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Building between sea and land

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BUILDING BETWEEN SEA AND LAND

by

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A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
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APPROVED, THESIS COMMITTEE

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ABSTRACT

Building Between Sea and Land

Peter Briggs Hoffmann

Addressing the perceived lack of figuration and organic expression in Modernist architecture and the separation of expression from tectonics in Post Modernist architectural work, this thesis examines the boat as an architectural artifact that may provide clues to a more complex relationship between man, nature, and technology. Specifically it provides ideas for the transformation of design and construction methods used to produce a boatbuilding museum and restoration facility on the island of Galveston, Texas.

The intent is to achieve a sense of constructional transparency in a skin and bones structure through literal as well as phenomenal revealing strategies. The design and construction process of the boat demonstrates ways of structuring the relationship between the measurable rational grid and the dynamic nongeometric forms and processes that are related to the changing natural environment.
Thanks

to Gretchen, who provided moral support
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INTRODUCTION

The aristocracies of the world have never doubted the supremacy of the home and garden and temple over all the baser mechanisms of existence, and the folk-civilizations out of which aristocracies have so often risen have never strayed far from these realities. In the Norse fables, the dwarfs are regarded as queer monsters, because they are always "busy people" who have no pride or joy except in the work they perform and the mischief they cause.

The great heresy of the modern world is that it ceased to worship the Lords of Life, who made the rivers flow, caused the animals to mate, and brought forth the yearly miracle of vegetation: it prostrated itself, on the contrary, before the dwarfs, with their mechanical ingenuity, and the giants, with their imbecile power. Today our lives are perpetually menaced by these "busy people:" we are surrounded by their machines, and for worship, we turn their pryer wheels of red-tape.

It will not always be so; that would be monstrous. Sooner or later we will learn to pick our way out of the debris that the dwarfs, the gnomes, and the giants have created; eventually, to use Henry Adam's figure, the sacred mother will supplant the dynamo. The prospects for our architecture are bound up with a new orientation towards the things that are symbolized in the home, the garden, and the temple; for architecture sums up the civilization it enshrines, and the mass of our buildings can never be
better or worse than the institutions that have shaped them.
Lewis Mumford,
Sticks and Stones

The gradual demise of Modernism and its machine-generated rationalism has signalled a profound change in how architecture is viewed. The writings of Post-Modernists such as Venturi have pointed to the lack of figuration and the unadmitted symbolic use of industrial motifs as the reasons for Modernism's failure. Venturi states the following in his summary of Learning from Las Vegas:

The progressive, technological, vernacular, process-oriented, superficially socially concerned, heroic, and original content of Modern architecture has been discussed before by critics and historians. Our point is that this content did not flow inevitably from the solving of functional problems but arose from Modern architects' unexplicated iconographic preferences and was manifest through a language--several languages--of form, and that formal languages and associational systems are inevitable and good, becoming tyrannies only when we are unconscious of them.¹

However, the response of Post-Modernism in the form of sheds decorated with pre-industrial symbolism has not resulted in an architecture that is any richer than the banal structures of lesser Modernist architects. What Venturi has given us is the ability to discover the
underlying lessons of the masters of the modern era by stripping away the superficial moral and rational justifications. Conversely, with these lessons at hand, it is possible to evaluate Post-Modern theory and work on a common ground.

This thesis proposes that a synthesis of Modern and Post-Modern ideas can result in an architecture richer and more meaningful that either theory alone. In order to do this, the idea will be advanced that the sailing yacht can function as a paradigm for this synthesis that establishes a more complex relationship between man, nature, and technology. This relationship is a crucial concern in a time in which man has transcended his need to dominate his environment as a species and is increasingly coming to the realization that he must adopt responsibility toward, and respect for, this environment to which his survival and well-being are ultimately linked. The boat will serve both as an abstract model of such a relationship in the design phase as well as a literal model for the transformation of a conventional building system.

The yacht was selected for two reasons. The first is that as a man-made object, the boat shares many concerns with architecture, such as aesthetics, form,
and structure. While these concerns may be judged to have different levels of importance in boat design than in architecture, there seems to be enough common ground between the two for comparison. The advantage, of course, is that the boat has been relatively isolated from the theoretical movements in architecture.

The second reason for selecting the yacht is that the boat seems to incorporate the ideas advanced in this thesis within a relatively compact structure with clear delineations.

