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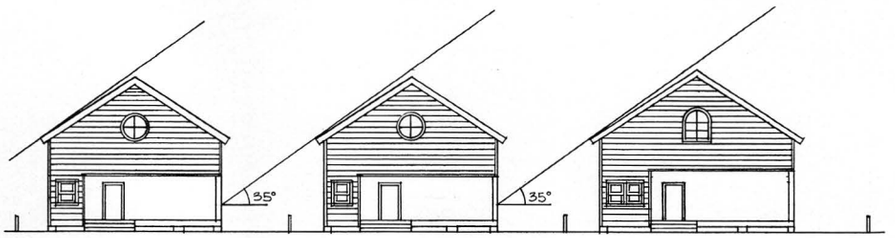
Drawings by Atul Kukreja
Murali Ramaswami
Jay De Shelter
Doaa Passyalia
Diane Fox



Seaside Solar envelope

The most significant fact about our advanced industrial society is that it is not sustainable. Over the past one hundred years we have created a pattern of human settlements entirely dependent upon constantly increasing supplies of fossil fuels and mineral resources that are certain to be nearly exhausted during the lifetime of someone born today.[1] If we are to make the necessary transition to an ecologically balanced society capable of being sustained primarily by renewable solar energy flows we shall have to create more compact, humanly scaled and functionally integrated buildings, towns and cities.[2]

The new resort town of Seaside, Florida provides many valuable lessons for the design of the sustainable solar communities of the future. Seaside's master plan and coded building styles are derived from traditional climate-responsive patterns prevalent before air conditioning and the automobile reshaped the urban landscape of the American south. Consequently, Seaside gives new form to a regionally-based tradition of architecture and urban design which, in principle, holds great potential for helping us to respond to the needs of design in the post-petroleum age.

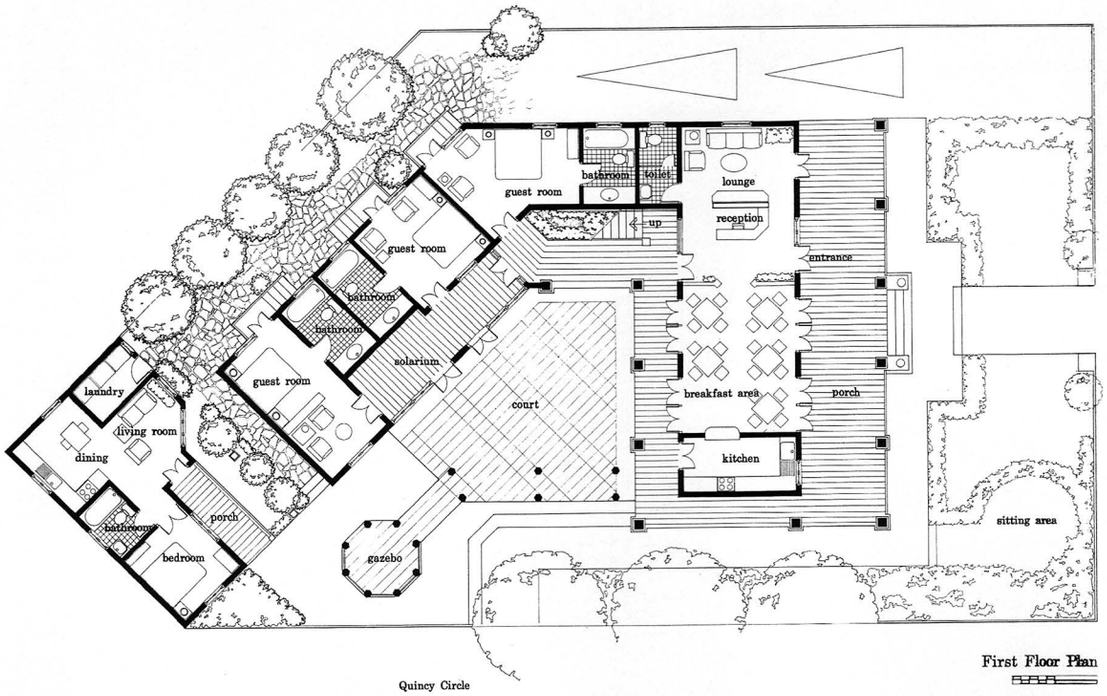
In order to explore this potential Seaside's developer Robert Davis invited Professor Gary Coates and students enrolled in his spring 1988 advanced architectural design studio to study Seaside and to design two model passive solar buildings, a bed-and-breakfast inn and a three bedroom house. The goals of the studio were: (1) to develop an understanding of the principles, patterns and technologies relevant to the design of sustainable buildings and communities; (2) to evaluate Seaside's building code in terms of its ability to give each property owner access to sun, wind and light; (3) to use Seaside's code, or a modified version of it, as a framework for designing climatically responsive buildings capable of being heated and cooled primarily by incident solar energy flows.

