

**Peter Rice** *Ove Arup & Partners*

Peter Rice, a structural engineer and senior partner with the Ove Arup firm, worked with many architects, among whom are Richard Rogers, Renzo Piano, and Bernard Tschumi, on such projects as Lloyd's Bank, the Pompidou Center, the DeMenil Museum, and the park of La Villette in Paris. From such associations, Rice developed a unique and important view of the role of drawing in architecture. Asked the same questions as the architects interviewed for this book, he adds another dimension to the discussion of drawing in architecture.<sup>8</sup>

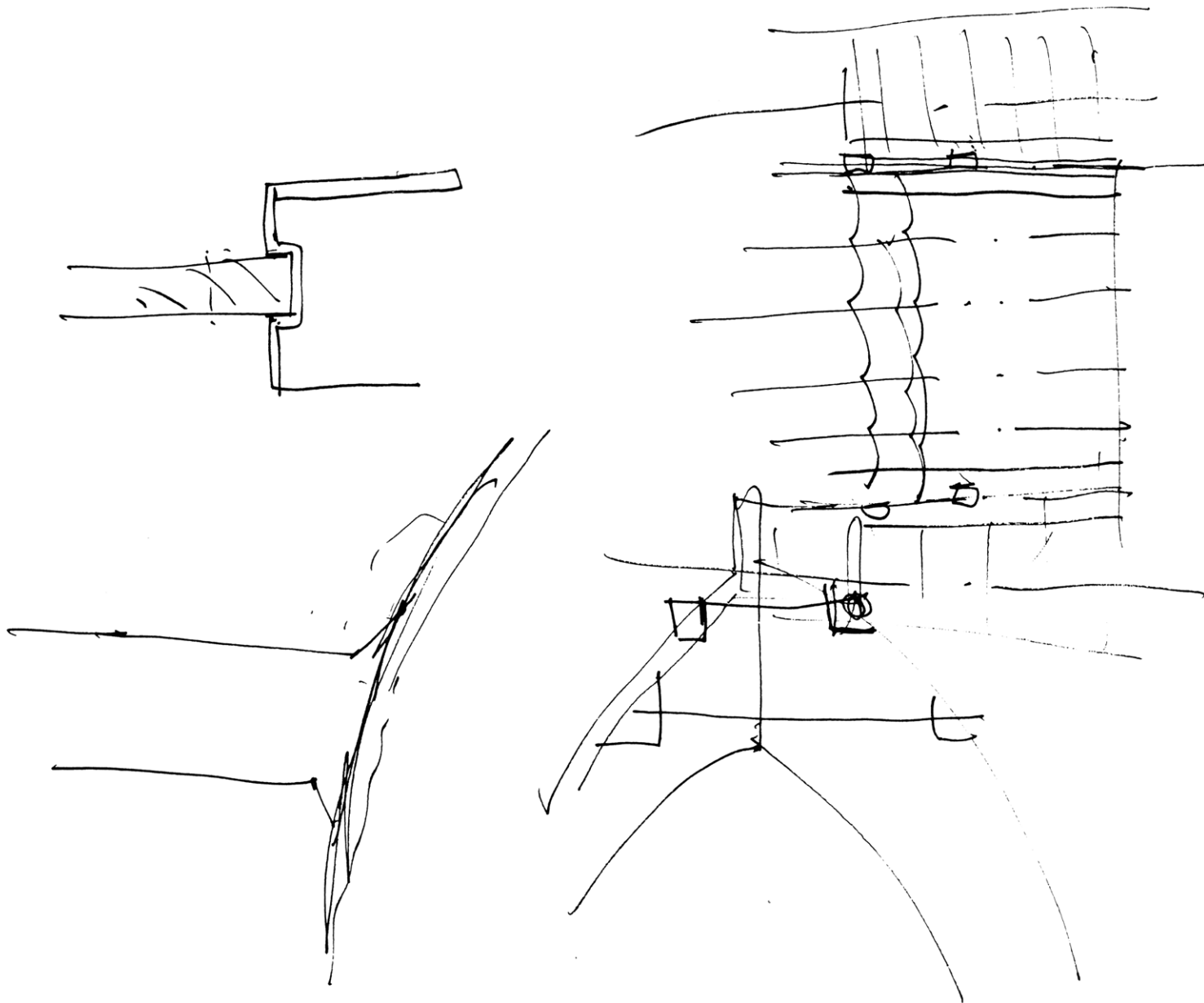
Drawing, for Rice, is a key factor in his relationship with architects. How architects draw and the way they use their drawings at the conceptual level, however, are less interesting to him than the drawings that are used after the conceptual stage of a project. This is because he looks on architecture, as he says, in terms of its mechanisms.

