



The Florida Architect July/August 1972

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COVER: Marco Island Hotel, a project of the Deltona Corporation designed by Vensel, Savage and Associates, Architects. The hotel will be the site of the FAAIA 58th Annual Convention and Building Products Exhibit on October 26-29, 1972

4/72

CONTENTS

- 7 Marco Beach Hotel
VENSEL, SAVAGE & ASSOCIATES, ARCHITECTS
- 13 Feasibility Reports For Architects
H. SAMUEL KRUSE, FAIA
- 17 Computer Aided Space Planning
WILLIAM R. MILLER
- 23 Stanley Residence
WILLIAM MORGAN, AIA
- 26 Advertisers

The Florida Architect July August

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MARCO ISLAND

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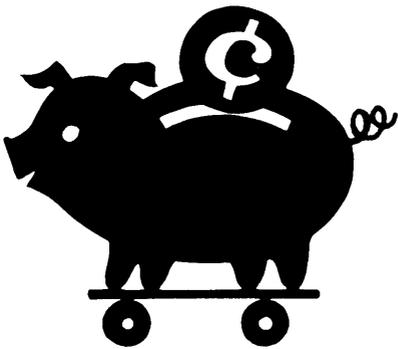
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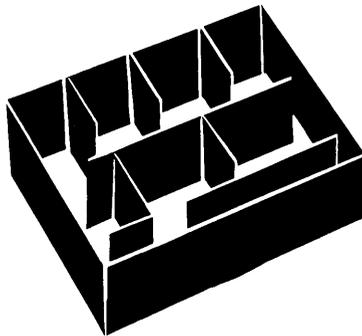
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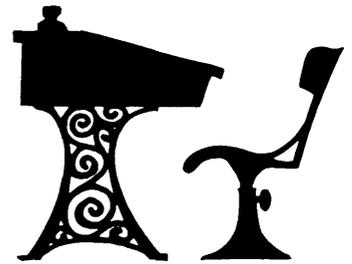


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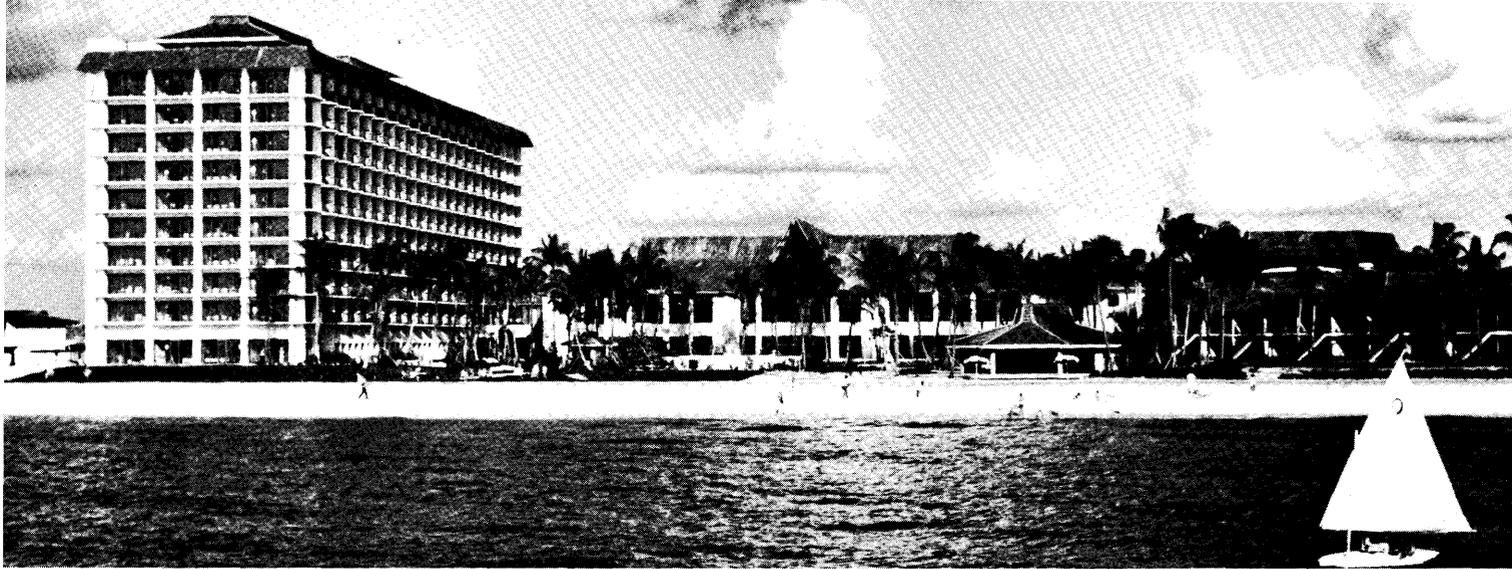
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Gulf coast resort by The Deltona Corporation sets new standards of luxury.

Marco Beach Hotel





MARCO BEACH HOTEL

When planning for the Marco Beach Hotel, Vensel, Savage and Associates couldn't escape the impression they were working on the impossible dream — with an \$18 million budget.

The client was The Deltona Corporation, builders of the planned community of Marco Island. The new hotel would thus need to accommodate a full range of guests from family vacationers to a hotel's life blood, conventions. It would at once be a resort and a posh workshop. It was necessary to develop a shelter concept that would enable fun seekers and dedicated conventioners to go their separate ways. Such features as ground level access to pool and beach, while the lobby level provides the most direct access to meeting rooms, help achieve those objectives.

Ultimately, too, the Marco Beach Hotel had to be of highest quality in keeping with the parent company's policies.

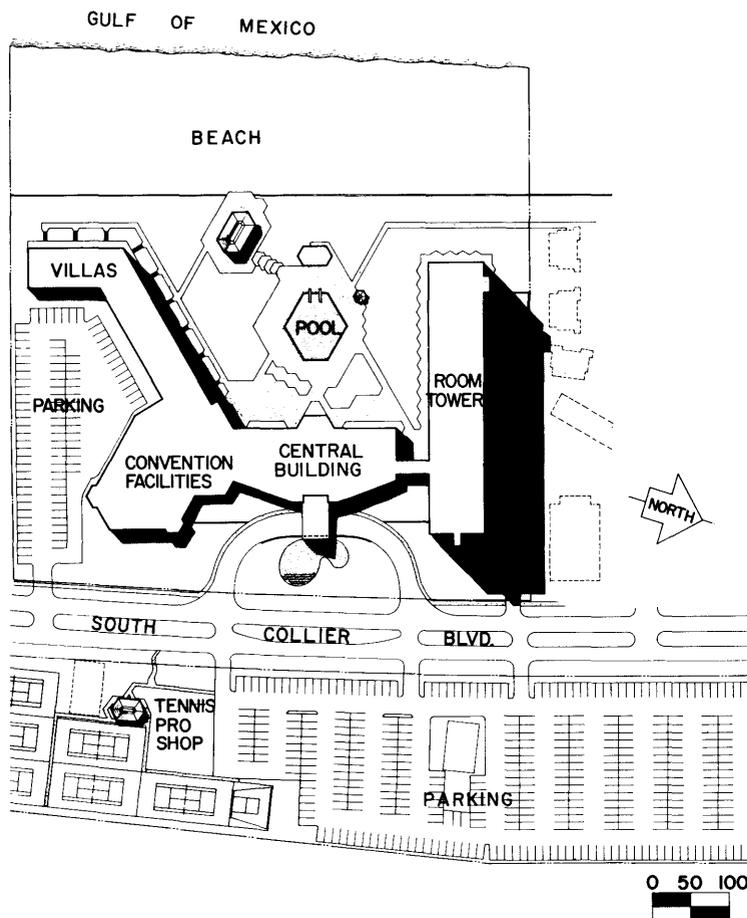
From a functional standpoint, personnel and supporting services were to be kept to a minimum. Convention facilities had to meet two requirements — flexible space and superior meeting rooms plus ultimate efficiency in serving meals quickly and easily, to even the largest convention groups, all with very little interference from service personnel.