To accomplish these aims work during the semester was divided into three major phases. During phase I (five weeks) student teams completed background research on regional climatic conditions, appropriate bioclimatic design strategies and vernacular and historical building traditions. During this phase existing solar access zoning ordinances were analyzed and used to evaluate Seaside's master plan and code. During phase II students generated sketch designs for either the bed-and-breakfast inn or the residence. During a site visit to Seaside over spring break these schemes were critiqued by Robert Davis and Rob Vieira of the Florida Solar Energy Center, who provided technical assistance throughout the semester. Phase III (eight weeks) focused on design development and project documentation.

Our evaluation of Seaside began with the idea that the first requirement of any sustainable community is that each property have access to sun, wind and light. By running major streets perpendicular to the Gulf of Mexico, on-shore and off-shore breezes at Seaside are channeled deep into the site while at the same time providing the majority of property owners with sea views. Also because of this pattern of street orientation, the majority of residential building sites have their long axis running east-west, which means that dwellings would always have their smallest elevations facing east and west and their largest surfaces facing north and south. This is the ideal orientation for minimizing unwanted solar gains in the summer and maximizing solar gains in the winter. Thus, the Seaside master plan provides a fundamentally sound framework for good passive solar building design.

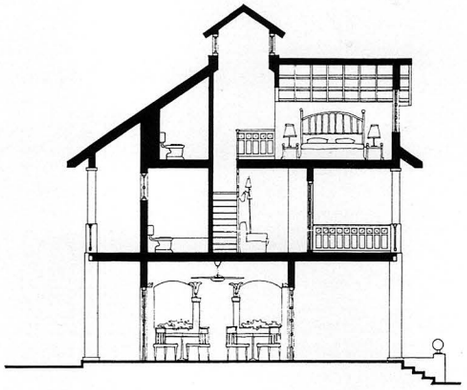
In designing our model residences and the bed-and-breakfast inn our first concern was to define appropriate solar envelopes for each site. As developed by architect Ralph Knowles, the solar envelope is a means of assuring solar access to properties surrounding a given site.[3] The envelope defines the largest volume of space that can be built without casting off-site shadows at specific days of the year and times of the day. Determining the appropriate times during which off-site solar access should be provided is a complex matter which depends upon balancing a number of factors including the thermal characteristics and needs of the buildings involved and the economic necessity to allow maximum development densities compatible with larger design purposes.

We discovered that it is not possible to design an eight room bed-and-breakfast inn on the given site without shading major portions of adjoining sites. However, since buildings on adjacent sites would still have at least one major unobstructed facade facing southeast, we felt that the existing Seaside code for Type IV properties represented an acceptable trade-off between solar access and development needs.



First floor plan, Atul Kukreja & Murali Ramaswami

Front elevation



Section A-A

South West elevation

The "Plantation Inn" by Atul Kukreja and Murali Ramaswami is a passively heated, cooled and daylit bed-and-breakfast inn with eight guest rooms and eight private baths. It was designed within the existing Seaside Type IV code which encourages the development of large private homes and small apartment buildings as well as bed-and-breakfast inns. The site is occupied by two buildings, a "big house" for guests located at the front of the lot and a "little house" which serves as a residence for the caretaker.

By wrapping a one-room wide plan around a south facing interior courtyard, this scheme maximizes cross-ventilation and solar access for every room while creating a large, relatively private climate-tempered outdoor space for guests to socialize in during the many months of pleasant weather. In addition, no two rooms are identical and each room is afforded an ocean view. The full length porch mandated by the code for the southeast facing front of the inn wraps around the building, providing additional outdoor living space. The south-facing portion of this porch which overlooks the courtyard is a sunspace in the winter and a ventilated porch in the summer.