The analysis of the boat is broken down into two parts: form and technology. While these categories do not include all of the considerations that will affect the final design, they do represent the forms of this thesis.

FORM

The conclusion in *Towards a New Architecture* states that:

> If we forget for a moment that a steamship is a machine for transport and look at it with a fresh eye, we shall feel that we are facing an important manifestation of temerity, of discipline, of harmony, of a beauty that is calm, vital, and strong.

A seriously-minded architect, looking at it as an architect (i.e. a creator of organisms), will find in a steamship his freedom from an age-
long but contemptible enslavement to the past.²

The significance of this passage cannot be overstated, for in it lies the key to radical changes in architecture. Le Corbusier, through his book as well as his buildings, helped open up a whole new world of forms that enriched an architectural vocabulary which was no longer capable of expressing changes in the relationship between man and nature.

The paragraph immediately following the above passage states that the architect only "prefer the majesty of solutions which spring from a problem that has been clearly stated."³ While Venturi might claim that this statement subverts the idea of a broadening of artistic expression by ascribing these forms to a deterministic process⁴, he is ignoring the essential aspect of Corbusier's plea, which is outlined by Peter Blake in *The Master Builders*:

...it was the formal quality of each object which interested Corbu. When Gertrude Stein said that "a rose is a rose is a rose," she meant that a rose was an object of beauty with inherent qualities of its own, not a symbol of something else, like love, or sentiment, or early summer. In his paintings, Le Corbusier said, in effect, that "a cube is a cube is a cube"--and never mind what the cube (or cylinder or sphere) might happen to represent. "Eyes that do not see" became one of Corbu's most insistent laments about his contemporaries;
what he was trying to recreate in his paintings and drawings was the appreciation of forms for their own sake, and specifically, the appreciation of a new order of forms.5

The essence of this argument is that Le Corbusier provided us with a wider variety of tools in terms of form with which to express ideas about the relationship between man, nature, and technology.

While Venturi's assertion that Le Corbusier favored the industrial forms over the historically architectural because of the unadmitted symbolism of the industrial prototype6 may be correct, this does not invalidate the introduction of these forms into the architectural vocabulary.

Looking at the model of the sailing yacht, it is obvious that it possesses the same beauty of form that the steamship does. Yet its roots are not found in the machine age but rather in a tradition of craftsmanship. Therefore, despite lacking the industrial symbolism, its beauty and meaning are not invalidated. Instead, the form of the boat points towards basic meanings in nature. Just like many historical architectural forms were derived from the process of overcoming gravity and elaborations thereof, the boat form relates to other less static forces in nature that have come to play a part in architecture as a result of technology.
that has made the conquering of gravity less important (steel, trusses, etc.).

This does not mean that symbolism does not play a role in the use of form. Rather, the symbolism of new forms should be allowed to develop within the realm of man's creations in order to provide any expanded vocabulary for architecture to investigate the relationship between man, nature, and technology.

Even within the variations of yacht form, symbolism does exist. For example, the raised afterdeck of a Spanish galleon is transferred to a small sailing boat. But, like applied decorative dryvit orders, this is a shallow symbolism. A more important symbolism is achieved when nonfunctional decoration is applied in a manner which reinforces and adds to the form of the boat.

Coming back to a design problem, there are two choices in how to allow boat symbolism to enrich a building. One is to tack a decorative fiberglass stern of a galleon onto a shed. This will scream "boat," but its significance will not go far towards explaining what "boat" is about. However, if the form and other aspects of the boat are allowed to inform how the shed is built, the result will not necessarily be a duck, which Venturi claims is the result of a process in which "the architectural systems of space,
structure, and program are submerged and
distorted by an overall symbolic form,7
but, instead, a richer, more complex shed.

In this case, the shed, transformed
by references to boat form, would begin to
abstractly symbolize man's struggle with
his relationship with nature positioning
itself somewhere between the separation
of man and nature symbolized to some
degree by Le Corbusier's pre-organic
architecture such as Villa Savoye and a
merging with nature expressed in Frank
Lloyd Wright's organic architecture.
Adding denotative signs, implying specific
cultural references rather than broader
connotative ideas, to this form need not
destroy it as Venturi implies when he
stated that "you can't paint on Mies,"8
but rather adds depth and specifics that
explore the underlying meaning, in this
case, relating to man's historical
relationship with the sea.

