuff” as they felt it to be — in combination with other materials, could have a feeling nearly as precious as linen, or marble.

PROCESS 8: WORKING THROUGH THE FINER MATERIALS, CONCRETE, BRICK, AND STONE, WITH
SPECIAL REGARD FOR LIGHT AND COLOR

In the Mary Rose Museum, the brickwork, concrete work, and stonework, are of the essence to the building. The Museum is mainly made of these materials, and it is the organization, and beauty of these materials, which will control the whole.

Although of course, in its broad outline, a building must be understood in advance, the creation of brick and stonework, to be beautiful, is almost like a painting. It has to be done, each piece as a response to the place. In laying the stones or bricks, or pouring small pieces of concrete, one moves, with the lines and pattern of the work, in response to the perceived harmony, the perceived need of the place, as it evolves.

In the West Dean Visitor's Centre we undertook such work. It will be helpful to describe it in a little detail so as to show, by extension, how the Museum will be handled, when it is built.

The dominant feeling in West Dean was of a grayish light, caused by the flint walls predominant in that place, touched with the nearly scarlet red of Midhurst brick. The whole time, throughout the work of building the main walls, we constantly played with the emerging color, and the emerging changing, red-gray harmony, as it evolved.

We made it change by changing, constantly, the balance of light gray (concrete, sand and cement only with a fine Chichester grit); brickwork (Midhurst scarlet reds); stone (a Portland limestone which was a slightly bluish gray); and flint (a warm gray flecked with white and black).

We began the masonry construction with a straight brick plinth — though even there, to increase the gray, I inserted a chase two courses up from the bottom, into which we later inserted a stone filling band, about two inches high, to make a better connection between the inside of the brickwork (red) and the gray of the earth below it (DEEP INTERLOCK, MUTUAL EMBEDDING).



The impact of 21st-century management as described on pages 144–50, on materials and construction.

Materials for the Mary Rose Museum. Here we see the handling of Sussex brick, Portland stone, and blackened concrete—a subdued red rose, gray, and blackened gray—that is anticipated for the Mary Rose Museum. What is shown here is a montage for construction that was first worked out at West Dean, only twenty miles from the Mary Rose Museum site, then adjusted in this picture to show changes in brick color, concrete color, portland stone, and configuration. At West Dean it took many experiments, and every course had to be placed by eye, in mock-ups, to make the whole thing come out right.

We then built eight courses of red brick, with some stepping back. We then inserted a stone course. Then, we made a decision — because the windows inside the north wall had been adjusted to an entirely different height because of experiments with views, from the inside — that we now faced a completely different organization of pattern, than originally expected at the time of first drawings.

That, in turn, required a different area of gray panels (flintwork). The concrete was then poured to form the verticals between the bricks.

Here again, it was vital that this concrete be poured by hand. There had been talk of using pre-fabricated concrete pieces. But I knew from personal experience of working concrete that it would be better, and far more harmonious, if poured. It sounds more expensive, but in fact was very simple, and not expensive to do.

This process of judging, adding a touch of gray, adding a line of pink or red, went on all the way to the top of the wall, and the construction of the cornice, where similar judgments were made, just before the mass of brick and masonry work was completed. It is not too much to say that we understood the vital implications of this process every day throughout the work, and modified our work, every few courses, throughout the whole period of construction of brick and concrete work. All in all the work took five to six months, from foundation to eave: And we made modifications according to what we saw and felt, at least every one to two weeks — thus a dozen to twenty times during the construction.

It is no more possible to create beauty of brickwork without taking such pains, than it would be possible to make a beautiful portrait without looking, and drawing, and looking, and drawing. . . .

It depends, absolutely, on the quality of the colors and patterns of brickwork in the light. And it depends on the handmade concrete work, which surprised everyone, because it was beautiful. The original brickwork contract for the West Dean Center was for £58,000. The rough sketches included walls of massive construction, in some

places more than two feet thick. The exterior treatment included brick, stone, concrete, and flint. It was made clear, too, that this was not an ornamental facing, but an integrated system of construction in which these various members would be made to interlock, with block and insulation, forming a highly integrated structural wall of massive weight and high thermal capacity.

When we began showing different subcontractors rough sketches, we had two reactions. The bids were, uniformly, too high — in some cases by 50% or 60%. Further, there was often a lack of cooperation in discussion; Chiverton, for instance, wanted us to talk to their estimator — an architect by training — and would not allow us to talk to the bricklayers themselves. Since the architect did not understand brickwork with his own hands, only as an abstract knowledge, his estimates ran high (because of unfamiliarity), and his discussion ran thin (possibly because of a lack of love or lack of enthusiasm for the craft).

There was also an element of fear. When we explained that on many occasions the process and the contract would depart greatly from what was presently visible on the drawings, and that we would negotiate in good faith to keep quantity of materials, and quantity of work constant, only a few of the bricklayers we interviewed were interested.

A fourth thing was that the larger bricklaying companies, oriented in their thinking towards high-pressure time/money operations, showed us work which was clearly not in keeping with the need for every portion of brickwork to evolve, or for the right and most living thing to be attained. These bricklayers and their companies might be called the wage slaves of corporate high-pressure operations. We could not ask them to help us.

Phil Pye, who finally did the work, was a humble, silent man: aggressive when he felt unfairly treated, but honest, cooperative, and willing to work with us. From the beginning, there was an inherent reasonableness in his attitude, and a sense of excitement to do something valuable.