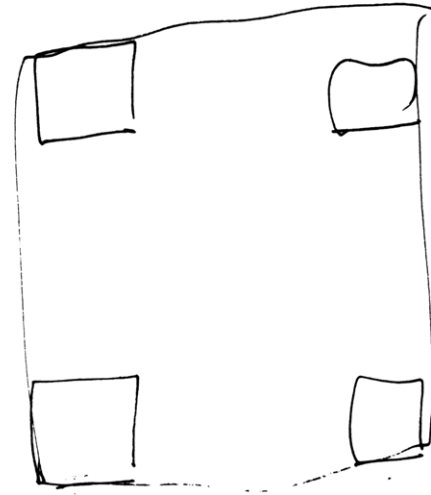
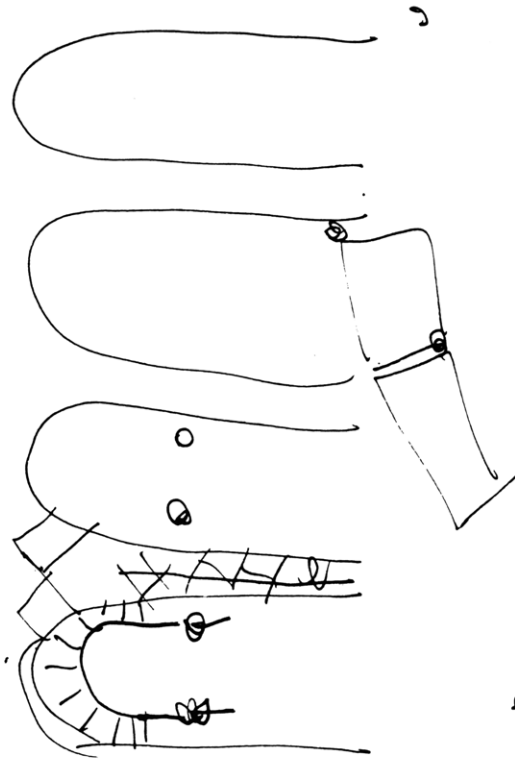
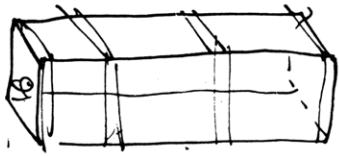
Nonetheless, Rice feels that the quality of architectural drawing given to engineers and builders is very important. It is the drawing that is often the instrument that provokes such people to respond to architectural ideas: **The way in which drawings are used by architects after the conceptual stage and the quality of these drawings does an awful lot to persuade even builders, people in the industry, to take ideas that they may not understand seriously.**

**A lot of what I do is individual at a certain level. I am an engineer who does a sort of design that becomes**

**an architectural feature, and part of that process is to look at individual structural ideas, the individual detailing and the structural pieces. I find that it is very important that kind of work be drawn very clearly. In relation to the other professions in the industry and particularly if you want to work with builders, building craftsmen, people who can put some of their own craft into the object, they become more interested when they see something that is well drawn. I guess it is a sign of respect.** Rice sketches at times, as we see in his work for the stadium at San Nicola in Bari, Italy (figures 138 and 139), and for the Pavilion of the Future at Expo '92 in Seville, Spain (figure 140). His principal method of working, however, is to construct things in his mind. The process by which what he develops in his mind is materialized as a design is very gradual. Before he can present a design to the architects, Rice feels that he has to communicate with the architects in a way that educates them. This education, so to speak, allows them to understand the purposes, advantages, and characteristics of a solution or element that he will suggest.

One of the reasons Rice doesn't draw a great deal is that he feels there are aspects of engineering, often little understood by architects, that are critical to the way buildings work but are not reducible to an image: **There is a fundamental element that I find is very little understood by architects, and that is the impact of one's physical**





140

**understanding of the way things work. . . . We have built into our perception a natural understanding of what is right and what is not right; what a correct structural image is. If you look at a bridge, you can feel a certain structural coherence, and that is something built into you, an understanding of things.**

**When you get outside that, when you change one of the parameters—if you make a bridge where the slab is not the size you naturally expect—that has an immediately destabilizing effect on the way you perceive something. That is the relationship between what you design and natural perception that is a fundamental ingredient I work with.** Architects are rarely aware of these relationships, Rice posits, because they have a strong tendency to think only in visual terms. In effect, drawing works, at times, to limit design because it prohibits architects from **entering a realm which enables you to create effects which are quite different from the proportions as seen in a drawing. One is often playing with elements which have a dimension other than how they might look in a drawing.**