Thus, within the form of the boat,
we find two levels of meaning. One is
that it works--as pure form, as a
structure that has inherent beauty to us
as human beings. A fish is not beautiful
because it is a recurring symbol in Frank
Gehry's architecture, but because it
simply appeals to a basic human sense of
aesthetics. A fish is a fish is a fish.

The second level of meaning is that
the form of the boat itself can also carry
significance. The shape signifies a history of man's relationship to the sea through boats. It signifies laws of nature such as hydrodynamics that we often can only intuitively understand. And, like the classical orders, it can accumulate significances through time that become further elaborations of its original meaning.

The two or more levels of meaning are not exclusive of each other. Rather, an object acquires a greater richness when many levels are present. But when higher levels of significance are separated from those below, as occurs in the work of Post-Modernists like Venturi, a certain aspect of inauthenticity manifests itself. A Doric order separated from the shed and rendered in fiberglass has a certain novelty value, but in the end, it is shallow and insignificant.

When the form of the boat is used to transform a shed (that is, a museum about boats and, indirectly, man's relationship to the sea), it will be more meaningful if it actually alters the shape of the shed as well as supplies signs to be applied to the shed.

Another aspect of form that is critical to this discussion is that of scale. Peter Blake writes that:

One of the eternal rules of great architecture is that it must stand up, visually, from two vantage
points: from far away, and at close quarters. All great buildings of the past looked well at a distance; their over-all form tended to be simple, somewhat diagrammatic, clearly understandable. At closer quarters, however, the importance of the over-all silhouette would be diminished and the eye would search for new points of interest--smaller-scale detail. The masters of the Acropolis, of the Gothic, and of the Renaissance all knew this truth. Only in recent years has it been forgotten, for much modern architecture looks simple and clear at a distance, but only flat and somewhat dull at close quarters.

In the Winslow house, Wright showed how clearly he understood this principle. For the over-all silhouette of this house is sharply defined, clear, and simple. Only as you approach its front door do the different wall surfaces reveal something new--an intricate play of ornamental detail, a richness of texture quite unexpected from so severe-looking a block. Sullivan, of course, knew the secret of scale-giving ornament and applied it to perception in his Guaranty building. But even Sullivan never applied it better than Wright did in the Winslow house. 

The sailing yacht embodies these principles and works successfully at both scales. From afar, the eye perceives the forms of hull and sail only. At this level, comparison can be made to the Corbusier pre-organic architecture. Corbusier makes the following statement:

Architecture is the masterly, correct, and magnificent play of
masses brought together in light. Our eyes are made to seek forms in light; light and shade reveal these forms; cubes, cones, spheres, cylinders or pyramids are the great primary forms which light reveals to advantage; the image of these is distinct and tangible within us and without ambiguity. It is for that reason that these are beautiful forms, the most beautiful forms. Everybody is agreed as to that, the child, the savage and the metaphysician. It is of the very nature of the plastic arts.\textsuperscript{10}

This assertion is demonstrated by his Villa Savoye. However, as one draws near the building, the singularity of scale becomes problematic.

Blake comments that

...some of the Machine Art men found themselves in real trouble because it became more and more difficult for them to produce buildings with sharply defined silhouettes. A soon as you begin to have roof overhangs, recessed panes of glass, projecting window sills, the silhouette of your "pure prism" becomes considerably less pure and considerably less prism-like.\textsuperscript{11}

The attempt to maintain the purity of form at close range led to a lack of details that partially led Venturi to state that "less is a bore."\textsuperscript{12}

Wright understood the problem and, like Sullivan before him, looked to nature for the solution to his problem. His often elaborate detail, disconcerting to
European architects who were introduced to his works by Wasmuth's *Executed Buildings and Projects by Frank Lloyd Wright*,\textsuperscript{13} was based on the fact that

...he never forgot for a moment that architecture comes alive only when it becomes more than a diagram. Much of the work produced by the International Style has tended to be diagrammatic and flat; Wright's work has never been either. In a Wrightian building there was always enough detail to hold the observer's interest all the way, at a distance as well as at close quarters. There was always that subtle transition from the kind of space in which the individual would feel at home—low-ceilinged, lit from above, and monumental. What Wright gave to architecture was really this: a way of dignifying the individual in an architecture for a mass society.\textsuperscript{14}

