

ROOM USE ONLY

A TOURIST COMPLEX FOR
PUERTO RICO

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ROOM USE ONLY

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SECTION A - PRELIMINARY STATEMENT

1. REASONS FOR CHOICE OF SUBJECT

Tourism is an important industry and a large source of income for both private and government interests in Puerto Rico. But the tourism industry in Puerto Rico has for long catered almost exclusively to the foreign, mostly American, tourist trade. The particular interest which I hold in this project is the development of a tourist complex which will cater to a wider scope of tourists, family vacationers, campers, excursions, both local and foreign. Tourism is a fickle industry dependant upon the economic trends of the times and by providing a wider range of tourists as an operating base for the project it will provide a more stable economic base

2. SOCIAL AND ECONOMIC JUSTIFICATION

The tourism industry in Puerto Rico is primarily concentrated in the San Juan metropolitan area with accomodations ranging from middle class to luxury hotels. These hotels are geared to handle the foreign tourist who typically stays for a short term vacation in search of sun and recreation. Conventions are common but usually not very large since convention facilities on the island are fairly limited. Therefore the tourism industry in Puerto Rico is very sensitive to the economic moods of the United States in particular, since the great majority of the tourists coming to the island originate from there. This fact has been witnessed recently with the

economic recession that hit the United States. The tight money caused the closing of several first class hotels in the San Juan area. Vacations are usually the first to go when money gets tight.

The tourism industry should also be decentralized away from the San Juan area in order to spread its benefits; money, jobs, development, throughout the rest of the island. There are presently some major hotels and resorts away from the San Juan area, the Dorado Hilton, El Conquistador Hotel near Fajardo are a couple, but the majority of the industry lies in San Juan. Sugar, though still an important industry, is no longer what it once was in inland Puerto Rico. Touristic development could be one way of bringing much needed revenue to the interior of the island.

Since the tourist industry is geared to accomodate the foreign tourist, the vacationer who happens to reside in Puerto Rico seriously lacks a place on the island where he can spend some time away from home. He can either pay the high prices of the hotels, which are formulated for the short term tourist, or he can have his own vacation home or he can always leave the island for his vacation. Any of these alternatives require a substantial financial backing. In this project, I wish to provide the resident of Puerto Rico, who would typically spend his vacation with all his family and for a longer span of time than the foreign tourist, a place where he can have the commodities of home away from home, a place on the island

where he can go to vacation.

The complex would ideally be a homogeneous integration of the foreign tourist, the vacationer who resides on the island, and the local traditions and people of the area. Most hotels, especially in the San Juan area, are just an extension of the tourists' cultural environment at home. Anything in the hotel they could have seen or aquired in the United States. This project will attempt to afford the tourist with a closer look into a different culture, traditions and the people of the island.

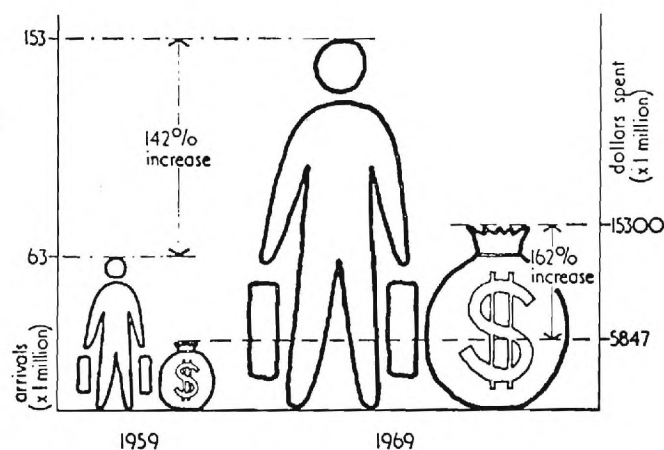
3. PROBLEM SCOPE OF THESIS DESIGN STUDY OR PRESENTATION

Design study and development of the problem shall include:

- a. General site plan showing sorrounding areas, main access routes to site, major population centers, recreational and touristic facilities in the general area.
- b. Master plan of entire project showing placement of the different type units and facilities.
- c. Development of the hotel for the complex in detail showing all plans, and including elevations, sections, character sketches and any other presentation means needed for the explanation of the building.