The design fulfills those requirements without any sacrifices. Personnel functions have been kept out of sight while still able to service all points of the sprawling hotel complex. And there is minimal interference with guests.

From a typical guest's viewpoint, a design goal of elegance without garish display was first established in the main lobby where visitors are given the earliest possible view of Marco Island's prize beach and gulf view.

A semi-circular driveway carries visitors fifteen feet above ground level to a covered entranceway. Automatic sliding doors provide a quick transition to a room of great height — the cathedral roof peaks at 40 feet above the lobby floor. But guests are almost magnetically drawn to the opposite side of the lobby where a 54-foot high window, extending from ground level to ceiling peak, reveals the huge hexagonal swimming pool, swaying palms, and, of course, the Gulf of Mexico beachfront.

"We wanted the guests to know they had arrived — in more ways than one," said Herbert R. Savage.

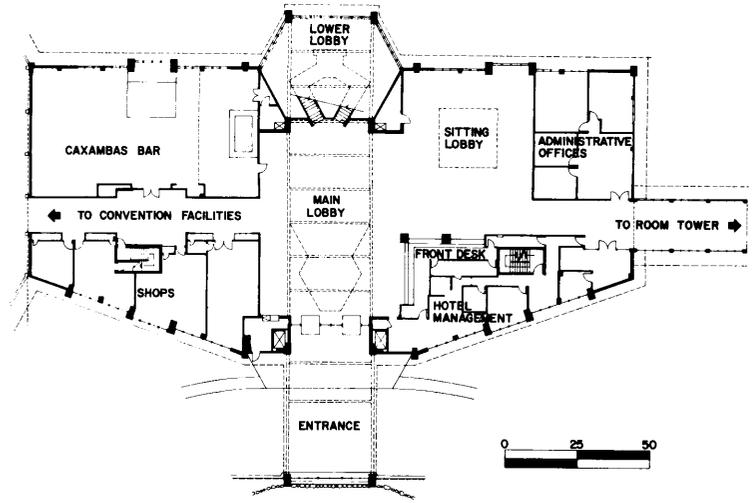


To make them feel even more welcome, the 317 tower rooms have 6-foot balconies overlooking the gulf; there are also private dressing areas, and the 15 by 28.5 feet overall dimensions contribute to the feeling of luxury at the water's edge.

If hotel guests care to explore the environs, there is much to see from an architectural or design standpoint.

Quinn's Bar (named after the famed Tahitian waterfront pub) is located practically on the gulf beach and provides the feeling of a Tahiti shore — especially with the old captain's lanterns, while the outrigger overhead contributes to the atmosphere of a freewheeling beachcomber. The casual but authentic beachfront oasis places guests at particular vantage points for Marco Island's famous multi-hued sunsets.

Continued





Evening walking to Quinn's from the hotel proper is enjoyable.

Landscape architects have created a tropical garden effect by encircling the pool with hundreds of jasmynes, daylillies, crown of thorn shrubs, oleanders, birds of paradise plants, black olive trees, Hong Kong orchids, frangipani, bougainvillea and hibiscus.

The garden setting can also be seen from the 30 lanai suites — bedroom, living room and kitchen — that stretch in two levels along the convention wing of the hotel. There are also 22 seaview villas and 120 rooms in the Islander section just north of the new hotel. This section was the original Marco Beach Hotel. Altogether the complex has 532 rooms.

For the people obliged to attend meetings amid all the tropical splendor, a convention wing has been created with flexibility.

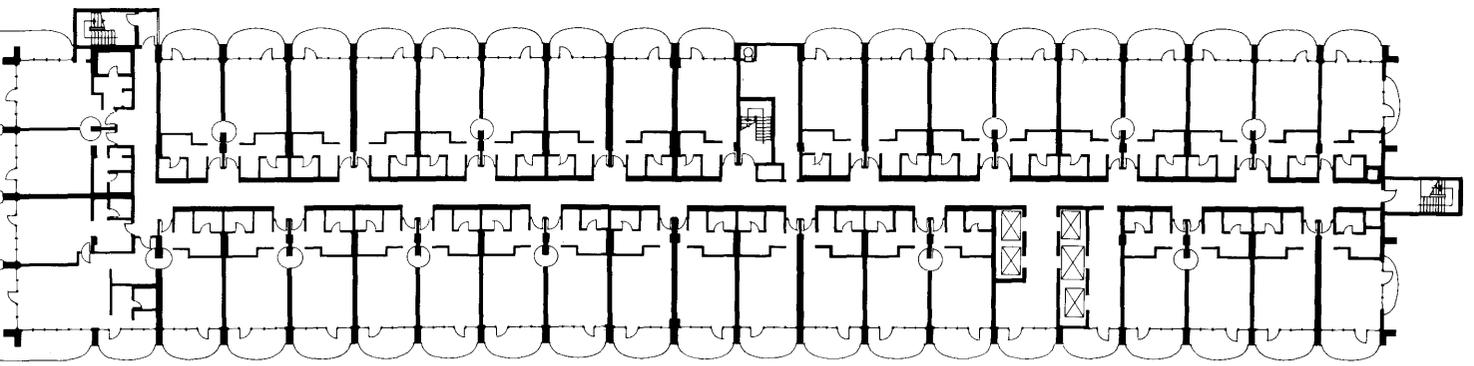
For instance, the convention center's ballroom can accommodate a reception for up to 1,500 people and can quickly be converted for 1,000 diners. Sliding walls permit three simultaneous meetings, each with individual projection booths.

The exhibition hall immediately below has space for 100 display booths and it can be converted into four large audio visual meeting areas, each with its own rear-screen projection booth. A central hall can seat 300. For smaller groups, 13 soundproof, modular meeting rooms can be provided.

