FROM BOX TO PAVILION

VARIABLE ENCLOSURE AS A STRATEGY FOR MAKING DWELLINGS IN FLORIDA

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Submitted in Partial Fulfillment of the requirements for the Degree of
Master of Architecture at the Massachusetts Institute of Technology
June 1981

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MAY 28 1981
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By STEVEN JOHN BOYINGTON

Submitted to the Department of Architecture on May 15, 1981 in partial fulfillment of the requirements for the degree of Master of Architecture

This thesis explores the design of dwellings which respond to the warm, humid climate of central Florida. The central hypothesis is that a house should change with the seasons; through the use of variable enclosure the house can close up into a mechanically conditioned "box" during uncomfortable weather and open up as a "pavilion" during pleasant conditions.

The thesis begins with a brief explanation of some characteristics of Florida's climate. This is followed by a discussion of some dwellings which have also used the "box and pavilion" strategy. The major portion of this work presents a collection of reference patterns for creating dwellings for warm, humid climates; there are examples to show how these patterns were incorporated into my design exploration. Finally, the thesis closes with a brief review of the references and a comparison with the product of my design exploration.

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ACKNOWLEDGEMENTS

Of the many who have assisted me in this study, the following deserve special mention:

Todd Rose, for encouraging me to choose a topic that can be of use in future work;

Barry Zevin, for helping me to define the scope of the exploration and maintain a focus on the issues;

Donna Barbaro, Michael Raphael, and Hiroshi Yoneyama for their advice and companionship during the process of the work;

and my wife, Carol, for her support and encouragement, albeit long distance.
1. "Variable enclosure"
INTRODUCTION

Prior to the widespread use of air conditioning, residents of warm, humid regions of the United States such as Florida had few means of adapting to the thermal discomforts of their climate. Primarily, they opened their houses to the surroundings and waited for cherished cool breezes. Their counterparts to the North had an easier time in dealing with climatic incompatibility; they could close up their dwellings and use fire, in its many applications from the wood stove to the steam boiler, to warm the interiors. The residents of Florida possessed no counterpart to fire in order to deal with the discomforts of their climate. There was no way they could both cool and dehumidify the interior of their dwellings upon demand.

In the southwestern United States, a warm but dry climate, building materials could be used to alleviate thermal discomfort. Mass construction was used to absorb the daily heat load before it reached the interior of a dwelling; at night, this heat was dissipated to the clear dark sky which acted as a natural heat sink.

In Florida, the night air is heavy with humidity which retains the day's heat and obscures the sky, preventing it from absorbing excess heat. Only after the invention of mechanical refrigeration did the residents of warm, moist climates achieve the ability to significantly alter the internal environments of their residences. Air conditioners allowed these residents to not only lower interior temperatures, but more importantly, to remove the water vapor from the air, dramatically increasing thermal comfort.
The widespread use of air conditioning greatly increased the number of people who desired to live in Florida and had a large impact on the dwellings they inhabited. Previously, those who chose to live permanently in Florida adopted a lifestyle and type of building that allowed them to enjoy the benefits of Florida's climate and endure its problems. Those who were wealthy enough, lived in Florida for only part of the year, during the cooler seasons, and retreated to their northern homes in the summer. Air conditioning allowed people to isolate themselves totally from the external environment throughout the year and create any desired microclimate within the walls of their residences. The latest generations of Floridians can be totally oblivious to their natural environment; except when they dash between air conditioned buildings and air conditioned cars or during an occasional weekend on the beach, they need never experience the native climate. Accustomed to relatively constant thermal conditions, these residents no longer have the ability to acclimatize themselves to the hotter periods of the year nor can they derive pleasure from the milder seasons.

During the early 1970's as the cost of energy rose, people once again began to try to live without constant air conditioning. They soon discovered that their homes, designed in times of less expensive energy, were not suitable for maintaining comfort without air conditioning. Dwellings were typically heavy concrete block boxes which sat in direct sunlight and had no way of taking advantage of natural breezes
INTRODUCTION

for cooling. Residents had two choices: high energy bills or discomfort.