SECTION B - HISTORY

Ever since the dawn of time man has migrated from one place to another and since that time other men have noted that there was a profit to be made accomodating these travelers. Widenning trade, commercial, cultural and educational interests expanded travel during the Renaissance. With the Industrial Revolution and the advance in technology during the XIX century travel increased and many areas of the world became accessible to the tourist who could afford to get there. But the greatest increase in tourism has come about after World War II and particularly from the late 1950's onwards. The rate of increse in travel has been so phenomenal that tourism is now the prime growth industry in the world.



1 Increase in world tourism during the last ten years

Several reasons are responsible for this tremendous growth in the tourism industry. In all of civilized history there has never been such a large segment of the population of the world with the degree of affluence and leisure time as

today. The young today lack the family responsibilities and possess the incomes which enable them to travel. Transportation facilities are faster, better and cheaper than ever before. Large increases in international trade and sports stimulates all sorts of cultural and financial interchange between countries which stimulates travel. Better education has increased interest within large segments of the population to visit the places which they have heard about. World fairs, Expo exhibitions, and other trade and cultural exhibitions, the Olympics and other events of this nature produce millions of travelers. Puerto Rico has its share of the world tourism trade and the growth of this industry has exerted its influence upon the economic life of the island.

Since its inception, tourism has been influenced and determined by three factors; transportation, service and accommodations. The accommodations have always been as varied as the tourists it accommodates. During the Middle Ages, pilgrims on the routes to Santiago de Compostela often found refuge in the convents and monasteries along the way. In the early XX century, only the wealthy could afford to travel so exclusive resorts, such as West Palm Beach, met the needs and demands of the industry at the time. But tourism today spans a large segment of people from varied income brackets and cultural backgrounds, so tourist facilities today should accommodate this variety.

Today's tourist usually falls into one of the following

general categories:

YOUTH. This category can be subdivided into the middle teens and under group and the late teens and early twenties group. The first subgroup usually travels with their families or in a group accompanied by adults. They are lodged in the same type accommodations as their adult travelers. The second group tends to travel individually or in small groups composed of people in their age group. This group will put up with the cheapest accommodations.

THOSE SEEKING LEISURE AND RELAXATION. This group includes adults of all ages. Within this grouping there are people who will put up with every type of accommodation, from cheap up through medium to luxury. They travel individually or in groups and use every conceivable mode of transportation.

BUSINESS. This group does not only include conventions but salesmen and executives who travel as a requirement of their businesses. The technical and scientific societies and their members also fall within this category. Their accommodations range typically from medium class to luxury.

The tourist facility must also make provisions to accommodate the method of transportation which their guests use.

Stables were for a long time a necessity for a hotel, though today it is considered more of a luxury. An airport hotel recognizes the airplane as the chief mode of transportation used by its guests just as a railroad station hotel recognizes the train. A motel accommodates the automobile as its guests' major transportation system while a marina facility recognizes a heavy use of water as a transportation medium.

Typically today, tourist facilities tend to have a rather select clientele, both as to its booking characteristics and to the mode of transportation of its guests. A resort hotel typically attracts wealthy clients in search of leisure

and relaxation and it limits its facilities to provide just for these needs of these clients. In short, it provides select facilities for select people.

In broad terms, in the Northern Hemisphere, in countries of western civilization, the general tourist flow is from north to south. The north has the affluence and the south has the sunshine. New Yorkers fly south for the winter and the French head for the beaches of Spain. The great industrial powers, therefore the money, generally lies in the north; the New England states, England, Germany, but the sunny beaches lie in the south. Puerto Rico falls into the southern category and therefore has traditionally catered to the northern influx of tourists. Though the foreign tourist shall always provide the majority of the tourist trade, there is no reason to neglect local tourism and the income which it can provide.

Trends show that in the future tourism shall continue on the rise, but as it rises, it also will widen the variety of tourists. Facilities in the future should accommodate as many of these diverse characteristics as circumstances will allow.