**They [architects] use structure in the same way that they use other elements. That is, as part of a visual assembly. There are certain architects, for example, who are looking to make things lighter in order to make the visual impact of things lighter. But there is a point beyond which if you try to make things light you destabilize peo-**

**ple's ability to understand what is going on.** Rice points to the design of the Pompidou Center with its external elevator as an example. The elevator is hung from above, so it appears to be unstable. At one point in the design process, some of the architects on the project, although not all, wanted to hang the elevator with the lightest materials possible. Rice resisted. Eventually very heavy steel was used to give people a sense of stability.

When architects are using structure as a part of an architectural assembly, Rice argues, it is not so much that they are insensitive to the way people experience structure. Rather, in thinking visually, architects become involved in the visual organization and proportion of a building and not its materiality and making. This emphasis on the visual prevents architects from an awareness that as you move outside the normal framework of perception you immediately create another effect. To meet your visual objective, you need to base it on the material and structural nature of the building. You cannot achieve the effect you want by basing it on a visual representation alone: **I think that at times architects and designers are in some respects too detached from the process of building, and the drawing methods they use are very much an element of this detachment.** Because Rice feels that the nature of a building's reception is profoundly influenced by its structure and engineering, he refuses merely to act as a cog in the architect's wheel. Rather he sees his work as a parallel to that of the

architect but in a narrower sphere of action. Rice uses an analogy from music offered by a French architect whom Rice has worked with. What this architect said in effect was that the architect is composer and the engineer an inspiration. Rice goes on to say that he himself **designs primarily or almost entirely that part of the building that is engineered, whereas the architect uses engineering as a part of the total architectural image of the building or what he, the architect, sees as designing.** His interest, Rice adds, is what moves him to understand the nature of structural perception of a building. And this interest leads him to the conclusion that drawing, while an essential part of the design process for architects, misses a large part of what a building is about and how it is received by people: **To feel right in a building is a primary requirement for people at a certain level. Their perception of this has a lot to do with the lines of force working within a building. This becomes a difficult aspect of the modern idiom; that is, the light building.**

**In traditional buildings, the nature of the gravity forces were a visible part of the architectural image. That's one important part of the popular perception of things and is why I think people require the structure to have certain characteristics. I am interested in playing with that as a physical feeling rather than as an architectural image.** One of the great problems of modern structural design in building, for Rice, is that for the most part

our perception of structure comes from gravity loads. As buildings get lighter, however, environmental loads like wind, snow, earthquakes, temperature effects, and such become increasingly more important. These kinds of loads have little to do with the general shape of a building. Unlike a gravity load, which is visible, they are not. As a result: **I think that all these things, to go back to the drawing issue, are elements that drawing does not address. As a consequence of that, perception through drawing is going to be fundamentally flawed insofar as you have a structure as an architectural element.** The limits of drawing become even more pronounced when one addresses the differences between three dimensions and two dimensions: **One of the evident features of drawing, and photographs for that matter, is that they are always seen two-dimensionally even if they are meant to be three-dimensional images of things.** As a result, he argues, the relation between, for example, volumes and area is distorted by drawing: **If I draw an element that is 20 meters in diameter and I then reduce it to 15 meters because it doesn't look right in the drawing, that is a ratio of three-fourths in representational terms. In volumetric terms, it is a ratio of one-half. And that is what you see when you look at the building. You don't see it in the drawn plan. It is something that cannot be corrected by drawing.**

Rice does note that there are architects who are aware of such problems. And while he sees limits to draw-

ing, he does use drawings himself at times, even if differently than architects: **If you are an engineer, you have a feeling for what is physically right and it is that perception that you are grafting onto drawings. In my own method of working, I work all the time with notebooks where I draw. I sketch out diagrams of things that I might be thinking. They are always just diagrams of things.** As an example of how he works with architects, particularly an architect whom he respects greatly, Rice described a discussion he had with Renzo Piano over the roof of the DeMenil Museum.<sup>9</sup> **I'll try to explain how one decision was made. Renzo might feel differently. What is important to note is that my objectives in doing what we did are not the kind that are easily expressed in drawing.** When the roof, a key element in Piano's scheme, was initiated, Piano sent a scheme with a three-dimensional grid: **I received the sketches and my initial reaction to them was that they were too contained and that there was too much of a solution in the drawings. They did not leave the freedom to develop gradually as one's perception of what one was really trying to do technically with the pieces improved; all our knowledge improved.** What Rice proposed was a ductile iron frame that could be developed in much the same way as a concrete sheet. The key for Rice, in this process of design, was to produce a concept first that defined a discrete articulate element that could be separately developed and tuned as more was learned about

the design. In time, Rice's concept was accepted and became a key part of the design because it made it possible to provide certain types of light that Piano wanted in the museum. **The interesting thing for me is that I was uninterested in the final shape of the thing. I was only interested in the concept that we had to have something that could change over time. . . . That's not anything to do with drawing.**