The same is true for the sailboat. In closing in, a richness of detail materializes from the once simple forms. While they are not as directly derived from nature as the forms of Sullivan and Wright were, they nevertheless create a connection between the larger form and the human being. These smaller scale forms, like the rigging, the texture of the deck, and other components of the boat, do not destroy the larger form, but rather they are always related to it and enrich it. Le Corbusier, in his later organic phase, addressed the problem of the scale by moving away from his attempts to create
machine-like finishes, devoid of scale, towards rougher textures which left

...the imprint of man on an architecture of the machine age—the imprint of man's hands in the rough formwork, and imprint of man's scale through the Modulor...15

In contrasting the sailing yacht and Corbusier's apartment block in Marseilles, it seems however, that Le Corbusier did not go far enough. Unlike the balance and synthesis between large and small scale form found in the yacht, the apartment block is still dominated by the larger form. Venturi writes the following:

Articulated architecture today is like a minuet in a discotheque, because even off the highway our sensibilities remain attuned to its bold scale and detail. Perhaps in the cacophonous context of our real landscape we are impatient with any architectural detail at all. Furthermore, sensitive articulation is an expensive luxury best eliminated before the bids come in. The two-foot cantilever on the face of a building, put there to suit a sensitive nuance of the program discerned only by the architect, is a hangover from more stable times. Today programs can change during the course of construction. We cannot afford too-literal conjunctions between form and transient functions. In sum, while today's forms are too sordent for their function in our environment, today's details are too sensitive for the timbre of our environment. However, at the
opposite extreme, there is an individual need for intimacy and detail, unmet by Modern design but satisfied by the five-eighths scale reproductions in Disneyland, by the caricatures of human scale in the patios of garden apartments, and by the seven-eighths scale furnishings of the fancy interiors of Levittown model homes.16

Again, the sailing yacht seems to be a good example of a man-make object that achieves the synthesis of large and small scale which is the hallmark of successful architecture and is found in infinite variations in nature. This synthesis found in the work of Wright and in the boat addresses Venturi's criticism concerning Modernism's lack of human detail without resorting to the application of detail rich in symbolism but devoid of a relationship to the underlying structure.

To summarize, the sailing yacht serves as a catalyst for three ideas regarding form. One is that new forms derived from fields outside of architecture are essential for the creation of an architecture that is concerned with man's relationship to his larger environment. These forms should not be rejected because of their initial symbolic associations (i.e. Le Corbusier's early relationship with the Modern art movement); rather, they should be
critically included in an architectural vocabulary that has to deal with the issue of man's relationship to nature. Mankind no longer is threatened by nature, but instead is threatened by its disregard of the fact that it is part of nature. Second, these forms should not be disassociated from the art of building and be applied to generic sheds. Jorn Utzon's Sydney Opera House is more significant and timeless than almost any recent decorated shed.

Third, as with the boat, there must be a synthesis of the different scales of form related to the perception of the object from different distances.

However, the use of the boat as a model does not end here. Its full potential is demonstrated only by including a discussion of technology.

TECHNOLOGY

Architecture may be ordinary—or rather, conventional—in two ways: in how it is constructed or in how it is seen, that is, in its process or in its symbolism. To construct conventionally is to use ordinary materials and engineering, accepting the present and usual organization of the building industry and its financial structure and hoping to ensure fast, sound, and economical construction. This is good in the short run, and the short run is what our clients have largely retained us architects for. Architectural theories of the short run tend toward
the idealization and generalization of expediency. Architecture for the long run requires creation, rather than adaptation, and response to advanced technology and sophisticated organization. It depends on sound research that may perhaps be promoted in the architect's office but should be financed outside it, because the client's fee is not adequate for and not intended for that purpose. Although architects have not wished to recognize it, most architectural problems are of the expedient type, and the more architects become involved in social problems, the more this is true. In general the world cannot wait for the architect to build his or her utopia, and in the main the architect's concern should belong not with what ought to be but with what is—and with how to help improve it now. This is a humbler role for architects than the Modern movement has wanted to accept; however, it is artistically a more promising one.17

While Venturi is correct in asserting that architecture often has to work within existing building systems, his separation of architecture into how it is built and how it is seen eliminates a level of richness that can be achieved by the manipulation and synthesis of building and expression.

One only has to look at some of Frank Gehry's work, such as the remodeling of his own house, to find a rich play of structure, materiality, and applied decoration in the service of architectural expression. Furthermore, Gehry works
within budgets that are comparable, if not lower than, those of other "expedient" projects. The sailing yacht shares some characteristics with Gehry's work in the expression of structure, materiality, and the place of decoration that are crucial to this thesis.