SECTION C - ANALYSIS

1. ACTIVITIES TO BE ACCOMMODATED

The tourist complex shall accommodate basically three types of people; the tourist the visiting public and the employee staff force.

The tourist, including the variations within this classification, is the basic unit which will determine the design of the housing units. The general break down of this project will be:

- 5-10%- adults traveling alone
- 45-55%- adults traveling with their children
- 30-40%- youth accompanied by adults
- 5-10%- youth traveling alone

The tourist population is estimated to oscilate between 1,000-1,500 people. The fluctuation in this population figure is due to certain intangibles such as the number of children a family brings on its vacation and the seasonal characteristics of the tourist industry. The design of the complex will allow for this sway.

The visiting public consists of people who have come to visit guests staying at the complex and those who are only going to use the beach, the marina and other facilities of the complex. As a guide to the design of the facilities, an increase of 50% to 100% in the total population of the complex is attributed to the visiting public. This increase will typically occur during the week-ends year round. The visiting public will be almost exclusively composed of residents of the island and their flow to the complex will not be as seasonal

as the tourist flow tends to be.

An employee staff force is necessary for the provision of services and maintenance to insure the proper function of the complex. For proper service to be administered to the guests, a labor force of one employee per unit is estimated to be sufficient. This figure just includes service personnel and not the administrative staff. During peak periods, a figure of .5 employee per unit may be added to the work force where it is felt to be needed the most.

BASIC FACILITIES

A. Living units

The tourist population will be housed in approximately 500 units, allowing \pm 50 units. Three basic categories of units are planned for this complex:

1. Units requiring much service
15% of total units = 75 units (hotel)
2. Units requiring moderate service
65% of total units = 325 units
3. Units requiring little service
20% of total units = 100 units

B. Service facilities

1. Central kitchen facilities
2. Laundry service
 - a. hotel use
 - b. guest and public use
3. Maintenance facilities
4. Central storage
5. Mechanical rooms

C. Communal facilities

1. Arrival and reception area
2. Recreational facilities
3. Commercial facilities
4. Day care center

5. Beach facilities
6. First aid station
7. Security
8. Parking

D. Administrative facilities

1. General administrative offices of complex
2. Hotel administration
3. Moderate and little service units administration
4. Food services offices
5. Maintenance

E. Employee facilities

1. Living units - 75 to 100 units
2. Lockers and bathing facilities

2. AREAS

A. Living units

1. Units requiring much service - 75 units

The typical guests who uses this unit is a foreign tourist who desires a high degree of service. This requires a high employee per unit ratio and therefore this type unit runs on a high operation cost. These units closely resemble the typical hotel operation commonly found in San Juan. Within these high service units there will be three basic types of rooms.

a. Small rooms. These are to be designed to accommodate a single person or a couple traveling alone. It will include a bathroom, closet, and a dressing room. These units will make-up 20-30% of the high service units.

b. Medium sized rooms. These rooms are to be designed to accommodate two or more persons and include the same basic facilities as the small rooms but in a more spacious layout. These units will make-up 40-60% of the high service units.

c. Large rooms. These rooms should be able to accommodate more than two persons. It will contain multipurpose areas which could be used as living areas, dining areas, etc. These units contain the same basic facilities as the previous rooms. These units shall compose a 10-20% of the high service units.

Areas of rooms in square feet	Min.	Max.
Small rooms	120	150
Medium sized rooms	160	260
Large rooms, suits	210	360
Bathrooms	40	45
Dressing rooms	30	40
Closets	7	20

2. Units requiring moderate service - 325 units

The typical guest using these units is a family or a group of people who wish to vacation having the household commodities and facilities at hand. A certain number of these units could be sold as vacation homes while the others could would be retained as rentals, either long or short term. The guests in these units will be both foreign and local tourists. These units may be developed vertically, horizontally or a combination of both. Out the total of 325 units, they will be divided into the following types and proportions:

a. Three bedroom units - 20% of total = 65 units

1. three bedrooms	432 sq. ft.
2. living room	144
3. dining and kitchen	180
4. 1½ bathrooms	90
5. terrace	100
	<u>946</u> sq. ft.