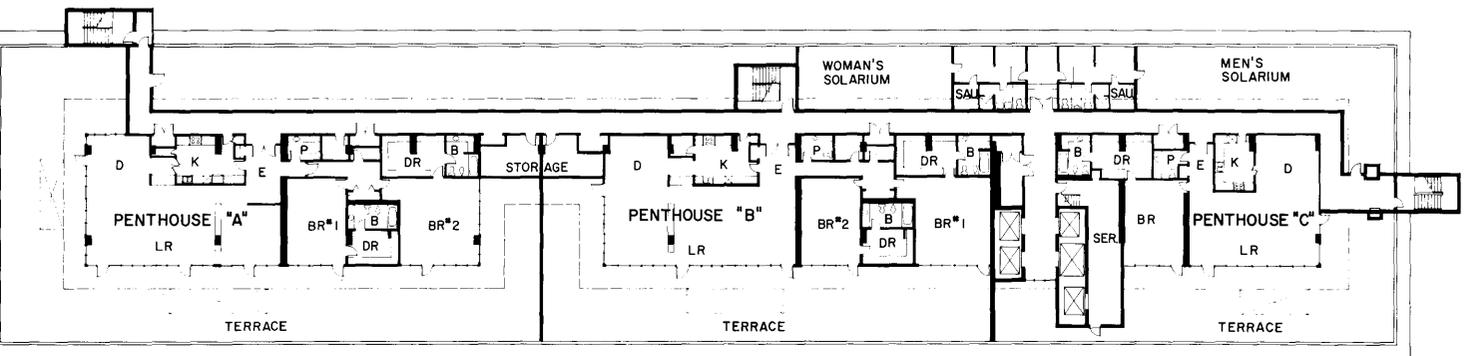
The interiors in the convention center and elsewhere were created by Henry End and Associates of Miami to complement the Polynesian-inspired concepts. The motifs contribute to the relaxed atmosphere with contemporary yet Floridian decor.

In essence, this resort complex is the composite of a conservative yet functional approach to the theme of "island" architecture.