This study proposes and investigates a strategy for making dwellings which are appropriate for warm, humid climates of regions such as Florida. It is not a proposal for "energy efficient" or "passive energy" housing: the increasing cost of energy merely provides the way we make dwellings. It is not an argument for the return of the pre-air conditioning Florida house, which, although it offers many lessons, could not meet the modern demands for comfort. Rather this study proposes a strategy for designing houses which try to reassociate inhabitants with the benefits of a warm, humid climate, make them aware of seasonal changes in climate, and which make more intelligent use of conveniences such as air conditioning.
CLIMATE

Floridians enjoy a climate in which exposure to the outdoors is pleasant for most of the year. The summers are long, warm and humid. The winters are short, mild and punctuated by brief intrusions of cold weather.

TEMPERATURE/HUMIDITY

The accompanying chart plots the change in temperature and relative humidity over an average day in central Florida for each of the twelve months. By using the "Bioclimatic Chart" one is able to determine whether a certain combination of dry-bulb temperature and relative humidity will result in a thermally comfortable environment. If conditions fall outside the delineated "comfort zone," the chart reveals the steps necessary for restoring thermal comfort. After examining the temperature/relative humidity curves
plotted for central Florida it is readily apparent that the primary cause of discomfort is the high humidity. Although afternoon temperatures in the summer often climb over 90°F adequate air movement is usually available to restore comfort. It is in the early morning that it is most difficult to remain comfortable. Temperatures are in the range of 70°F to 80°F, but the humidity generally hovers around 95%. Air movement, alone, is not enough to restore comfort, and some method of dehumidification such as air conditioning is required.

During the winter, temperatures range from 50°F to 70°F with occasional early-morning drops to the freezing point. Thermal comfort can be maintained throughout this period by careful use of direct sunlight combined with some localized heating.
CLIMATE

BREEZES

In central Florida, prevailing breezes usually come from the northeast or the southwest, but winds can actually come from any direction, so buildings must be designed to take advantage of breezes from all sides.

SUN

At 28° North latitude, the location of this study, the noontime solar altitude ranges from a high of 85° on June 21 to a low of 38° on December 21. Designers must take care to assure that direct radiation can enter the interior of a house only during the coolest months of December and January. During all of the remaining months, temperatures are mild enough that an unshaded space could rapidly overheat. Because of the high solar angles and the high humidity of the air, the sky vault over central Florida is extremely bright. Overhangs must not only prevent direct sunlight from entering a dwelling but must also block out ambient solar glare.

RAIN

Precipitation most often occurs on summer afternoons and comes in the form of hard thunderstorms which significantly cool the outside air. Dwellings should include areas that are protected from the driving rain but which permit residents to enjoy the relief from the hot afternoon heat.

If careful consideration is given to the implications of the natural climate conditions found in Central Florida, it is possible to attain thermal comfort without mechanical heating or cooling for over 50% of the year. For the remaining part of the year, heating and cool-
ing requirements can be kept to a minimum through the judicious location and use of conditioned spaces.
A building which has been designed to make optimal use of external climate conditions for creating thermal comfort is radically different from a building which relies entirely on mechanical conditioning. This difference suggests the notion of designing buildings that change in character as the climate changes. A house that acts as a pavilion during pleasant weather—opening up the interior to the outside environment—and closes up into a box during uncomfortable periods would be a suitably dynamic response to variations in climate. The application of this idea to the design of dwellings for central Florida is the major thrust of this thesis. I have collected a set of patterns for homes in warm, humid climates, and in this thesis, I have attempted to apply these patterns to a design exploration.

Before discussing the patterns and reviewing my synthesis of the Box into the Pavilion, I feel that it is necessary to discuss several of the references I used while creating this thesis.

THE CRACKER HOUSE

The first and foremost reference I used in my attempt to create an appropriate house for central Florida's climate, is the indigenous housing of the early Florida settlers. These settlers were often referred to as "crackers," and their simple dwellings were known as "cracker houses." The house was a frame structure raised up off the ground and surrounded by a verandah. Trees were plentiful so the construction was light wood frame, which was appropriate to the climate because the material did not absorb much heat.
during the day and quickly cooled once the sun went down. Raising the dwelling off the ground kept the floor dry and protected it from insect damage. Raising the living spaces also increased their exposure to breezes and reduces their availability to mosquitoes.