+ 10% for circulation

Accessories - Stove, oven, refrigerator,
sink, waste disposal, etc.

b. Two bedroom unit - 65% of total = 211 units

1. two bedrooms	288 sq. ft.
2. living room	144
3. dining and kitchen	180
4. bathroom	60
5. terrace	64
	<u>736</u> sq. ft.
	+ 10% for circulation

Accessories - Same as three bedroom unit

c. One bedroom unit - 15% of total = 49 units

1. bedroom	144 sq. ft.
2. living room	100
3. dining and kitchen	70
4. bathroom	60
5. terrace	50
	<u>420</u> sq. ft.
	+ 10% for circulation

Accessories - Same as above units.

d. General facilities (where applicable)

1. janitor's closet
2. elevators, halls, stairs
3. waste disposal system
4. mechanical rooms

3. Units requiring little service

The typical guest who uses these facilities is usually young, traveling individually or in groups and sometimes is camping out or living in a trailer.

a. Dormitory style facility

This facility provides accommodations for groups in which many facilities such as bathrooms are communal. This facility is programmed to accommodate 18% of the total tourist population of the complex or some 70 people.

1. Large group facilities. Three basic units each accommodating 15-20 persons. Each of these nodes is calculated on the basis of 50 sq. ft. per person which includes area for a bed

and a closet. Bathrooms for each of these facilities is allotted 400-600 sq. ft. Toilets and showers are to be at a 1/8 ratio and lavatories on a 1/6 ratio.

2. Small group facilities

These are basically four person rooms and there will be a total of 5 rooms of this type. Area estimates are based on 50 sq. ft. per person. There will be 5 independent bathrooms of 100 sq. ft. each.

3. Communal areas

Commons area to be used as lounge, T.V. and the such. Area estimated on the premise of 10 sq. ft. per person or a total of 700 sq. ft.

4. Storage

100 sq. ft.

b. Camping grounds.

This facility shall account for 6% of the total units or 30, units. It is calculated that on the average there will be 4 persons per camp site unit. These units shall be limited to 4-8 sites per acre of land or approximately 5 acres overall.

1. Facilities per camp site

Parking space
Cooking area
Outdoor table
Washing facilities

2. Common facilities

Toilets - 1/10 persons = 12
Urinals - 1/10 persons = 12
Showers - 1/8 persons = 15

B. Service facilities

1. Food preparation

Central kitchen facility shall provide the major food preparations for restaurants, bar, ballroom, etc. Concession stands throughout the site shall supply complimentary food and beverage vending operations.

a. offices for dietitians	120 sq. ft.
b. receiving area in storage	200
c. food storage	
- immediate storage	200
- fruits and vegetable storage	70
- meats and seafood storage	70
- dairy products storage	70
- general storage	500
d. Food preparation area	1,500
- meat prep.	
- kitchen	
- pastries	
- vegetable prep.	
- electronic ovens	
e. dish and silverware washing	400
f. cart wash	100
g. employee's dining	300
i. service pantry	
j. auxiliary kitchen (serving Cafet.)	900

2. Laundry service 3,500

a. director's office	
b. soiled linen area	
c. sorting area	
d. washing and drying	
e. pressing	
f. clean linen storage	
g. employees' lounge	
h. employees' lockers	
i. clean linen pick up area	
j. sewing	

3. Maintenance of physical plant and equipment

a. chief maintenance engineer's off.	150
b. office	100
c. secretaries	200
d. employees' lounge and lockers	

e.	workshops for painting, electricity plumbing, carpentry	2,000 sq. ft.
f.	maintenance of grounds	1,800
	- garage for 4 tractors	
	- garage for 2 trucks	
	- other mechanized equipment	
g.	foremen's offices (10)	900
h.	construction materials stor.	500
i.	furniture storage	1,300

4. Central storage

Central storage facility shall handle all materials received for the complex with the exception of food supplies which will be delivered directly to the kitchen.

a.	loading dock	600
b.	receiving area	100
c.	offices (2)	200
d.	general storage	2,500