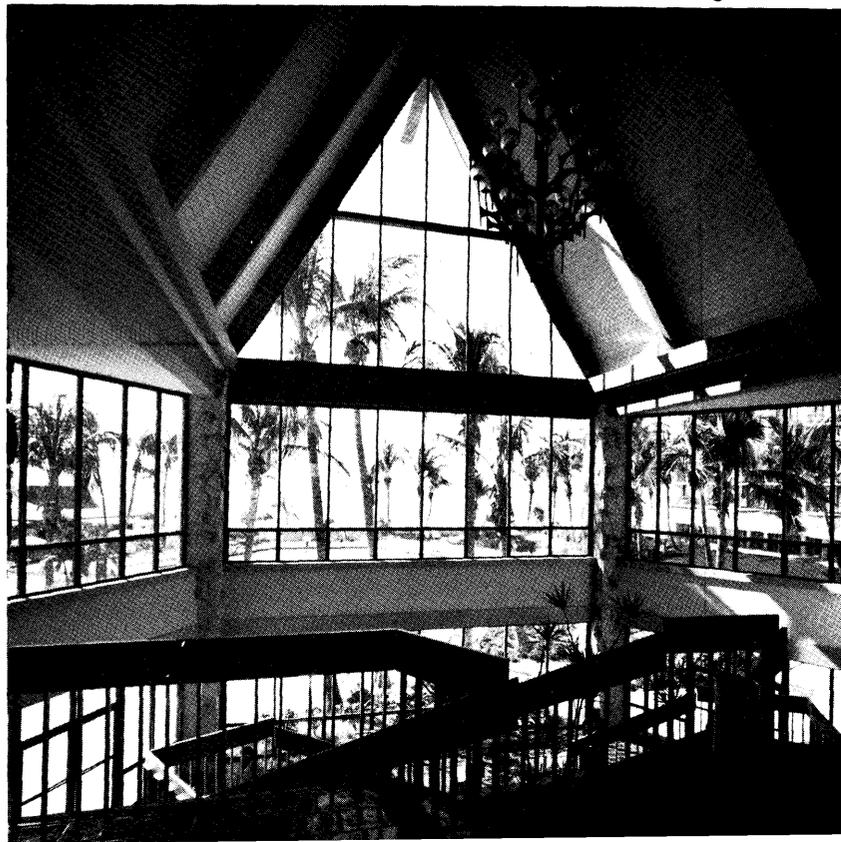
ROOM TOWER — TYPICAL FLOOR PLAN



MARCO BEACH HOTEL

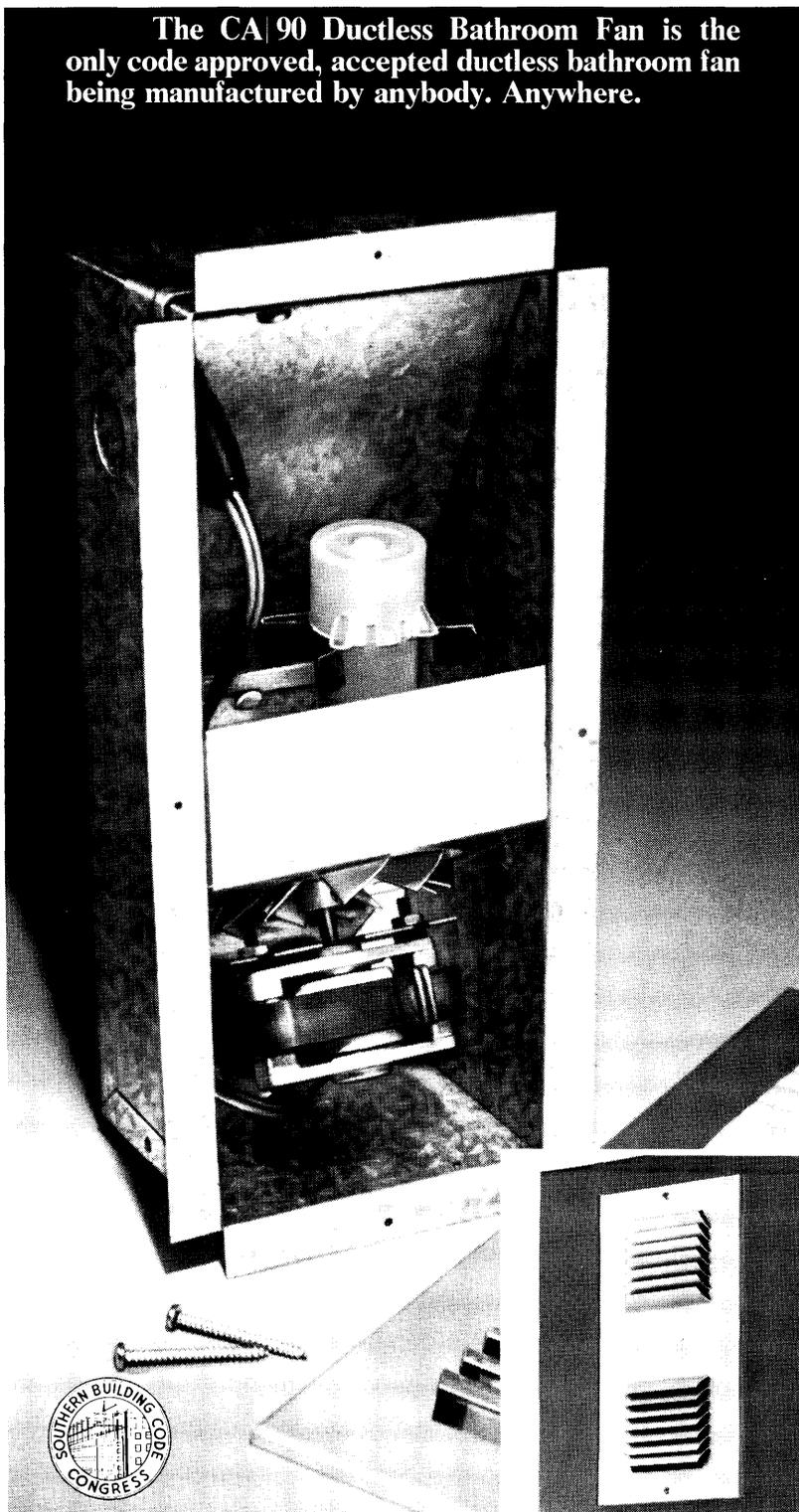
Alexandre Georges

ARCHITECTS: Vensel, Savage & Associates
 STRUCTURAL ENGINEER: William Weaver
 MECHANICAL ENGINEER: Cook, Sloan & Lowe
 LANDSCAPE DESIGNER: Bruce Howard
 INTERIOR DESIGN: Henry End Associates



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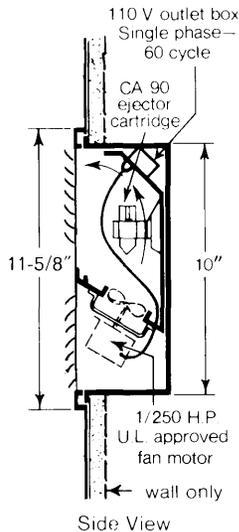
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Feasibility Reports For Architects

H. SAMUEL KRUSE, FAIA

*FOURTH IN A SERIES OF ARTICLES PREPARED BY
FAAIA PRACTICE AIDS COMMITTEE*

Feasibility reports have such an influence in the creative process for architecture that they can be classed with schematic sketches as the geneses of architecture. In this sense, architecture, or a significant ingredient of the practice of architecture, includes feasibility reports whether prepared by architects or not.

The recent spurt of interest in feasibility reports by small office practitioners (SOP's) is not due to an awareness that many of them have been exploited in the preparation of feasibility reports by others (which benefited neither themselves nor their communities). In many communities the architect is the only professional to whom the developers can turn for the kinds of studies needed to determine the feasibility of projects within constraints imposed by community concern for density, traffic, pollution, aesthetic and other environmental impact considerations. In this light, the feasibility report becomes the first step of the three steps in project development — decision, design and delivery. Since such steps influence the outcome of architecture, every architect should become second to none as an expert in the preparation of feasibility studies and reports.

Until recently, feasibility reports were preliminary decision-making vehicles based on dollar-and-cents economics, and the architect's role in their preparation was usually limited to "Physical Concerns" (as building program and budget) and sometimes site selection, nearly always controlled by the economic feasibility prepared by others. Some architects became skilled in a particular field and, as a result, were commissioned to prepare the complete study, economic feasibility, program and budget, and site selection.

In Florida there are many SOP's who have this expertise in hotel developments and shopping centers. Of course, these architects do not sit down at a typewriter and whip-out a report over a weekend. They exploit carefully developed and available resources and organize the opinions of a number of experts.

Recently the feasibility study has become much more than a tool for economic decision. Added to the study are considerations of social and environmental impact, which can easily stop an economically feasible project if found socially and environmentally unacceptable. Many developers are finding these considerations overwhelming and seek the advice and counsel of those whom they believe understand such subjective indeterminates. More architects are being commissioned to do such work and SOP's are getting their share.

For this reason this paper is written to help the SOP prepare a check list of criteria for outlining the scope of a feasibility study and how to develop resources for the reliable information needed for a new-age feasibility report.

Essentially, a feasibility report shows the developer what can be built at what cost to earn a given income, or what must be charged in sales, leases or rents, to cover projected development costs. Both require a considerable amount of crystal-ball gazing into the future. This puts a premium upon reliability of information and the validity of opinion, if the report is to be acceptable. In such a situation the architect's opinions count for little and, as for a Doctoral dissertation, authorities must be referenced and generally acceptable, but especially to the client.

The SOP's first task is to learn where he can obtain reliable information and to develop the source of data which are considered valid, even when the data are only the consensus of informed opinion on future trends. He must not believe

that he can obtain all data free of charge; some he can get for the asking (friends, colleagues and government agencies), however, he must expect to pay for those documents prepared by associations and private institutions for use by their members and recognized consultants.

There are certain institutions which should be approached first: Department of Housing and Urban Development and Department of Health, Education and Welfare are prime sources of information on requirements for U.S. Government regulatory decisions and financial support for housing, health facilities, educational facilities and the like. For the U. S. Government Printing Office, Washington, D. C. 20402, index of printed material available and its cost, gives titles of a tremendous amount of reports, directives, studies, regulations and standards under a large variety of headings. From this index select the titles that suggest the most likely to give the help that is needed and order them. Even if these documents themselves give bibliographies, quote recognized authorities and other information sources which can lead to more pertinent sources.

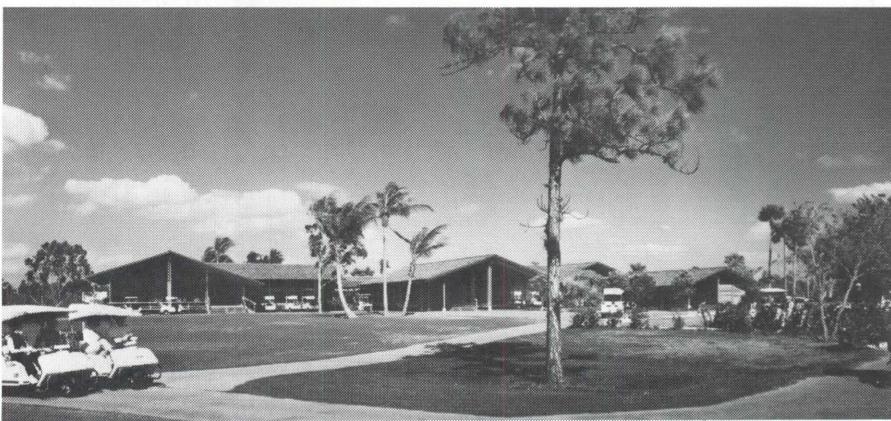
The National Association of Real Estate Boards, 155 East Superior Street, Chicago, Illinois 60611, has a bibliography series which lists annually the publications related to real estate problems under headings as "Apartment Buildings," "Commercial Property," "Industrial Property" and others. The Association indicates the availability and prices of the items listed through its Book Services Program.