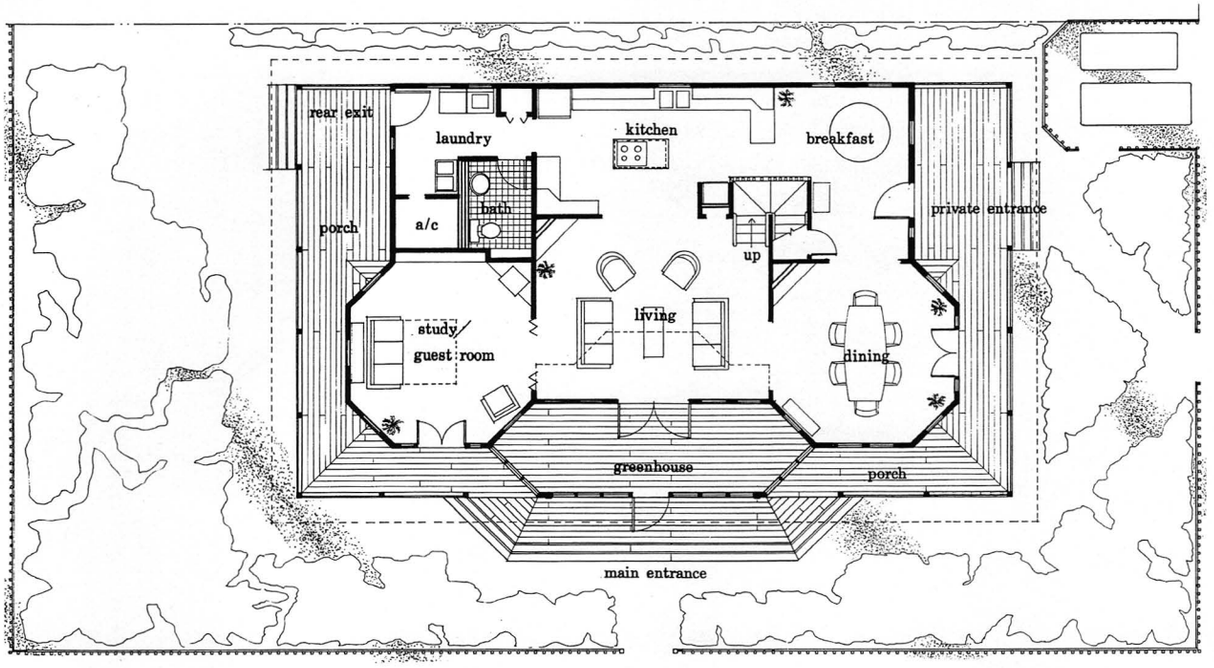
Like all the inns and dwellings we developed during the semester, the Plantation Inn is designed to use fifty percent less heating energy than a comparable non-solar building and would be capable of greatly reducing any need for air conditioning through appropriate sun shading and the provision of stack and cross ventilation in every room. This scheme demonstrates that it is possible to use the Seaside code to design contemporary passive solar buildings based on historic precendents which meet criteria for economically viable site development.

"Apricot Cottage" is a residence designed by Jay De Shetler for a site adjoining the Walton County road, a major cross state highway which cuts through the southern edge of Seaside. The guiding metaphor for this scheme is the image of two beach umbrellas blocking the high summer sun while channeling cooling ocean breezes.

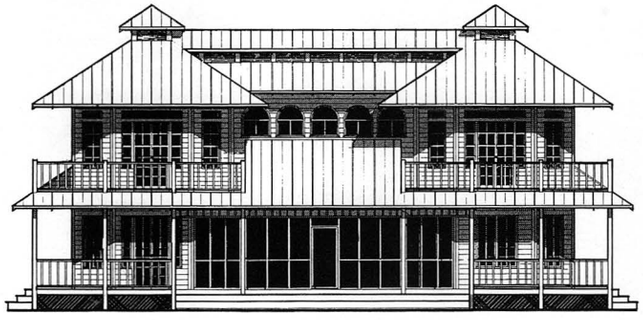
Following the shape of the solar envelope the high east-west ridge of the house is shifted toward the southern edge of the lot, thereby providing more developable volume without casting shadows on the house to the north. Wide porches wrap around the east, south and west facades of the building providing outdoor rooms facing the sea. The porches shade the walls and windows from unwanted sun and channel ocean breezes into adjoining rooms.