5. Mechanical rooms

a.	boiler room	3,500
b.	fuel tank room	800
c.	water tank room	300
d.	water heater	600
e.	transformers	300
f.	telephone room	100
g.	compressor	800
h.	air conditioning and fans	2,400

C. Communal Facilities

1. Arrival facilities

- a. drop-off and receiving areas
- b. reception and reservations
- c. public toilet facilities

2. Recreational facilities

- a. Indoor facilities
 - ping pong tables (3)
 - dominoes and card tables (10)
 - Theater-movie (multipurpose, dances, etc.)
- 4,000

b. Outdoor facilities

- pools (2)	5,000 sq. ft.
- sun deck and poolside tables	
- tennis courts (2)	14,000
- change rooms	400
- volleyball courts (2)	5,040
- change rooms	600
-bicycle rentals	400
office	60
workshop	150
- stables	3,400
10 horses	
10 ponies	
offices	
- golf course	
9 holes	50-80 acres
18 holes	110-160 acres
club house	1,500 sq.ft.
- marina	

Initially the marina will be small, just accommodating boat rentals and the boats of local tourists during their stay. If a market is found to exist the marina would then be expanded to accommodate permanent moorings of local boats. The lagoon to the east of the site is probably well suited as a harbor though it might have to be dredged in places.

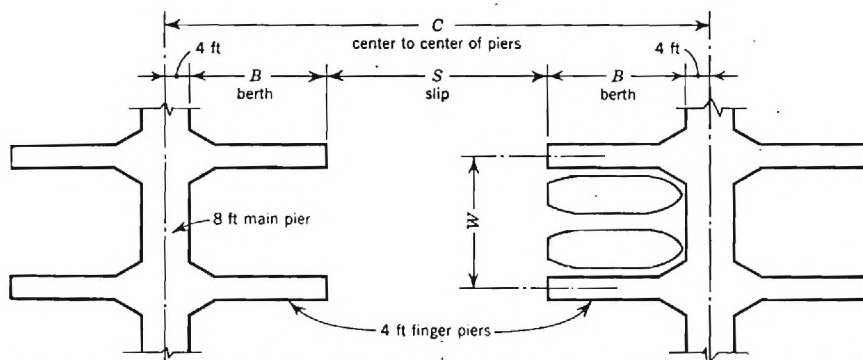
Tides on the northern coast of Puerto Rico are not out of the ordinary so the need for floating docks is not a necessity.

Average length of the boats using the marina is 20 to 30 feet. The entrance to the lagoon should be a minimum of 100 feet to accommodate Coast Guard vessels. Breakers will probably not be necessary since the harbor is well protected and an coral reef offshore presently act as a breaker.

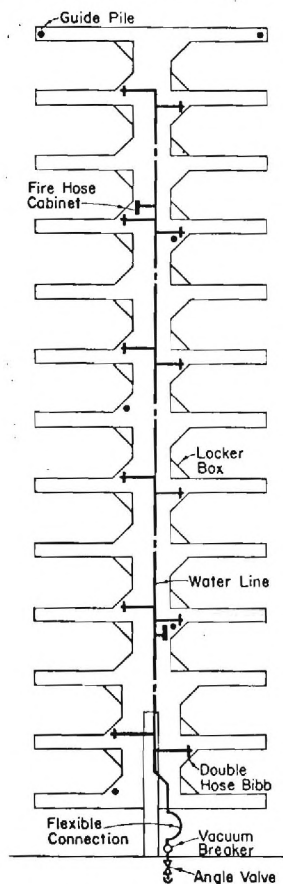
Necessary facilities

- fuel dock
- maintenance and repair of boats
- marine shop

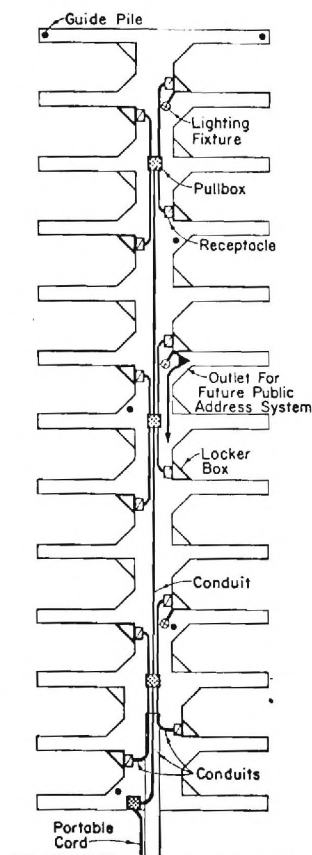
- fresh water and wash area
- launching ramp
- electricity
- parking