Starting with structure, there are similarities in the play between structure and skin in the boat, and Gehry's house. This selective revealing could be termed erotic in the sense that it falls between the structural exhibitionism or pornography (or morality, depending on one's viewpoint) of orthodox Modernism, and the suppression of structure in favor of pure skin (the inflatable sex toy) of the classical plaster-covered steel structures of the 1893 Columbian World's Exposition, or, more recently, the decorated sheds of stylistic Post-Modernists like Venturi.

What Gehry's house revocation makes clear is that by bringing the architectural imagination to bear on standard construction systems, one can effect transformations that create a richness of meanings within the structure of Venturi's shed. What separates many of Gehry's projects, as well as the sailing yacht, from the shallowness of expression found in a building like the Guild House by Venturi, is the selective and
controlled revelation of structure. This provides a connection between the forms and decorations of an object, and its underlying constructional reality. One should not assign morality to structure, as Mies did in his search for meaning that Blake describes as

...an endless process of purification and crystallization of an idea—until that idea becomes so disarmingly simple, so overwhelmingly "obvious" that it must, according to Mies's beliefs, represent the ultimate truth. His famous saying—"less is more"—is not only typical of Mies as a man of few and well-chosen words; it is also descriptive of the method by which he works, a method of distilling ideas to the point of ultimate purity.18

However, structure is an essential element in understanding a building.

Gehry selectively strips away the plaster covering of the structure his house, revealing the underlying systems that support the plaster forms. In the process, the plaster itself is revealed to be a real material, no longer a plane of indeterminate materiality and origin. This process of revealing does not carry moral overtones of structural logic but rather seeks to include structure as an additional layer of meaning, making connections between elements of the house that otherwise would stand in simple isolation.
In an interview with Peter Arnell, Gehry describes his rationale for expressing the structure in his buildings:

When you start looking at buildings, when you start being interested in architecture, you walk down the street and you say, "Oh look at that great structure. Isn't that great? Too bad they can't leave it like that." How many times have you heard that in your life? Buildings that are just done by ordinary people--they look like hell when they're finished--but when they're under construction they look great. So that's part of it. Another is that I look at painting a lot...There's an immediacy in paintings, you feel like the brush strokes were just made. I think about paintings all the time, so one part of architecture that I felt an interest in exploring was how to bring these ideas to buildings. The tradition of Mondrian's paintings affecting architecture is an old story. I wanted to see what else we can learn from paintings. In particular, how could a building be made to look like it's in process? And how can the expressive and compositional attitudes of painting be explored in a building? That's what led me to explore opening up the structure and using the raw wood techniques and developing buildings that look like they just happened. They look like in the normal building process somebody just stopped.19

Gehry's preoccupation with the process of construction is echoed at an abstract level in the finished sailboat. While the physical demands in terms of water-tightness make it necessary to cover the structure almost completely with an
impermeable skin, the underlying structure of ribs, which is the manifestation of both the construction process and the structural need to pick up and redirect the force of the water, is almost always revealed in subtle ways that allow a comprehension of the building process and of its relationship to the finished object. For example, the ribs of the boat are often exposed in a narrow strip between deck and coaming. This revealing of the structural rhythm of the ribs is enough to suggest the existence of the ship's ribcage that would otherwise be covered by planking and decking. Inside the boat, the ribs are again exposed selectively. In addition, the rhythm of the frame is used to control the location of bulkheads (walls of sorts) and other interior constructions. The result is a complex environment that is enriched by a synthesis of the boat's structure with the more plastic and occasionally decorative forms of the cabin's furnishings.

Of course, the expression of structure does not have to be literal in order to enrich the built object. Mies himself demonstrated this with his Lake Shore Drive Apartments. Blake makes the following comments:

The structural expression Mies chose for "860" is unusual and original in the extreme. While the buildings are steel-framed, the
Chicago building code required the steel to be fireproofed with two inches of concrete all around. If Mies had just left his buildings as a "bare" fire-proofed structure, he would have had two vertical cages of concrete filled in with glass. The result would have been an indeterminate building, neither vertical nor horizontal, for the column and beam pattern would have created a series of horizontal rectangles twenty-one feet wide and about nine feet high, while the complete facade itself would have been decidedly vertical.