Urban Land Institute, 1200 Eighteenth Street, N.W., Washington, D.C. 20006 is next to the U.S. Government as a resource for information related directly to land development (housing projects, planned communities, shopping centers, etc.) prepared by recognized authorities. National Association of Building Owners and Managers, 134 South LaSalle Street, Chicago, Illinois 60603, is an authoritative resource for management, maintenance and operations costs and other data. F. W. Dodge Corporation, The Engineering News-Record are sources for construction costs and trends, generally known and utilized by SOP's for a variety of purposes.

Local resources must be developed as thoroughly as national resources. Besides learning who of the local individuals and institutions are the most knowledgeable and reliable in the obvious fields of banking and real estate, it is necessary to learn, first-hand, local conditions and trends. This need is illustrated by an experience some years ago that an architect member of the local Chamber of Commerce had. A large aviation manufacturer was seeking a site in Florida and many cities vied for the manufacturer's decision favoring their city. Each Chamber of Commerce, did it's best to prepare brochures which illustrated with facts, figures and pictures why the available sites in it's city were the best. The architect-member prepared the brochure for his local Chamber of Commerce and acted as chairman of the committee of business citizens selected to interview the manufacturer on his visit to the community. On the day of the interview the committee met with the manufacturer and discovered, to the dismay of the committee, that he was a team of twelve community re-

Continued

Okay,
 somebody
 yells fire.
 Will it be
 goodbye
 building, or
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FEASIBILITY REPORTS, Continued

searchers who wanted to know, in great detail, how the public school system operated, its millage and cost/effectiveness per pupil; the public transportation system, costs, routes, efficacy and future plans for expansion; real estate costs and trends, not only for their own plant site, but for their employees; the tax picture, not only for the plant and its operation, but their employees and their civic services including schools, police and fire protection, parks, water, sewers, libraries, etc.

The committee was unprepared for this barrage of inquiry, had no idea where data could be gathered quickly for answering the questions and, needless to say, did not win the manufacturer's favor.

If the architect-member for the Chamber of Commerce had first learned what the manufacturer wanted from a feasibility study, in all probability a more detailed and useful presentation could have been made. The story illustrates the need to know local resources so thoroughly that a sudden demand for a detailed analysis will not panic the SOP to inaction and missed opportunity; and it also illustrates the most salient features of all feasibility studies: (1) how detailed must the study be, (2) how much time may be spent on the study, and (3) does the client for whom the study is being prepared have experiences, precedents, biases or other constraints influencing the outcome of the study, and (4) is the client willing to pay for the cost to match the desired report. **A feasibility report must be useful to the client in making an important decision; it must not be an academic exercise in impressing a client on how much the researcher knows.**

The Department of Transportation is quite clear in what it wants in their "impact study" for highways, bridges and airfields. Hilton and Sheraton, two hotel chains, have similar definitions for their feasibility reports for franchise operations as well as project development; however similar, there are important differences in criteria for operations, occupancy rates, depreciation, etc., and in format. It is important that the client define in considerable detail what it wants from a study, the criteria to be used or developed, and the format to be used. Large chains (Howard Johnson, Sheraton, etc.) have printed summary sheets so that the supporting data can take many forms, but the summary of the results is presented the way they want it.

"Scheme A – Office Building" is a copy of a typical summary sheet for a feasibility report for building for commercial and office use and does not reflect in Estimated Project Cost the public and private social costs, were this a project in an area where the project would have significant environmental impact. Note that the interest for a 20 year mortgage is cheap, rents depressingly low, but occupancy extremely optimistic. All of these conditions are given validity by supporting data in the report, which lists or quotes the authority for the assumptions and/or recommendations in the summary.

Notice that the possible return is factual and avoids saying that the project is feasible or not. The report does not make the decision; it assists the client in making a decision. In the case of "Scheme A" the return looks disappointing. However, "Scheme A" looks good to a wealthy man in his early sixties who does not want to make more money, but not lose any, and to leave his grandchildren a good income earning property. One must remember that there are many reasons why people do things. Developing real estate is not exception. Prepare a report as valid as one can within the time and resources available, as honestly as you can, and the client will be able to make a valued decision.

Some reports become very complex – those involving environmental impact especially. These studies nearly always require the services of governmental agencies, and personnel and specialists usually found at Universities. These reports have bulky supporting data and more items in the summary, which includes not only statements as to economic return, but also brief statements as to the institutional and environmental impact the project generates.

Some architects charge from ¾% to 1½% for a study of average detail for a project like "Scheme A". Sometimes an architect will credit half of the fee for the feasibility report to the fee for the orthodox architectural service if he should be given the commission. An architect must remember that in preparing reports on which decision of serious implications is based, the architect, as in orthodox practice, as an independent provider of professional services, is exposed to legal actions involving claims of damage sustained by third parties arising out of the alleged negligence of the architect. If he performs his studies seriously using reasonable judgment as to the reliability of information and completeness, his exposure need not give him sleepless nights. It is also necessary to remember that the architect's compensation should reflect this exposure and responsibility and the service value to the client.

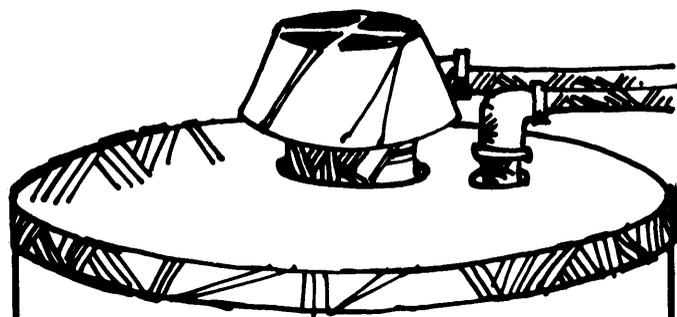
SCHEME A – OFFICE BUILDING	
1. BUILDING AREAS	
a. Gross incl. mechanical, service (sq. ft.)	105,000
b. Net rentable (sq. ft.)	
Commercial – first floor	6,000
Commercial – basement	3,000
Offices – loft	22,000
Offices – suites	52,000
Total net rentable area (sq. ft.)	83,000
2. ESTIMATED PROJECT COST	
Land	\$ 150,000
Construction (105,000 sq.ft. @ \$15.25)	1,600,000
Movable part. (eight floors @ 600 lin. ft.)	150,000
Architectural and engineering fees	110,000
Interest during construction	45,000
Taxes and insurance during construction	4,000
Legal	1,000
Miscellaneous and contingencies	25,000
Total estimated project cost	\$2,085,000
3. POSSIBLE FINANCING	
Project cost	\$2,085,000
Mortgage at 60%	1,250,000
Equity required	\$835,000
Land	150,000
Cash required	\$ 685,000
5% 20 yr. mortgage of above amount assumed.	
Annual amortization, interest	\$ 105,300
4. ESTIMATED ANNUAL GROSS INCOME	
Commercial – 6,000 sq.ft. @ \$2.25	\$ 13,500
3,000 sq.ft. @ \$1.00	3,000
Loft Space – 22,000 sq.ft. @ \$3.25	71,500
Suites – 52,000 sq.ft. @ \$3.75	195,000
	\$283,000
Less 5% vacancy	14,000
Estimated annual gross income	\$269,000
5. ESTIMATED ANNUAL OPERATING COST	
Operating expenses (including all services	
\$1.00 per sq.ft. rentable)	\$ 83,000
Property tax	21,500
Insurance	5,000
Replacement reserve and miscellaneous	6,000
Total annual operating cost	\$115,500
6. AMORTIZATION, DEPRECIATION, INCOME TAXES, PROFIT	
Annual gross income	\$269,000
Less annual operating costs	115,500
Annual Net income	\$153,500
7. POSSIBLE RETURN	
a. If mortgaged: Annual net income	\$153,500
Annual amortization, interest	105,300
For annual income taxes and return – first 20 yrs. \$ 48,200.	
After debt service, this amount equals 5.77% of equity of \$835,000	
during first 20 years: \$153,500 annual net income equals 18.38% on	
\$835,000 equity after 20 years.	
If owner financed, annual net income of \$153,500 equals 7.36%	
return on \$2,085,000 project cost or would amortize cost with return	
of 6% for 28 years 3 months.	