Length of berth, B, in feet (1)	Width, W, in feet (2)	Slip, S, in feet (3)	Center to center of piers, in feet (4)
20	20	35	83
30	28	52-56	121
40	32	70	158
50	36	100	208
60	42	120	248
70	48	140	288
80	56	160	328



(a) WATER PIPING PLAN



(b) ELECTRICAL PLAN

c. Public and social facilities

- main dining hall seating 110 people	4,500 sq. ft.
- bar-cocktail lounge 50 people	500
- private dining rooms (2)	2,500
- cafeteria	2,500
- restaurant	
- banquet and ball room	
450 people capacity	
storage	
- possibility of a casino	
guests wanting to gamble could be	
directed to El Conquistador Hotel	
nearby.	

3. Commercial facilities

a. drug store	600
b. barber shop	200
c. beauty parlor	300
d. souvenir and gift shop	300
e. sporting goods	300
f. other concessions	1,000-1,500

4. Day care center

a. foyer	100
b. office	100
c. toilets	250
d. storage	80
e. indoors playing area	600
f. outdoors playground	

5. Beach facilities

These facilities will be used by both the tourists and the public. It is the area which will receive the greatest amount of public use of the entire project. Direct access to the beach facilities by the public is necessary.

a. entrance and ticket booth	200
b. office of gatekeeper	150
c. women's dressing rooms	
- lockers (500)	500
- dressing booths (50)	1,500
- toilets (25)	375
- lavatories (20)	275
- showers (25)	250
- janitor's closet and stor.	130

d. men's dressing rooms	
- lockers (500)	1,000 sq. ft.
- urinals (150)	50
- toilets (10)	150
- lavatories (20)	275
- showers (25)	250
- janitor' closet and stor.	130
e. lockers for lifeguards	
f. outdoor showers	
h. concession area	

6. First aid station

Due to the size and type of activities which take on the complex and its remoteness from an immediate urban area, minimal medical services are required on the site.

a. waiting room	80
b. doctor's office	100
c. treatment rooms (2)	160
d. wet area	50
e. equipment storage	80

7. Security

Puerto Rico has more than its share of crime and even though this is a remote site adequate protection of the guests and their property is still necessary.

a. guards' facilities	
- garage for security vehicles (2)	400
- dressing rooms and lockers	100
- office	80
b. fire fighting facilities	
- garage for a small fire truck	200
- dressing rooms and lockers	100
- office	80
- equipment storage	80

8. Parking facilities

Since the major transportation medium to arrive to the site will be the automobile, accommodations must be made for it.

a. hotel parking	98 cars
b. moderate service units	480
c. little service units	180
d. employees' parking	1,500
e. visitors' (concentrated near beach)	1,000
f. service	40

D. Administrative facilities

1. General administration of the complex

a. Executive directors	
- offices (2)	300 sq. ft.
- conference room	400
- toilet	
b. General manager	
- office	150
- secretary	90
- toilet	
c. Manager	
- office	150
- secretary	90
- toilet	
d..Leasing	
- office	90
- secretary	70
e. Sales, promotion and advertising	
- semi-private office	120
- secretaries	100
f. Secretarial pool (5 sect.)	400
g. Auditing	
- office	90
- secretary	70
h. Office for chief accountant	120
i. Statistis	120
j. Tenant relations	
- office	120
- secretary	90

2. Hotel administration

a. Manager	
- office	150
- secretary	90
- toilet	
b. Information desk	100
c. Registration desk	100
d. Telephone switchboard	150

3. Moderate and little service units administration

Subordinate to general administration.