To avoid this visual conflict, Mies finished all his concrete-covered columns and beams with black steel plate, and then welded on to this black steel plate a pattern of slim, vertical I-beam rails eight inches deep, which soar up from the second-floor line of the building in a pattern of closely spaced vertical strips all the way up to the roof line 250 feet above. These slim rails give the facades a fluted appearance that suggests the vertical fluting found in the late Gothic cathedrals. They make the "860" towers the most vertical-looking skyscrapers ever built.\textsuperscript{20}

In the boat, a similar indirect indication of structure is often used. Often, the fastenings used to attach planking and decking to the frame are left exposed, thus visually tracing the lines of underlying ribs.

This kind of detail is symptomatic of another dimension shared by Mies and the ship designer. Because the details and connections of the structure are often
revealed, they are in fact designed. This does not mean that they are over-elaborated so as to draw attention to themselves, but rather they are designed in a way that respects the forces imposed on them as well as the material of which they are made. For example, where the decking meets an edge that is at an angle to it, that edge is cut in a sawtooth pattern so that the individual planks may butt into it at full width. While a detail such as this may reflect an emphasis on craftsmanship that is not possible in most architecture, it reflects a clarity and level of consideration that are.

In the end, a play between structure and skin, and the careful consideration of detail, will establish a more complex relationship between the user and the object. Michele Benedikt writes in For an Architecture of Reality that

Significant buildings, real buildings, are achieved rather than provided. They are built over time by someone rather than arriving all but ready-made by strangers. Thus we should not be surprised at how often anonymous buildings, provided by government or "housing authority," or provided by corporations, are neglected, vandalized, or just suffered and ignored.

Buildings with significance show a fundamental seriousness—even when they are "follies"—and a sense of magnitude independent of their actual size. Their good workmanship
forms a bond, in the manner of a gift, between the designer/owner/builder and the user, no matter how modest the scale and materials. Effort, care, ingenuity (rather than cleverness), knowledge, ambition--these traits of its creators "come through" in a building and tell us how it is to be taken.21

Structural expression is not a moral imperative that should dominate, but neither should its expressive and explanatory dimensions be eliminated from the vocabulary of architecture in favor of symbolic applications from other times. This does not mean that symbolic ornament should not be part of the object, merely that it should be integrated with the object, as these illustrations show. Most of the ornament on the sailing yacht tends, however, to be more abstract and in the spirit of the following passage by Blake:

Wright's geometric ornament in Unity Curch was intimately, "organically," related to the structure, to the different volumes within the space, and to the manner in which these volumes might help him manipulate the space within.22

The use of materials is the last aspect of the yacht that needs to be examined. The modern sailing yacht often is constructed of a bewildering variety of materials, ranging from wood to more
exotic materials like Kevlar and carbon fibers, yet a successful and organic synthesis of these materials is usually achieved. The use of materials is characterized by two concerns. The first is a critical evaluation of materials regarding their fitness for specific purposes, ranging from serving as structure to the fulfillment of tactile demands. The second is a tradition of experimenting with new materials and incorporating them into the palette.

Examining the first concern reveals that the demands which are placed on materials range from the almost purely structural to the almost purely tactile and poetic. Beginning with the hull and the sail plan, it can be seen that the use of material is basically determined by the structural characteristics of the materials. The hull of the boat is generally constructed out of fiberglass combined with such space-age products as Kevlar and honeycomb sandwich. The mast and beam are generally made of aluminum while the stays that hold it up consist of high-strength steel. The sensory characteristics of these materials are not very important, as they are generally perceived from a distance.

One exception to this is the sound that a fiberglass hull makes when driving through a wave. The common complaint made
when hull construction shifted from wood to fiberglass was that this sound was no longer satisfying. Aside from this, the only sensory demand on the hull is that it be smooth. Moving to the deck of the boat, the naval architect is confronted by a more complex set of demands. While retaining the need for structural strength, new visual, tactile, and auditory demands have to be met. From a functional standpoint, a fiberglass deck would be optimal, but the requirements of man and machine are not the same. Because of this, decks are often built of wood which causes some reduction in structural strength but provides a wealth of textures sounds and associations (to nature, traditional sailing craft, etc.).