The two octagonal umbrella-like pavilions frame a great central living room which opens on its southern edge into a three-story space capped by a glazed belvedere used for daylighting and ventilation. A variable sunporch adjoins this space to the south. In the summer the living room becomes a thermal chimney capable of venting warm air out the belvedere from every part of the house. In the winter this light-filled room becomes a solar plenum for distributing warm air from the sun porch to all adjoining rooms. Each room has its own cross ventilation as well as being connected to the whole house cross and stack ventilation system. Apricot Cottage integrates technical and aesthetic concerns in a scheme that is both relaxed and highly ordered.

The proposal by Doaa Passyalia is a reinterpretation of the bungalow-style house found throughout the rural south. All proportions in plan, section and elevation are derived from the Fibonacci series which gives whole number approximations of the golden section. The front part of the site contains the public living spaces. The plan is thermally zoned, with the heat generating and service spaces to the north and a solarium for solar heating to the south. A three-story solar atrium connects the public living pavilion to the private bedroom pavilion at the rear of the site. The atrium not only provides a shared social space but it is capable of providing significant solar heat and ventilation cooling for both adjoining pavilions. The third-floor deck at the top of the greenhouse offers an unobstructed view of the Gulf of Mexico.



Plan by Jay DeShelter



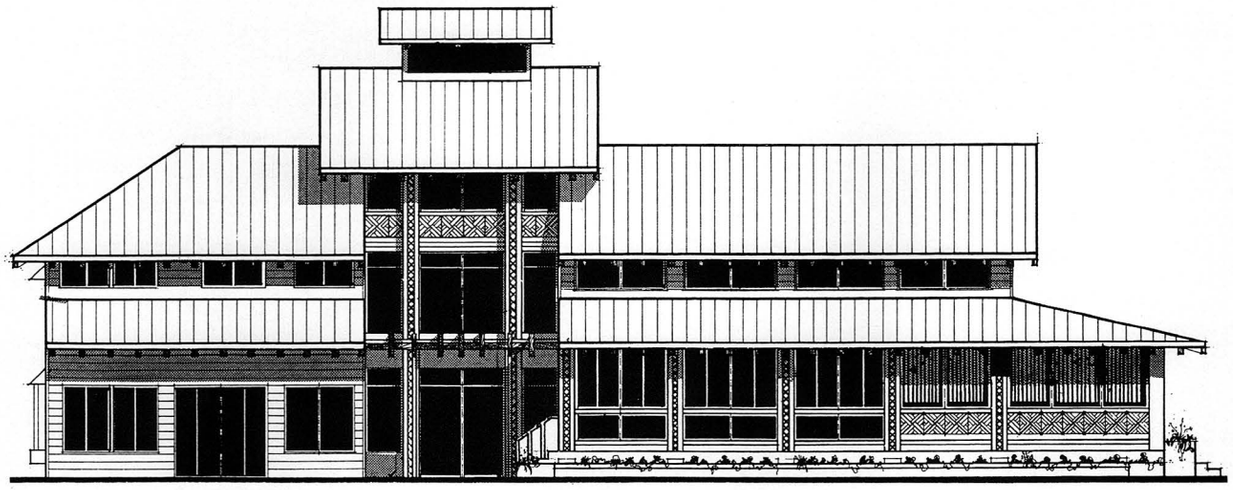
South elevation

East elevation

"Palmetto Place," designed by Diane Fox works with the big house, little house idea encouraged by the code. It is proposed for a site adjoining the Walton County Road which overlooks the Gulf. The main house and the small guest house (or teenage cottage) are sited to create two distinctly different outdoor rooms, one of which is open to the sun and faces the sea and the other of which is shaded and more private. The third floor open air viewing tower, reminiscent of the lighthouse designs on the Atlantic coast from Nantucket to Key West, gives the house a maritime image. The long thin plan gives the major rooms of the house views outward toward the sea and inward toward the interior deck while also providing significant cross ventilation and access to solar heating. The large south facing porch provides expanded living space during much of the year. Building and yard are joined in this proposal to create many kinds of spaces for enjoying the Seaside climate.