- | | |
|--------------------------------|-------------|
| a. Offices | |
| - Manager and secretarial pool | 600 sq. ft. |

4. Food services administration

- | | |
|---------------------------------------|-----|
| a. General manager | |
| - office | 150 |
| - secretary | 100 |
| - toilet | |
| b. Catering manager | |
| - office | 120 |
| - secretary | 90 |
| c. Sales representative | |
| - office | 100 |
| - secretary | 70 |
| d. Purchaser, receiving, wine steward | |
| - offices (2) | 200 |
| e. Chef | 100 |
| f. Controller's office | 120 |
| g. Dietitian | 100 |

E. Employee Facilities

It is estimated that there will be approximately 750 employees, including the administrative staff.

1. Living units

Due to the remoteness of the project, 75-100 units are made available to employees who would prefer to live on the project. Should this program not work out, the units should be able to become part of the rentable space.

2. Lockers and bathing facilities

- | | |
|---------------------|---------------|
| a. men (est. 480) | 1,500 sq. ft. |
| b. women (est. 270) | 900 |

Within these total areas, 65% of the total should be lockers and the remaining 35%, bathing and toilet facilities

- | | |
|-------------------------------------|-------------|
| c. lounge and vending machine areas | 400 sq. ft. |
|-------------------------------------|-------------|

3. Lighting, acoustical and climatic factors

Lighting in the hotel areas varies upon the space which it serves. In the bedrooms several factors should be taken into consideration. The lighting over one bed should not disturb the sleep of somebody in the other bed. The bathrooms need much higher illumination than the rest of the living spaces in the room. It is desirable to control all the light from the bedside and the entrance. Dimmers are useful in permitting the guest to exactly control the degree of illumination.

Levels of illumination for other areas of the hotel are provided by the table below.

Area in hotel	Minimum illumination value (lux)
Entrance hall—general	200
Reception and inquiry desk	400
Public rooms:	
cloakrooms	100
dining rooms—general	100
cash desks	400
lounges, writing rooms	200
Bedrooms:	
general	100
bedhead	200
bathroom	100
Kitchens:	
general	200
food preparation, cooking, wash-up	400
food stores	200
Service areas:	
laundries	200
cellars	200
stores, baggage rooms	100

Sound is an important factor in hotel design and should be considered from the start of the design in order to insure the comfort of the guests. Bedroom unit should be situated where there will be a minimal amount of external noise sources

to annoy the guests. Internal noise sources can be divided into airborne and impact noises. Airborne noises include conversations, radios, clattering of kitchen equipment, etc. Door slamming, footsteps and machinery vibrations would fall under impact noises. Construction methods which help minimize these noise sources should be considered in the design of the complex. Thick walls, cavity walls, carpeting are several methods of controlling sounds. Acoustical design of the large public rooms must be considered in order to eliminate echoes.

The climate in Puerto Rico is rather stable during the year. The high during the days is usually in the high 80's with nights in the low 70's. The prevailing winds on the northeast corner of the island are either from the northeast or the southeast. There is usually a sea breeze during the day so the temperature does not seem as intense and relief from the heat is as close as the nearest shade. The climate shall play an important role in the design since it is one of the main reasons for which tourists come to the island. Air conditioning will be necessary in all the living units and the major public rooms. But many of the areas shall take advantage of the climate; the reception areas, the lounging areas, and some of the dining facilities can be open areas. Conditioned spaces can be found anywhere, so utilizing the climatic conditions at hand can lend a unique quality to the complex.

4. Economic factors

The tourist trade, in its present state in Puerto Rico, is mostly concentrated in the San Juan area. This has

concentrated most of the entertainment and tourist facilities in this area and the tourist seldom ventures inland to the rest of the island. This complex will bring some of the economic benefits of the tourism industry to the local area. Many of the jobs on the complex can be filled by the local work and the complex would also provide income for the municipality of Fajardo in the form of taxes. The development of the area would also increase land values in the area. The inland areas, since the drop in sugar production, have tried to draw industries and manufacturing enterprises in order to attract incomes to their areas. The tourist complex would be exploiting a growing industry and has a conceivable chance of success.