The large verandah surrounded the house with a space that was continuously open to available breezes. This space often served as the social center of the home and residents spent many summer evenings sitting on the verandah in wicker rocking chairs and chatting with friends. Occasionally, cracker houses would also include smaller, more private porches which served as nighttime sleeping spaces.

Each room inside the cracker house had large windows on at least two sides to insure adequate cross

7. The Barnacle, house in Miami, Florida, 1891
ventilation. Often the interior rooms were arranged around a central breezeway which provided further exposure to natural air movements, or they were clustered around a central vertical space which was vented at the top to allow excess heat to escape from the house. Spaces that generated their own heat and humidity such as kitchens and bathrooms were often separated from the main body of the house and connected by covered walkways known as "dogtrots." The entire complex was shaded by a large overhanging roof which not only prevented direct sunlight from entering the interior spaces but also shaded residents from the glare of the semi-tropical sky. The roof was usually a hip design in order to protect all sides from the driving rains of the afternoon thunderstorms.

The cracker house was an appro-
appropriate response to the climate of central Florida, as it attempted to make optimal use of external conditions to provide comfort to its occupants. However, the cracker house represented a static response to climatic conditions. It opened up to the external environment but was not very effective at shutting out the environment when protection was necessary. The ability to let in summer breezes also meant that there was a large amount of cold air infiltration during the winter. The cracker house was difficult to keep warm, and with the advent of air conditioning, it proved to be a difficult dwelling to cool.

Today's typical Florida tract house, on the other hand, solves the cooling problems of the cracker house by limiting its connection with the exterior to a few small windows and a sliding glass "patio" door. A concrete block box, if properly insulated, the tract house is readily amenable to year round mechanical conditioning. Its internal comfort is totally dependent on its climate control machinery, and the intimate interaction that the cracker house provided between interior and exterior environments is almost totally gone. The last remaining trace of this climatic connection is the seldom used sliding glass "patio" door.

THE JAPANESE HOUSE

A second important reference for this thesis was the traditional Japanese house. It offers a more dynamic response to the changing environment than the "cracker" house, although the two buildings share many characteristics. Like the Florida dwelling, the Japanese house is
also built from wood construction, is raised off the ground, and is partially surrounded by a verandah. The roof is large and protecting, and quite often is hipped.

The Japanese house, however, is more than a series of rooms with large windows and surrounded by a verandah. The building contains several layers of sliding panels which allow the entire structure to open up into a pavilion. One type of interior wood frame panel known as "kusuma" is pasted over with an opaque paper. These panels generally are found between rooms and can slide in and out to increase room dimensions or provide access from one space to another. Some panels, known as "shoji" are covered with a translucent paper. These panels are usually found at the edge of a room adjacent to the verandah. When the
panels are closed, light can still filter into the interior room; when they are open, the panels admit breezes from the verandah. At the outer edge of the verandah, heavy wooden shutters known as "amado" are found. When they are closed they provide protection against wind, rain, cold, and intruders. Above the "amado" are open wooden grills known as "ratama;" these prevent heat from building up inside the verandah and allow additional air circulation.

The presence of several layers of sliding panels allows the Japanese house to provide a dynamic response to the changing weather. The dwelling opens up like a pavilion during good weather and closes into a box during poor conditions. However, the construction of the house is so insubstantial that even when it is tightly closed, it does not
provide very effective thermal protection. As in the cracker house, the occupants must simply endure climatic extremes. During the winter, some comfort is provided by localized heat sources such as the small charcoal brazier known as the "hibachi," but the Japanese house, like the cracker house, is a dwelling that is well adapted to warm, humid weather. Both houses allow their occupants to live in close contact with the external environment throughout most of the year, yet neither provides adequate protection during periods of climatic extremes. Neither building would be acceptable as modern housing due to occupant expectation for uniformly reasonable comfort during the entire year.