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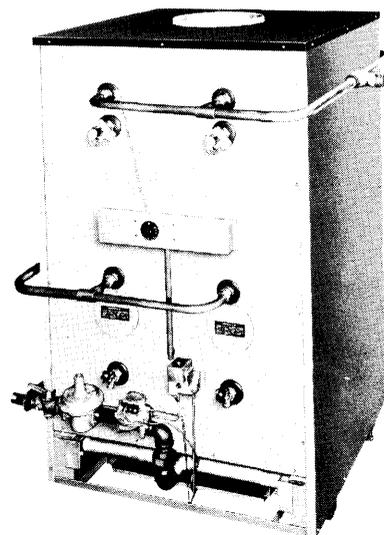
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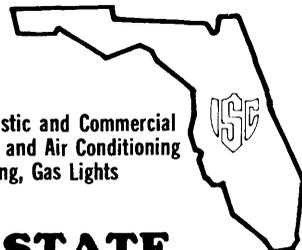
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COMPUTER-AIDED SPACE PLANNING

William R. Miller
Principal and Co-Founder, Design Methods

Prepared for
Design Automation Workshop
San Francisco, California

Abstract

This paper describes the application of MATRAN-III, a computer program developed by the author, to planning the space for a branch bank in Southern California. MATRAN-III is used to identify clusters of elements within a set of inter-related elements. The program accepts any arbitrary listing of the elements and their proximal relations and creates an adjacency matrix. This matrix is block diagonalized yielding visually recognizable patterns which can be mapped into line-dot diagrams. These diagrams can then be presented to a designer providing him with a memory pattern from which we can begin laying out the geometric configuration of the space.

Introduction

Space planning is an architectural phrase used to describe the process of locating the functional spaces within a building facility. These spaces may be either rooms, as is the case with laying out building floor plans, or work stations as in the problem of office landscaping. In either case, the design process is essentially the same.

The typical non-computerized approach to space planning can be idealized as a three-fold process of information gathering, trial and error design and solution presentation. In actuality, many other things are included in the total design process, such as the emotional feel of a building, the flow of space, the transition between spaces, philosophical ideals, rhythm, pattern, texture, etc.

The information gathering portion of the process is referred to as the "program development" phase. A "program" is a written document (not to be confused with a computer program) which defines the space planning problem. The contents of this document are usually based on conversations with the client, the results of questionnaire surveys and professional knowledge. In essence, the program document states the design requirements for the proposed facility.

After the program has been written, the project enters the design phase. The designer studies the program until he feels he has sufficient knowledge of the problem to begin laying out a plan for the facility. The information most pertinent to this process consists of a list of all the functional spaces within the facility, the square footage requirements for each of the spaces and a list of all the adjacency requirements between spaces. Figure-1 shows a sample set of this type of information.

<u>ID</u>	<u>NAME</u>	<u>RELATES</u>	<u>AREA</u>
1	SALES DIRECTOR	2, 3	180
2	CONFERENCE ROOM	1, 3	250
3	SALES SECRETARY	1, 2, 4	100
4	LOBBY	3, 5	200
5	PROJECT SECRETARY	4, 6, 7	100
6	LIBRARY	5, 7	200
7	PROJECT DIRECTOR	5, 6	180

FIGURE-1: ADJACENCY REQUIREMENTS

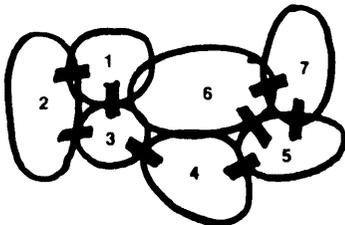


FIGURE-2: BUBBLE DIAGRAM

The designer's early plans are generally in the form of bubble diagrams. A bubble diagram, as shown in Figure-2, displays each functional space as a free-hand oval (hence the term "bubble") such that its area is directly proportional to the amount of square footage required for that specific space. Adjacency requirements are shown by drawing the ovals of adjacent areas tangent to each other. The bubble diagram used by the designer is an attempt to relate many things not relative, yet this diagram helps organize the designer's thought on many points simultaneously. Many bubble diagrams may be drawn for each of the various parts of a given facility. This process eventually leads to a final diagram incorporation of all the functional spaces within the facility and as many of the adjacency requirements as the designer was able to satisfy. After an acceptable bubble diagram has been created, it is translated into a rectilinear plan. Continued

	1	2	3	4	5	6	7	
1	1	1	1					SALES DIRECTOR
2	1	1	1					CONFERENCE ROOM
3	1	1	1	1				SALES SECRETARY
4			1	1	1			LOBBY
5				1	1	1		PROJECT SECRETARY
6					1	1	1	LIBRARY
7				1	1	1		PROJECT DIRECTOR

FIGURE-3: ADJACENCY MATRIX

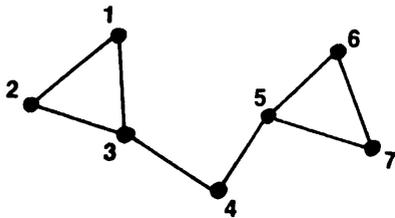


FIGURE-4: RELATIONAL DIAGRAM

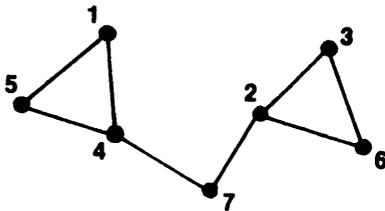


FIGURE-5: REVISED RELATIONAL DIAGRAM

	1	2	3	4	5	6	7	
1	1			1	1			SALES DIRECTOR
2		1	1				1	PROJECT SECRETARY
3		1	1				1	LIBRARY
4	1			1	1		1	SALES SECRETARY
5	1			1	1			CONFERENCE ROOM
6		1	1			1		PROJECT DIRECTOR
7		1	1				1	LOBBY