In Rice's opinion, since conceptual drawings tend to look more complete than they actually are, drawings also tend to close out possibilities not described in the drawing. Thus he is, as a designer, much more interested in concepts free of the constraints of shape and form. There are, for him, physical characteristics that are better understood by thinking about what one is trying to do than by putting an initial shape or form to them. So when Rice draws—and he admits that he does not draw well—his sketches have all to do with ideas rather than forms. His way of working, he argues, has been successful with architects because **it leaves them free to put their own visual interpretation on it at a drawn level, because I am describing an idea, not an image.** What is more important is that Rice's approach forces architects to begin to understand how something works rather than how it looks, while allowing the architect to maintain control over the visual aspects of the design. But: **They are giving up control because in the end these elements, like the ferro-cement element in the**

**DeMenil, come out of the process rather than conscious aesthetic decisions.** But while asking architects to work in this way with him is important to Rice, he does note that **we are living in a time when architects have been handed an authority in design which makes them look on the engineer as an enabler. Many architects work from the basis that properly handled you can design and do anything, you can build anything. Within broad frameworks this is not wholly untrue. But of course working that way you lose out on the characteristics I am talking about.** Nonetheless, Rice realizes that it is up to the architect to choose when and how to allow him into the discourse about any project.

Many architects, he notes, use everything they can, and especially drawings, to generate an identity. Such reliance on an identity that is defined through drawing closes the possibility for new modes of communication and understanding. Most important, for Rice, is that drawing tends to reinforce what he sees as a simplifying approach to architectural design that architects often take. **In a way, this has partly to do with a kind of schizophrenia that exists in architecture today. Architects are both rooted in the past and part of our modern environment. The rooted in the past part has to do with the simplicity of the kind of building materials that were available and the kind of order that gave the whole building process.** Architects thus are caught in a dilemma. On the one hand,

they have a very traditional idea of what order is—an order that is based on the characteristics of materials that were available when this order was established. On the other hand, Rice points out, **when you get modern materials which enable you to do things that are very light, that are capable of expanding the art [of architecture], spanning and doing things that previous materials didn't do, architects wish to express this. But the expressions are often simplified to the same level as the ordered characteristics of things before. You get people talking about lightness, transparency . . . but they still want them to obey the same kind of natural principles that the previous materials obeyed.** Concepts like symmetry Rice sees as rooted in the way that architects learn to draw, and in the tendency he also sees in drawing in which “things you want to draw end up symmetrical.” But snow, wind, or other natural phenomena are totally asymmetric, and thus there is no particular advantage to symmetry.

In the shift to modernity and the possibilities it opens up structurally, the drawings produced by architects, for the most part, are a limiting instrument rather than a liberating one. This limitation is more marked for Rice because **architects are what I would call second-order draftsmen, just like engineers are second-order mathematicians.** As a result, in Rice's view, many architects develop a style of drawing based on what they know their limitations as draftsmen to be and never really depart from



it. Drawing in this way “is not a necessary element in architecture, as it is in art.” Drawing in architecture has become a kind of status symbol that Rice equates with a kind of manhood: **Being a good draftsman for an architect is a kind of sign that you know what you are doing.** The best architectural drawings from Rice’s perspective are those that are capable of advancing architecture because in a way they have no direct relation to the architectural object as such. He observes, for example, that a number of younger architects use drawing as a disconnected means of exploring things that could not be built as drawn.<sup>10</sup> What Rice sees in this type of drawing is an exploration of forms and shapes in the same way a sculptor might explore them. Following this, one has to define which among them might be realized. For Rice that is a dialogue carried out at the edge of what is possible. It is a kind of drawing that pushes architecture. To do this, Rice feels, you have to be a very confident draftsman. For the most part, though, **architects, because they try to draw things you can build, are actually, I think, constantly constraining, on the one hand, their ability to explore a concept through drawing and, on the other hand, the drawing itself. This is true even at the level of sketches.** While Rice generally emphasizes the limits of architectural drawing as it is used conventionally, he does see instances where the drawing is very useful: **I think there is another level at which drawing is a valid instrument, and that is at the level of exploring what I would**