THE BUDGE RESIDENCE

A third important reference in-
corporates many of the characteristics of the previous two examples. The Budge House in Healdsburg, California was designed in 1966 by the firm of Moore/Lyndon/Turnbull/Whitaker, and it uses modern materials and construction techniques to help provide occupant comfort throughout the year. In its form and design, the Budge House recalls the traditional cracker house. Like the Japanese house as well, it is built of wood, raised slightly off the ground and surrounded—on three sides—by a verandah. The major interior rooms were placed on the corners for enhanced ventilation, and the central interior space is open to the roof peak to allow daylight in and excess heat out.

The Japanese prototype is more clearly seen in the use of movable panels. Partitions between the in-
terior rooms and the verandah are formed by panels which flip up allowing the rooms to expand out into the environment. These panels are more substantial than those found in Japanese examples and they include insulation and weather-stripping in order to provide good weather protection when they are closed. However, since these panels occupy nearly all of the wall between the rooms and the verandah, interior spaces are dark and isolated when the panels are closed. To some extent, this condition is acceptable in the Budge House which is primarily a summer residence to be used only during pleasant weather. One corner of the house, however, maintains a year round connection with the outdoors. There is no verandah outside the living room; instead, the edge of the building is formed from
fixed glass windows and sliding glass doors which open directly to the exterior.

As with the Japanese house, the Budge residence responds to the change in seasons through the manipulation of panels. The use of sealant and insulation of the panels, however, allows the mechanical systems to operate effectively to maintain comfort when the building is closed tight. However, the verandah functions only as an expansion zone for the rooms it surrounds. Unlike the porch on the cracker house, it has no life as a space in its own right. Despite its ability to adapt to climatic changes, the Budge House is primarily a seasonal residence; when the panels are closed, the rooms are simply too isolated from the exterior for the building to adequately function as a year round dwelling.

From these primary references as well as many others, I extracted a series of patterns which are useful in designing a house that responds to the seasonal demands of living in Florida's climate. After developing the patterns, I attempted to synthesize them into a design that will be as appropriate to Florida's climate as the cracker house was, but which would also change with the seasons like the Japanese house and still provide for the efficient operation of mechanical conditioning as is found in the Budge residence.
The following patterns illustrate principles which are important in designing a dwelling for places such as Florida, which have a warm, humid climate. None of these patterns represent rigid rules. As represented they are too brief and general to operate as more than guidelines.

The patterns are organized under three categories. The first category is concerned with the arrangement of a cluster of dwellings. The second and third categories contain patterns which facilitate the development of the central hypothesis of this study, a dwelling that closes as a box and opens as a pavilion. Each category starts with the larger scale, more general principles and proceeds to smaller scale, more specific patterns.

Each pattern is accompanied by a diagram of the principle or a photo of a reference, which is then followed by a drawing or photo illustrating how or where this pattern was incorporated in the design exploration. The design examples were extracted from drawings produced during the course of the exploration.

The patterns are followed with more complete drawings from the design exploration and photos of the model. The complete design is not discussed in detail as the patterns explain much of the work.
THE SITE
The patterns in this group deal primarily with the layout of dwelling units for warm humid climates. Cluster development was explored only briefly in the course of this thesis. Unit density is similar to middle income suburban projects currently found in central Florida, and the site is typical of such developments. There is a 5% southeastern slope and vegetation consists primarily of native grasses and tall pine trees.
UNIT SPACING

Each dwelling diverts prevailing breezes and creates wind shadows. If another dwelling is too close, it will not receive the full benefits of these breezes. Therefore, locate units so as to maintain wind spaces between adjacent buildings in the direction of prevailing breezes.1

ROW HOUSE

If the units are clustered in a row house situation additional protection from the western and eastern sun is achieved. Other methods of clustering could possibly interfere with breeze penetration by creating wind shadows. Vertical aggregation of units was not investigated in this thesis since direct ground access was considered important.2
BREEZEWAYS
Buildings which contain several dwelling units create broad wind shadows. Airflow helps keep exterior walls cool; provide breezeways between units to make the entire building accessible to breezes and to remove heat from individual units. 3

GREEN STREETS
When exposed to direct sunlight, asphalt and concrete get much hotter than surrounding vegetation. Access roads to unit clusters should not be entirely paved. Pavement should only be employed where necessary, as in the general location of automobile wheels. This system will not only reduce paved surfaces but will also slow vehicular traffic in residential areas. 4
THE SITE

PARKING UNDERNEATH
When exposed to the hot sub-tropical sun, automobiles heat up their immediate surroundings. Since dwellings have been raised off the ground to enhance interior conditions, place car parking in the spaces below living areas. This provides for efficient use of space, keeps the automobiles shaded and reduces exposed pavement.