FIGURE-6: REVISED ADJACENCY MATRIX

	1	5	4	7	2	3	6	
1	1	1	1					SALES DIRECTOR
5	1	1	1					CONFERENCE ROOM
4	1	1	1	1				SALES SECRETARY
7			1	1	1			LOBBY
2				1	1	1	1	PROJECT SECRETARY
3					1	1	1	LIBRARY
6					1	1	1	PROJECT DIRECTOR

FIGURE-7: REVISED ADJACENCY MATRIX BLOCK DIAGONALIZED

Presentation of the design solution to the client usually emphasizes just that, the design solution. The design process is typically not presented. The total process of developing a program, designing the facility and presenting the solution is usually time consuming and costly. The solution is generally sub-optimum and open to much criticism.

Methodology

The methodology described herein concerns that portion of the space planning process involved with the juxtaposition of the functional spaces within a proposed facility given their desired adjacency requirements. The method utilizes an adjacency matrix for defining the elements (functional spaces) and their proximal relationships. A complete description of this methodology is published elsewhere (Ref. 4). The following description has been included for the sake of completeness.

The previous sample data is shown formatted as an adjacency matrix in Figure-3. The rows and columns of the matrix are labeled with the element identification numbers. Note that the numbering sequence must be the same for both the rows and columns. The presence of a one (1) in the interior of the matrix represents the existence of a relation between the addressing elements. If a cell is blank, then no relation exists between the addressing elements. For the sake of graphical clarity it is assumed that all elements relate to themselves, thus there is a "base diagonal" of ones running from the upper left corner to the lower right corner of the matrix. Since all relations are assumed bi-directional (if A is next to B, then B must be next to A) the matrix is symmetric about the base diagonal.

This same set of data can also be shown using a line-dot diagram (relational diagram) as indicated in Figure-4. The functional areas are represented by the nodes and the adjacency requirements between functional areas are shown as lines between nodes. This diagram is similar to the designer's bubble diagram. In practice it has been found that the line-dot diagram actually shows the relational structure of a space planning problem more effectively than the designer's traditional bubble diagram. The bubble diagram tends to obscure the relational structure of the problem by showing too much information, i.e., square footage and non-required adjacency constraints. The line-dot diagram shows only that information necessary to delineate the relational structure of the problem.

Note the visual relationship between the adjacency matrix of Figure-(3) and the diagram of Figure-(4). There are two clusters, or groups, of elements in the diagram and there are two clusters of one's in the matrix. For example, elements 1, 2, and 3 are clustered in the diagram with a corresponding cluster of one's lying in the intersecting rows and columns representing the same elements in the matrix.

Note, if we would have numbered the notes of our diagram, say as in Figure-5, we would find that the corresponding adjacency matrix as shown in Figure-6, would be non-sensical. If however, we could diagonalize this matrix by rearranging the corresponding rows and columns of the matrix to that of Figure-7, we would once again identify the visual relationship between the diagram and the matrix.

This visual relationship allows one to find the clusters for any set of interrelated elements, assuming: Continued



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COMPUTER-AIDED SPACE PLANNING, Continued

1. The only attribute assigned to an element or relation is that of existence. (Intensity of a relation between elements may be included.)
2. All relations are bi-directional.
3. All elements relate to themselves.

The methodology is summarized as follows:

1. List the elements in the problem set and their relationships in terms of an adjacency matrix.
2. Block diagonalized the adjacency matrix.
3. Visually identify the clusters forming along the base diagonal.
4. Map this information into a relational diagram.

MATRAN-III

As one might well guess, the critical step of this process involves manipulating the rows and columns within the matrix such that the unit values are forced to cluster along the base diagonal. If one were to attempt this task manually, he would be forever exchanging rows and columns. With the aid of a computer, however, it is possible to write a program that will perform this manipulation automatically. Such a program, MATRAN-III, has been written. It is composed of the following major segments: data input, data manipulation and data output.

Input data is comprised of three basic types: job title information, element base data and run status data. Job title data allows the user to identify the project name, number and descriptive comments. Element base data consists of the element identification number, the element name, the element area (sq. ft.), a list of the related elements and the degree importance of each relationship (as defined on a scale of high, medium or low). Run status data identifies whether or not any set of relations within a given weighted range is to be suppressed.

The program organizes this data into a format ready for matrix manipulation by creating an adjacency matrix such that the rows and columns are labeled with the element identification numbers. The field of the matrix is loaded with importance values associated with the relations between elements. The value for a non-relation equals zero (0), for a low relation: one (1), for a medium relation: two (2), and for a high relation: three (3). The main manipulation subroutine then causes the computer to block diagonalize the matrix by interchanging various rows and corresponding columns such that relational values converge to the base diagonal. In a weighted analysis the higher values converge to the diagonal faster than the lower values.

The computer first identifies two rows (and corresponding columns) for possible exchange. The value of the matrix is then calculated. (The value of the matrix at any given time is equal to the sum of the products of the relational value within a cell, either 0, 1, 2, or 3, multiplied by its distance, number of cells from the base diagonal.) This calculated value is placed in temporary memory. The computer then calculates the projected new value of the matrix assuming that the rows and columns in question are exchanged. This is done without actually making the exchange. If the value of the matrix prior to the proposed exchange is greater

than the projected value then an improved condition has been identified and the computer is allowed to make the exchange. If the value of the matrix prior to the exchange is less than or equal to the projected value then no improvement is projected and the exchange does not take place. The computer next identifies two more rows (and corresponding columns) for possible exchange. This process continues until no further improvement can be made.

Once the computer has blocked diagonalized the data matrix it is ready to output information. The output is composed of a list of all the elements and their relations (this is simply a reflection of the input data), a print out of the data matrix (the input data formatted as an adjacency matrix) and a print out of the solution matrix (diagonalized data matrix).

The solution matrix is then visually interpreted by manually partitioning the matrix to identify clusters and other recognizable patterns along the diagonal. The partitioned matrix is then mapped into a relational diagram. This diagram is presented to the designer to provide him with a memory pattern from which he can begin laying out or plan for the facility.

Application Description

The following example describes the application of MATRAN-III to planning the space for a Wells Fargo branch bank in Pomona, California. The description concentrates on the computerized space planning portion of the problem. Brief comments are made regarding the program's interface with the total design process.

The first step of the design process was to establish the design requirements for the proposed branch bank. This task was performed jointly by architectural designers and banking operations experts. From the set of requirements came a list of the functional areas and their corresponding proximal relationships. The geometric constraints were neglected at this point. The only attribute assigned to each functional space was that of existence. The relations, however, were said to exist with either a high, medium or low degree of importance. Since relations between spaces were based on geographical proximity all relations were assumed to be bi-directional.