Finally, in the cabin itself, structural demands are at their minimum while the sensual and poetic demands are at their maximum. Wood, along with fiber, dominates the palate of less synthetic material. As Benedict explains:

Part of our appreciating the materiality of an object has to do with our appreciation of the natural origin of its substance and the manufacturing or forming processes that the latter has evidently undergone. New and very synthetic materials are confusing in this way: neither their origin nor their forming is readily perceivable. This makes materiality the component of realness most often implicated when something is judged to be
"fake," though the term applies also, in more difficult-to-discuss ways, to the other components.23

The other aspect of materiality in sailboat construction that is of interest is the tradition of experimentation. While the severe demands of the sea do not allow much room for error in the selection of materials, boatbuilders have traditionally been innovative in the application of new materials and processes for the working of materials. An analogy may be drawn to the work of Frank Lloyd Wright in this regard. Anthony C. Antoniades asserts that

Wright did not hesitate to experiment. In fact, he remains unique for his inventions. The concrete blocks and the reinforcing methods he devised for several of his houses, along with his attitude toward the use of new materials produced by industry, demonstrate an architect open to possibilities, eager to solve broader problems, for whom materials are conceived as molecular problem-solving devices. His concrete blocks were employed to solve problems of low-cost housing and construction efficiency.24

Perhaps one of Wright's most interesting uses of new materials occurred during the design of the Johnson Wax Building. Here Wright used Pyrex glass tubing for his fenestration in order to meet both the fundamental requirement of
diffuse light as well as the aesthetic requirement for horizontal banding. The point is that Wright and many ship designers were open to transformations of technology through the use of new materials.

While Venturi may be partially correct in asserting that the architect's fee is not adequate to finance "sound research" of advanced technology, the fact remains that both boatbuilding as well as architecture have a tradition of experimentation with new materials at a less scientific yet valid level. The transformations that occur as a result of this often enrich the built object in unforeseen ways.
DESIGN PHASE

The goal of the design phase of this thesis will be to integrate the ideas presented thus far into the development of a combination boat restoration facility and museum. As outlined, the boat will serve both as an abstract as well as a literal model for the transformation of a shed structure through form and technology. The objectives of the design will be to express aspects of man's relationship with nature as well as the role of the boat as a technology that establishes a more specific relationship to the sea. The desired result is a building which synthesizes constructional concerns with expressive ones in order to achieve a high level of architectural richness.
PROGRAM AND SITE

The proposed building is a structure that combines both boat restoration facilities as well as a museum for the display of artifacts related to shipbuilding on the Gulf Coast. The program has been derived from interviews with the head of the Galveston Seaport Museum as well as the study of the Maine Maritime Museum which is considered a model facility for the museum component.

Basic demands include the extensive use of controlled natural light, suitability of exhibition spaces for flexible exhibit design, availability of sufficient restrooms and other facilities for fundraising functions. Visual connections to living displays surrounding the museum (including the museum owned tallship Elissa, working boats, and other vessels docked in proximity as well as the Todd Shipyards across the water on Pelican Island). Other essentials include the provision of storage space for larger artifacts, as well as educational spaces in the form of classrooms.

Since the facility is largely financially self-sufficient, relying on gate receipts and fundraising, cost of building is important. A rough breakdown of the program is as follows:

| EXHIBIT SPACES       | 6000 sq. ft. |
| WORKSHOP             | 4000 sq. ft. |
| STORAGE              | 4000 sq. ft. |
| THEATER/CLASSROOM    | 1200 sq. ft. |
| GIFT SHOP            | 700 sq. ft.  |
| OFFICES              | 1000 sq. ft. |
| RESTROOMS            | for 200 to 300 people |
The site is on what is called Pier 21 on the bay side of Galveston. Located two blocks from the historic Strand which features a collection of Victorian cast iron structures, the site stands between the city itself and the industrial areas lining the bay. Because of its location, Galveston is frequently hit by tropical hurricanes, which in the past have destroyed large percentages of the structures on the island. The city responded to the hurricane of 1900, which killed over six thousand people, by raising the entire city seventeen feet above its previous elevation as well as building a seawall to protect it from the fury of the ocean. The site is surrounded on three sides by docking facilities and is directly across Pelican Bay from the Todd Shipyards.
JURY COMMENTS AND CONCLUSION

Thesis Jury was held in the Parish Gallery on April 20, 1991.