**call movement. If you take a house, the way you go through it, the way you see that is actually something you can only explore in a plan. But that is not using a plan to say that the plan is good. It is actually a very internal means for the architect to decide whether what he is doing is actually right. It is an instrument for deciding flow.**

Although drawing is a most useful instrument of exploration and communication, Rice finds, ironically, that **I have more trouble with architects who draw well than with people who don’t. Mainly because people who draw well have less freedom to move outside what they have drawn. Once it is on paper it is a bit like an Englishman’s word: it is his bond.** The drawing in this instance limits an architect because it is too material and too concrete in a way: **An architect’s drawing is what he wants to do. It actually ties him down. He has comparatively less room to maneuver once he has put an idea on paper. I find that easy to understand as I don’t like moving away from my first idea either.** Ideally Rice would want a working relationship with an architect in which both try to work out through dialogue a set of ideas that would inform the project before setting anything on paper: **The first part of the exercise is about trying to talk around the problem, and that is not about trying to get something about the problem into your mind so it gets lodged in there. The idea should become with other people’s minds a party to a**

**process by which things get matured. Suddenly new ideas come out. I would like that part of the process to be done before too much drawing is done.** Such a process is exemplified in the work Rice did with Richard Rogers for a bridge over the Seine in Paris. Rice feels the process he prefers came about because **Richard had no idea what a bridge should look like. That was one case where that kind of process pertained happily. All that people could do was to talk about the problem and not actually visualize it. Even those people in the office who drew very well couldn't put pen to paper. The interesting part of the experience was that we talked much longer than we would normally. I felt it produced something that we couldn't have produced even remotely had we started drawing first.** This process of design opens up the discussion not only because it does not image the design too soon, but because it does not look at constraints like location first. Rather, the process Rice defines would first look at and, in Rice's words, "try to enjoy" the idea "of what is a bridge."

While Rice realizes that constraints are important in any design, and in most instances are essential to designing, what he is opposed to is constraining oneself too soon and inappropriately. Drawing is usually based on a set of constraints, and once an image is drawn it becomes a kind of constraint in its own right: **You've done something that just feels right and you are not even aware it is a constraint.** Rice believes drawing should be used as an instru-

ment for design, but later in the process than is conventional. Drawing should begin when one is well into the conceptual stage of a design: **After you have allowed yourself time to absorb the problems, so that your reaction to them would be much more mature. Things that come up might surprise you, and this would give this a chance to work. Then you begin to draw.** This does not mean that drawing is wholly unnecessary, but that much of it is done for reasons other than design necessity. **I think that part of our drawing procedure has become semiotic. It is much more about signs. You can't really read them, they are so full of this sign language.** The drawings often done for a project, Rice feels, are less about the building than about producing drawings that people like to look at. Rice sees this as unhealthy because architects will have less and less to do with architecture. Much criticism thrown at architects, for example that of Prince Charles, Rice argues, is misdirected. What the prince should have been complaining about is not the architects but the process by which more and more of the design of buildings is being taken away from architects. As developers have more and more say over building, Rice feels, **the architect is no longer deciding the building. He is clothing the building the same way a fashion designer clothes a model. . . . My own feeling is that drawing is the sinecure that an architect can use to make himself feel less guilty about the whole thing. But it is not ultimately the problem.**

**It is a sinecure because drawing enables the architect to concentrate on the visual side rather than on**

**reality [of power, money, and its influence on building].**

What is ironic to Rice is that by emphasizing drawing more and more to raise their status and to increase the possibilities for conceptual creativity, architects may “decrease both.”

What architects need to look at finally is the relation between drawing and language. Rice says that he has recently discovered that the discourse about drawing with French architects, in a language that Rice argues allows for precision, is defined by a different approach than that of English architects: **The French do drawings but they are always looking in their conceptual thinking for ways of describing them.** For some architects, drawing has become a way to substitute for a poverty of language. This has made drawing more important than it might otherwise be.

Given the problems that architecture faces today, it is imperative, Rice believes, that architects reengage society and not escape their responsibility by drawing alone. While drawing is a critical instrument in architecture, it has its limits. Drawing can get in the way of good design as much as it can produce it. Architects in rethinking the uses of drawing will at the same time be forced to rethink the very nature of the design process and the place of the architect in our contemporary world.

The issue, for Rice, is not so much whether his views are correct. Rather the issue is how to open up new and different ways of thinking about design. It is an opening that drawing, as it is currently understood and used both in the process of design and in the definition of who an architect is, Rice believes prevents.

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