LEVEL CHANGES
Fences, hedges, and similar means for achieving privacy also inhibit breezes from reaching the dwellings. Use level changes and low fences to attain privacy without blocking the wind.
GAZEBOS
On warm summer evenings it is often pleasant to move away from the building in order to be open to breezes from all sides. Provide gazebos as quiet places for such purposes during pleasant weather.

VEGETATION
Thick vegetation at ground level slows prevailing winds and increases humidity. Encourage the growth of high branching trees which provide shade and allow breezes to reach the dwellings.
THE "BOX"

When the external climate is uncomfortable, it is necessary to have a place of retreat within the dwelling where one can create an acceptable microclimate. The patterns in this section deal with the creation of such a place.
ELONGATION
Because of the ease of shading south facing walls, buildings should be elongated along an east-west axis. This creates long north and south edges which can be opened to cooling breezes, and reduces vulnerable east and west exposure.

SOL-AIR ORIENTATION
In Florida, an orientation of 5° east of south ±10° minimizes exposure to the low, hot western and eastern sun. A slight bias towards the east is due to the slightly lower air temperatures before noon. This allows elongation along the southern face since it is more easily shaded from the high altitude summer sun.
THE "BOX"

MOVABLE INSULATING PANELS
During much of the year the weather is pleasant and walls cease to be important. Protection is needed only from insects, sun and rain. Walls that slide back or flip-up allow expansion from retreat zone to the decks and facilitate thru-ventila-
tion. Make the panels, insulating so the retreat zone or "box" is easier to heat and cool. 11

ZONED AIR-CONDITIONING
In Florida some of the day's most uncomfortable conditions occur just before dawn when the relative humidity rises to 95%. Zoning the air conditioning so the bedrooms can be closed and cooled independently would allow comfort during this portion of an otherwise comfortable day. 12
SECOND FLOOR BEDROOMS
Wind velocities are lower and humidities are higher in the evenings. Place bedrooms at the upper levels to intercept higher wind velocities and to provide more privacy when walls are open. 13

FARMHOUSE KITCHEN
The "box" or retreat zone should be an intimate space in contrast to the seasons where activities occur in the open "pavilion." Provide a "farmhouse" kitchen that allows activities such as eating and socializing to occur in addition to cooking. 14
THE "BOX"

DIRECT EDGE
If the dwelling is closed off entirely from the environment in order to facilitate mechanical conditioning, the interior becomes dark. Therefore, provide each space within the "box" with windows that open directly to the exterior, not only onto decks or verandahs. These will admit natural daylight and create some connection between interior and exterior.15

CENTRAL SKYLIGHT
Deep roof overhangs and adjacent decks create dark spaces in the center of dwellings. Provide north-facing skylights over central spaces to allow sunlight to filter into the center of each dwelling.16
INTERIOR MASS

Mass materials can dampen the effect of the solar heat load and distribute it evenly across the day. Place these materials in the interior of the dwelling and protect them from direct sunlight with lighter, more resistive materials. However, careful consideration must be given to condensation problems. 
THE "PAVILION"

When exterior conditions are pleasant, the dwelling should have the ability to open up in order to take advantage of climatic amenities. The patterns in this section describe methods for increasing contact between the interior and the environment and of optimizing comfort under ambient climatic conditions.
BREEZE ORIENTATION

The optimal sol-air orientation conflicts with the fact that prevailing breezes often come directly from the east. Orienting the building in a more easterly direction is not a solution because it would necessitate the use of complex solar shading devices. The problem can be solved by the judicious use of walls to deflect eastern breezes through the building.\textsuperscript{18}