This information was then listed on standard coding forms. Data cards were punched and submitted to a UNIVAC 1108 computer under the control of the MATRAN-III program. The computer first created a symmetric adjacency matrix (data matrix) and identified those areas that were totally unrelated to the problem set. A revised adjacency matrix was then generated eliminating the unrelated areas from the matrix. A computer then block diagonalized the revised matrix. The diagonalized matrix (solution matrix) was then printed utilizing various graphic embellishments.

The next step was to visually partition the solution matrix. This partitioned matrix provided the basis for the relational diagram shown in Figure-11. This relational diagram was then presented to the designer.

The designer started laying out the geometric space by first planting those elements of the relational diagram that had definite geographical locations. These elements were:

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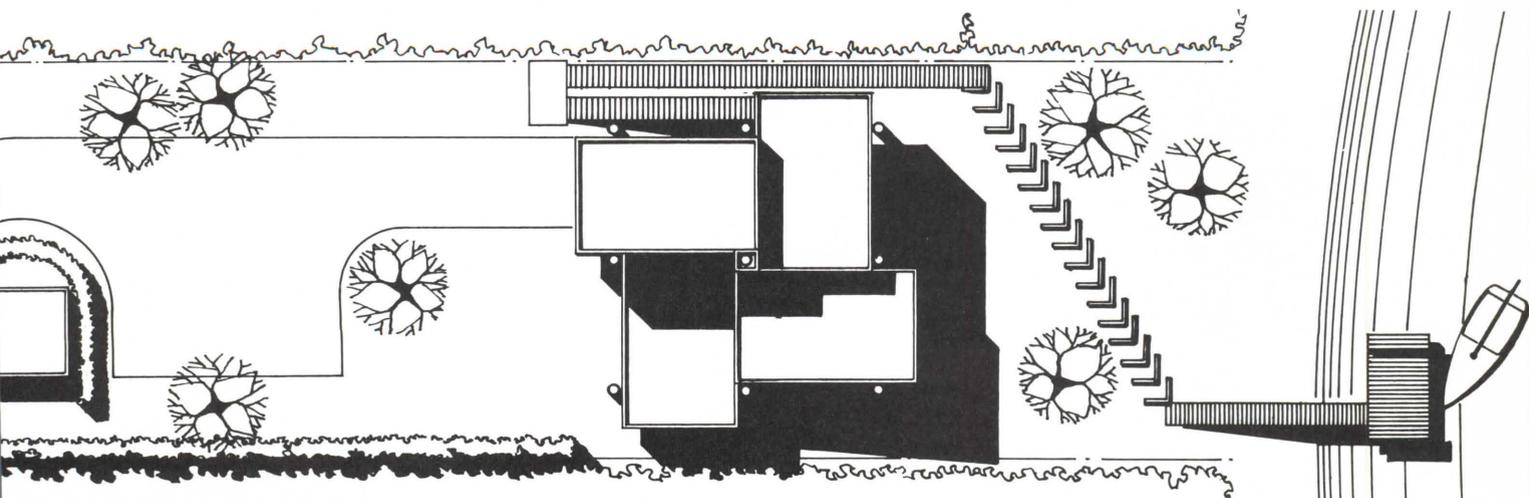
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Stanley Residence

OWNER: Dr. and Mrs. Robert G. Stanley
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LOCATION: Central Florida



Stanley Residence



The site is 53 feet wide and heavily wooded, sloping downward to a lake to the east. Neighboring cottages dot the hillside to the south, and a recreational area lies to the north.

The owners desired a living room suitable for displaying rare maps, prints and paintings; a separate dining room near the kitchen; a screened porch overlooking the lake; a guest suite separated from the family living area; a studio for writing and print framing; a covered parking area near the kitchen; and a master bedroom suite with two additional bedrooms nearby.

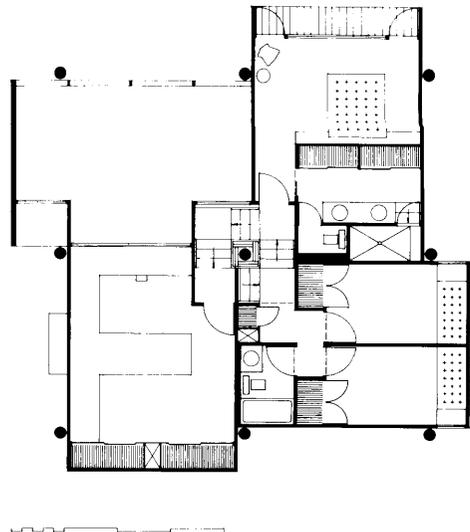
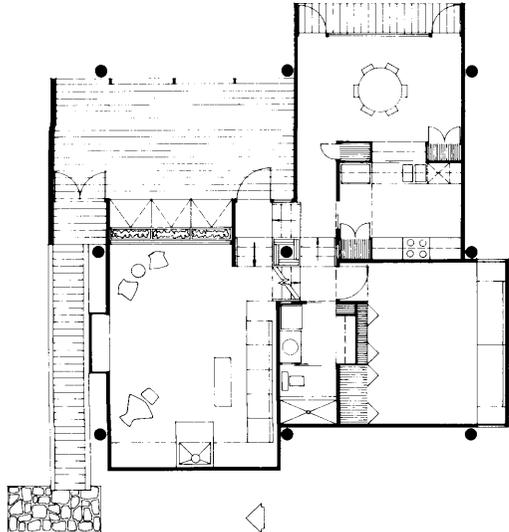
All living spaces are arranged to overlook the lake, with minimum openings on remaining walls for privacy. The timber structure is lifted above the hillside on 9 wooden piles, supporting a series of platforms in a pinwheel configuration ascending in a continuous spiral around the central wood stair. Visitors enter by way of a ramp leading up to the two story porch from which they continue up to the living room,

bedrooms and studio, or down to the kitchen, guest suite and carport. The porch shades the living room and studio without obstructing the view of the lake.

Wood is the principal building material throughout. Specially designed threaded shear plates permitted laminated southern yellow pine beams to be adapted to the irregular surfaces of supporting piles, clearly expressed inside and outside. Walls are rough sawn fir plywood horizontal lapped siding, nailed to 2" x 4" wood studs with 4" insulation. Floors are factory laminated edge grain pine forming 12" wide planks with unbroken continuity across exposed timber floor and ceiling joists. This type of laminated planking is used ordinarily for truck bed bottoms, and resembles a bowling alley surface when finished as exposed residential flooring. Exposed exterior wood surfaces are treated with a penetrating wood preservative. Interiors including cabinets and built-ins are exposed natural finish. ●



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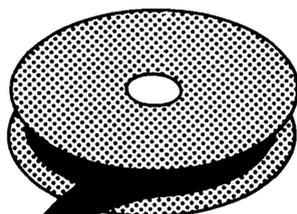
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