We believe that our design studies over the course of the semester have demonstrated that it is possible, with minor modifications, to design attractive, livable and high performance passive solar dwellings at Seaside. We are also persuaded that if the solar envelope is used as a framework, the master plan and building code are planning tools capable of generating an energy conserving solar community through individual acts of building by a diversity of owners over an extended period of time.

Certainly criticisms of Seaside can be made concerning social issues and larger patterns of energy use. Seaside is a resort community for the relatively well-to-do and many residents drive or fly great distances to stay in their vacation homes over weekends, summers and holidays. It could be argued that whatever energy might be saved through structures such as those designed by our students would be more than compensated for by the



South elevation, Doaa Passyalia

South elevation, Diane Fox

transportation energy spent by these long-distance commutes. It could also be argued that Seaside is not a "real" community because there are not enough community based jobs to make it economically self-reliant and socially and racially diverse.

But, in the end, these and related criticisms apply not only to Seaside but to nearly every community and especially to every resort area in America. It would not be fair or useful to single out Seaside for the failures and contradictions of the larger society within which it exists. What is significant about Seaside is that is has set a precendent by showing that it is possible to make a profit by developing a humanly scaled, mixed-use town which, in terms of on-site energy use, is energy efficient and ecologically responsible. Even though Seaside is far from complete it is evident that this approach to the development of a resort community offers many advantages over the typical patterns of high rise and condominium development on the one hand and buckshot strip development on the other. While it remains to be seen whether a strong sense of community and place develop at Seaside, it would seem that the physical fabric of the town and the process by which it is being designed and built at least make such an outcome possible.

We can learn from Seaside and we can go beyond it. What if Seaside, or a town very much like it, were to have its own municipal solar energy utility, with photovoltaics and wind generators providing inflation-free solar electricity to the community and the surrounding area? Such an enterprise would be capable of meeting local energy needs while also generating income for the community. Much could also be done by using the community's sewage as the basis for a biologically derived waste treatment system. John Todd of the Four Elements Corporation has already designed and built commercial scale "Solar Aquatic Wastewater purification systems capable of exceeding existing water purity standards while producing fish, vegetables and other income-producing products as well as generating local jobs."[4]

The sustainable communities of the future will use these and other ecologically derived, renewable energy based technologies to create diverse, stable local economies as well as architecturally distinguished and cooperative communities. Seaside itself is capable of integrating such possibilities during the years ahead as need and opportunity arise. The present and enduring value of Seaside is that it provides an image of what the sustainable buildings, towns and cities of the future might look like and it demonstrates a process by which such places might be created. Few resort communities, now or in the past, have offered us so much.

NOTES

1. For one of the most current and complete books documenting the U.S. and world energy and resource crises see John Gever, Robert Kaufman, David Skole, and Charles Vorosmarty, *Beyond Oil: The Threat to Food and Fuel in the Coming Decades*, Cambridge, Mass.: Ballinger Publishing Company, 1986.
2. For a comprehensive examination of the issue of sustainable community design see: Gary Coates (ed.), *Resettling America: Energy, Ecology and Community*, Andover, Massachusetts: Brick House Publishing Co., 1981; Sim Van der Ryn and Peter Calthorpe, *Sustainable Communities: A New Design Synthesis for Cities, Suburbs and Towns*, San Francisco, CA.: Sierra Club Books, 1986; and, Michael N. Corbett, *A Better Place to Live: New Designs for Tomorrow's Communities*, Emmaus, PA.: Rodale Press, 1981.
3. See Ralph L. Knowles, *Sun, Rhythm, Form*, Cambridge, Massachusetts: M.I.T. Press, 1981. Also see the article by Ralph Knowles, "Solar Access, Rhythm and Design," in Ralph W. Crump and Martin J. Harms (eds.), *The Design Connection: Energy and Technology in Architecture*, N.Y., N.Y.: Van Nostrand Reinhold Company, 1981.