SHALLOW DEPTH

Breezes cannot penetrate dwellings that are too deep or which contain inoperable interior partitions. Buildings should have shallow depths and all partitions should be movable to prevent the buildup of dead air spaces.\textsuperscript{19}
THE "PAVILION"

**VANES**

Breezes do not always flow perpendicular to the long, open sides of the dwelling. Use fin walls to direct variant breezes through the building.\(^{20}\)

**OPERABLE VANES**

Breezes must be directed towards inhabited areas. Provide body height casement windows to guide breezes directly towards occupants. Just below the ceiling provide awning-type windows which can open and direct breezes downward into occupied spaces.\(^{21}\)
OPENING WALLS
Provide large opening walls which allow unrestricted air flow through large areas of the dwelling. It is possible to concentrate air flow to produce higher maximum wind velocities by using small inlets and large outlets. However, this limits air flow to small areas rather than throughout the living space.22

SHELTERING ROOF
In warm humid climates the sky is excessively bright throughout and hard driving rains occur frequently. Provide a large sheltering roof to protect inhabitants from the rain and the glare of the sub-tropical sky.23
THE "PAVILION"

OFF THE GROUND
Wind velocities drop sharply near the ground, and in the late summer months the ground temperature is often higher than the air temperature. Therefore, place the first living level off the ground to allow air to cool the floor and to provide greater air movement in the living area.

DECKS AT THE EDGE
On warm but pleasant days, the spaces away from the center of the building have the best exposure to cooling breezes. Protection is needed, however, from insects, sun and rain. Therefore, provide large screened decks along the outer edges and corners of the dwelling.
SLEEPING PORCHES
Provide porches for sleeping during times when the weather is warm but not warm enough to merit air conditioning. These decks should provide visual privacy and protection from insects, rain, and dew.²⁶

COLLECTIVE INSECT SCREENING
When breezes arrive at an oblique angle, the presence of an insect screen over a window can cause the breeze to skim past the opening, dramatically reducing interior air flows. This problem can be reduced by screening entire decks rather than individual openings.²⁷
THE "PAVILION"

LOUVERS/WESTERN PROTECTION
The low, setting sun can overheat the western edge of open living areas. Vertical louvers can reduce this solar load without obstructing light and view. Provide such louvers along western edges to prevent overheating and to provide additional privacy between adjacent decks.²⁸

VENT HUMIDITY AND HEAT
Activities such as cooking and bathing create additional humidity and heat. Locate these activities downwind and ventilate them with devices such as operable skylights and fans.²⁹
CENTRAL WELL WITH ATTIC FAN

Natural connective movement of air is often inadequate to remove heat and humidity. A central vertical space with an exhaust fan at the top can draw air from all the spaces allowing it to be replaced with cooler outside air. 30

OPENINGS AT CEILINGS

Operable transoms and openings near ceilings allow hot air to escape. However, provide a means to close them during periods of heating and air conditioning. 31
THE "PAVILION"

PADDLE FANS
There can be occasions when the breezes are not sufficient for comfort but air conditioning is not necessary. Provide fans which augment the available breezes.32

OPEN FURNITURE
Proper concern for the climate requires consideration of the furniture also. Provide furniture that does not envelop the occupant, and that still allows breezes to reach the skin. Furniture that moves such as rocking chairs and hammocks enhance ventilation, and lightweight furniture can be shifted to take advantage of available breezes.33
OPEN STORAGE
High humidities are conducive to the development of mildew. Provide open storage or louvered closets and cupboards to allow air to circulate and humidity to escape. A small heat source such as a lightbulb can assist in inducing ventilation and reduce humidity. 34

WOOD CONSTRUCTION
Masonry building materials absorb solar radiation during the day and reradiate it late at night—a disadvantage in warm humid climates where temperatures do not fall significantly in the evenings. Light wood construction resists solar heat gain and cools rapidly. Therefore, protect living areas and all masonry materials with walls and roofs of light wood construction. 35
LIGHT COLORS
The color of a surface can make a difference of up to 75% in the amount of solar radiation it will absorb. Use light colored roofs and walls to reflect solar radiation. Take care to choose finishes that will not deteriorate rapidly and lower their reflectivity.36

VENT ROOF
The greatest amount of solar radiation falls upon the roof. Protect lower spaces by providing ventilated spaces between different layers of the roof and the ceiling. This will allow heat to escape at the ridges to be replaced by cooler air at the eaves.37
DESIGN EXPLORATION

105. STUDY OF CLUSTER
DESIGN EXPLORATION

107. FIRST FLOOR PLAN
DESIGN EXPLORATION

109. SECTION

[Diagram of a building with annotations and a car parked nearby.