Jury members:

Thesis Committee: Spencer Parsons
Peter Waldman
Danny Samuels

Outside Jurors: Judith Wolin
Jim Williamson
Mark Wamble

Faculty: Alan Balfour
William Cannady
Mark Linder

Presentation synopsis:

The Thesis started as a criticism of both the separation of tectonic issues from the expressive content of architecture seen in the preponderance of the decorated shed as well as the celebration of the machine ideal of modernist constructions. In an attempt to engage the poetic possibilities of tectonics in a field dominated by rationality and standardization, the boat was chosen as a catalyst for the transformation of design and construction methods. The boat was chosen because as an architectural artifact it represents a system that synthesizes both the static qualities of grid and order with the dynamics of its function in a constantly changing natural environment. In order to achieve a similar richness in a building,
the design and conxstuction process of the boat was examined in order to abstract principles that could be transferred to a building that had to respond to a different set of problems relating to its function as an educational facility as well as its siting.

The site in Galveston further set up the relationship between the static and dynamic. Galveston is essentially a grid superimposed on a bar of sand that moves and changes constantly in response to hurricanes and tides. The attempt to maintain the order of the grid against the forces of nature is a constant struggle that shapes the character of the city. The physical manifestations of this struggle can be seen in the seawall and its attempt to stabilize the shape of the island as well as in the fact that the entire city was raised seventeen feet to prevent it from being submerged by storms. The specific site of the project is Pier 21 on the bay side of the island. This pier is historically important in that it was the center of commerce and immigration when Galveson was the largest port on the Gulf coast.

The traditional boatbuilding process begins with the carving of a wooden halfmodel, the shape of which is based both on scientific principles as well as the intuition of the designer. This form
is then subjected to measured cuts that allow its section to be plotted at specific points, generating a set of drawings. These drawings are then expanded to full size molds in a process called lofting. These molds are then set up on a measured beam or surface called a strongback which also often doubles as the keel. Stringers are then bent around these molds to recreate the shape of the halfmodel at full scale. Ribs and planking are then successively added to complete the process. This process was adapted in the project as a set of braces stiffening the building against wind forces. These braces had to respond to different spatial configurations over the length of the building resulting in a constantly changing geometry set between the utter rationality of the gridded translucent wall on the east and the dynamic undulating forms of the western side. The braces stabilize the building physically yet destabilize the interior spaces visually. The dynamic/static conflict in the building is further developed in the way light is let in. North-east light, diffused by translucent panels on the east side of the building is juxtaposed with direct sunlight entering the building through glazed areas on the west side. Materials are subjected to the same logic, with kalwall (where the
transormation processes undergone are no longer readable) making up the eastern skin, and copper (which changes as it ages) the western. Materials inbetween display both characteristics in an analogy to the bracing of the structure.

Jury response.

Criticism of the project mainly focussed on the perception that the process generated from the analysis was not followed through fully in transforming the building. Specifically, the finished building was seen as still being comprised of a boat and a shed as opposed to synthesizing them into a less recognizable entity. (Jim Williamson claiming that it was basically a shed with bumps on it.) This failure to work more intensely with elements that could be seen as common ground such as gable/keel was perceived as a large lost opportunity. While I agree to a certain extent that the overlap could have been better developed, I maintained that the setting up of opposite conditions (represented by the east/west sides) is vital to the project in terms of understanding the project in its context and providing a constructed framework that makes the intellectual framework comprehensible. The strength and goal of the project was not the attempt to form
something new out of disparate conditions, but rather to illuminate and use the structures that mediate between them in order to make sense of the context (from city to individual building element). Part of the problem may have been in the presentation (both verbal and the use of a model which was too focused on external appearance) which could be seen as overly simple.

A similar criticism was expressed later claiming that the jump to image was premature and thus interfered with a logical development of the process. This again may be true to a certain extent, but in retrospect what may have been more problematic was the jump to parti. The essential disposition of spaces was established relatively early in the process and this may have cut off too many possibilities later. A related point was made that problems were invented to justify means. Some of the problems cited were economy (craftsmanship vs. industrial process) site and parti. Again my feeling is that if the process had been devoid of restraints the project would have lost significance. This is related to my initial critical position regarding the decorated shed which in many ways is a result of economic and pragmatic restraints. In trying to affect a transformation of a standard solution to a
problem it would be irresponsible to tamper with the conditions of the problem. So while the keeping of certain pragmatic constraints may have kept the design process from developing fully it also strengthened it in relation to the original problem formulation.
NOTES


3. Ibid

4. Venturi, p.133.


10. Le Corbusier, p.29.


15. Ibid, p.143.

16. Venturi, p.139.

17. Ibid, p.129.


22. Blake, p.333.

23. Benedict, p.44.


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