Scale bar indicating 1 inch equals 10 feet.
In this thesis, I attempted to design a dwelling which responded dynamically to the changes in the external environment. The patterns were the guiding principles in the design process and the "box to pavilion" hypothesis was the central concept around which the patterns were constructed.

The product of this exploration is similar in part to all three of the major references presented earlier. As in the cracker house, the dwelling is built from light wood construction, and living areas are raised off the ground and protected by large roofs. Interior spaces are arranged around a central vertical space which ventilates both heat and humidity. Unlike the cracker house, however, the interior spaces can be shut off from the environment and mechanically conditioned during periods of unpleasant weather.

My design bears a resemblance to the Japanese house in its use of moving panels to change from an enclosed box to an open pavilion and vice versa. The box in my design, however, is constructed primarily of concrete and provides more effective thermal protection than the wood and paper construction of the Japanese prototype.

As in the Budge residence, my design makes liberal use of insulation in its construction, giving it the potential for efficient air conditioning and mechanical heating. Yet, when closed into a box, my design affords more contact with the exterior than is found in the reference building. Whereas the verandahs on the Budge House are simply narrow expansion zones between interior and exterior, the porches on my design
are spaces with their own independent existence.

All four buildings--the three references and my proposed design--share one common pattern: the way in which the interior space opens up and expands to greet the external environment. They are all organized as a series of layers; one retreats or moves out depending on the weather. In the cracker house, one simply moves from the interior of the dwelling out onto the verandahs. The other three buildings not only permit this outward movement but also provide the ability to vary the enclosure through the use of opening walls.

However, this layering--putting the "box within the pavilion"--presents two major problems. It limits the amount of exterior edge that is available to the "box" or conditioned zone. One of the major problems with the Budge residence, this condition was improved in my design yet the "box" is still isolated from the exterior edge of the building.

The "box" is also involved with the second major problem. Despite the existence of the opening walls, none of the dwellings can ever become totally open, cross-ventilated spaces.

If the box were placed beside the pavilion rather than within it, these problems might have been avoided. In my study, the breezeway serves only as an entryway; expanding this area into the more open living spaces of the pavilion would have enhanced cross-ventilation, and would have allowed more light, view, and controlled winter sunlight into the conditioned space of the box.

This thesis is merely a step on
CONCLUSION/PROJECTIONS

the route to developing a housing that reacts sensitively to the Florida climate. Three existing references have been reviewed; this design has been presented as a fourth example, and some ideas for further improvement have been noted. No design can be considered to be the final word on this issue; my only hope is that this work can act as a stepping stone in the development of housing that provides year round thermal comfort while allowing occupants to experience the fullest benefits of Florida's climate.
EXF 61 C*--

ELL

VM05M

VPR

oN

EXPANSION OF INTEREST

BOX

PAVILION

VARIABLE ENCLOSURE

PROJECTION

61
FOOTNOTES


6 Evans, p. 66.


10 Ibid., p. 61.

11 Mazria, p. 230-239.


14 Alexander, p. 660-663.


16 Ibid.

17 AIA Research Corporation, p. 232.

18 Evans, p. 62-65.

19 Ibid., p. 68.


21 Olgyay, p. 110-111.


23 Fry, p. 47-49.

25 Fry, p. 62.

26 Ibid.


29 AIA Research Corporation, p. 233.

30 Ibid., p. 264.

31 Ibid.

32 Evans, p. 132-140.

33 Fry, p. 78.

34 Fry, p. 79.

35 Evans, p. 101-103.
36 Givoni, p. 120-124.

37 Fry, p. 47-49.