5. Zoning, building code, building construction

This site is rather remote and a zoning classification in Puerto Rico has not expanded very far from the urban areas. No problem is foreseen in the approval of this area becoming a tourism and recreational facility. The site is under the jurisdiction of the municipality of Fajardo.

The building code used in Puerto Rico conforms with the National Building Code. There are few special conditions to be considered; the island is not in a seismic zone and hurricanes are about the only special condition which should be accounted for in the design.

Masonry and concrete are the most common building materials in Puerto Rico. The local labor force is skilled in this type of construction, the materials are produced locally making it the most convenient and cheapest building system

available. Steel is limited to reinforcement in the concrete. Steel members and steel frame construction is very limited since all of the materials and the labor would have to be imported.

6. Equipment

General air conditioning and air exchange rates.

Table V Recommended temperatures and rates of air change (based on HVE Guide 1965)

Rooms of hotel	Room temperature, °C	Air change rate per hour for normal occupancy	
		Natural ventilation	Mechanical ventilation
Lounges, smoking-rooms	18.3	2	10 to 15
Dining rooms, banquet halls	18.3	2	10 to 15
Ballrooms	18.3	2	10 to 12
Bedrooms	15.6	1	—
Bedsitting-rooms	18.3	1.5	—
Lavatories	15.6	2	6 to 8*
Bathrooms	21.2	1	6*
Kitchens	15.6	—	20 to 60
Staffrooms	18.3	1½	—
Offices	18.3	2	4 to 6*

*Internal rooms

Note Requirements of the Offices, Shops and Railway Premises Act apply to work areas. Higher ventilation rates may be required in confined space

Water supply in the area are sufficient to supply a project of this scope. The following table gives a guide as to the amount of water needed.

*Table VI Total cold water storage per head**

Occupants	Litres per head
Hotel guests	100
Non-resident staff	50
Resident staff	140
Restaurant diners	7.5 per meal

*Normally these quantities will be adequate, but in critical cases table III may be used to check their correctness

Table VII Total cold water storage for various types of fitting

Fitting	Storage (litres)
Shower	450 to 900
Slipper bath	900
Wc	180
Wash basin	90
Sink	90
Urinal	180
Yard tap	180

Electrical, telephone and television reception and service are available in the area. Fire codes and security measures are to be taken in order to insure the safety of the guests and staff. Emergency fire and medical facilities have been accommodated on the site and further facilities, should they be necessary, are available in Fajardo.

7. Psychological and esthetic factors

The complex will be as outdoor oriented as possible. This quality, which is made possible by the tropical climate, should be exploited to the fullest since it is the sun and fresh air that the majority of the tourists in Puerto Rico are looking for. This is especially true during the winter season.

The complex should also provide a cultural exchange between the tourist and the local populace. Dances, sports, films and just plain mingling can encourage the exchange. Cock fighting is popular in this area and perhaps a facility on the site would benefit both the tourist and the local fans of the sport. It would provide the tourist with a look at a custom not commonly found in his home. Metal claws have been replaced by plastic claws which cuts down on the blood of the sport but not the excitement.

SECTION D - SITE SELECTION

1. Relationship to other land use areas

Consult appendix

2. Relationship to transportation

Main accessroads to the site are indicated on the general site plan in the appendix.

3. Geographical characteristics

Topography map included in appendix.

Most of the site is relatively flat some 6 feet above sea level. The site does contain three hills of approximately 75 feet in height covered with thick vegetation. There are some low lying marshy areas on the site which have difficult access. These marshes support a large amount of small wildlife and consideration should be given to preserving these areas and their wildlife. Insects should not be a major problem because of the constant sea breeze and the fact that the marshes are not a stagnant pool of water.

The lagoon which borders the site on the east could very well be used to accommodate the marina. The entrance and the coral reef will have to be widened sufficiently to provide adequate access to the marina.

The beach, even though it's on the Atlantic Ocean, is fairly calm due to the coral reef barrier located offshore. The water is not as clear as in the Caribbean Sea but it will still provide a more than adequate beach.

4. Area

The area of the site is approximately 260 cuerdas.
A cuerda is slightly larger than an acre.

SECTION E - APPENDICIES

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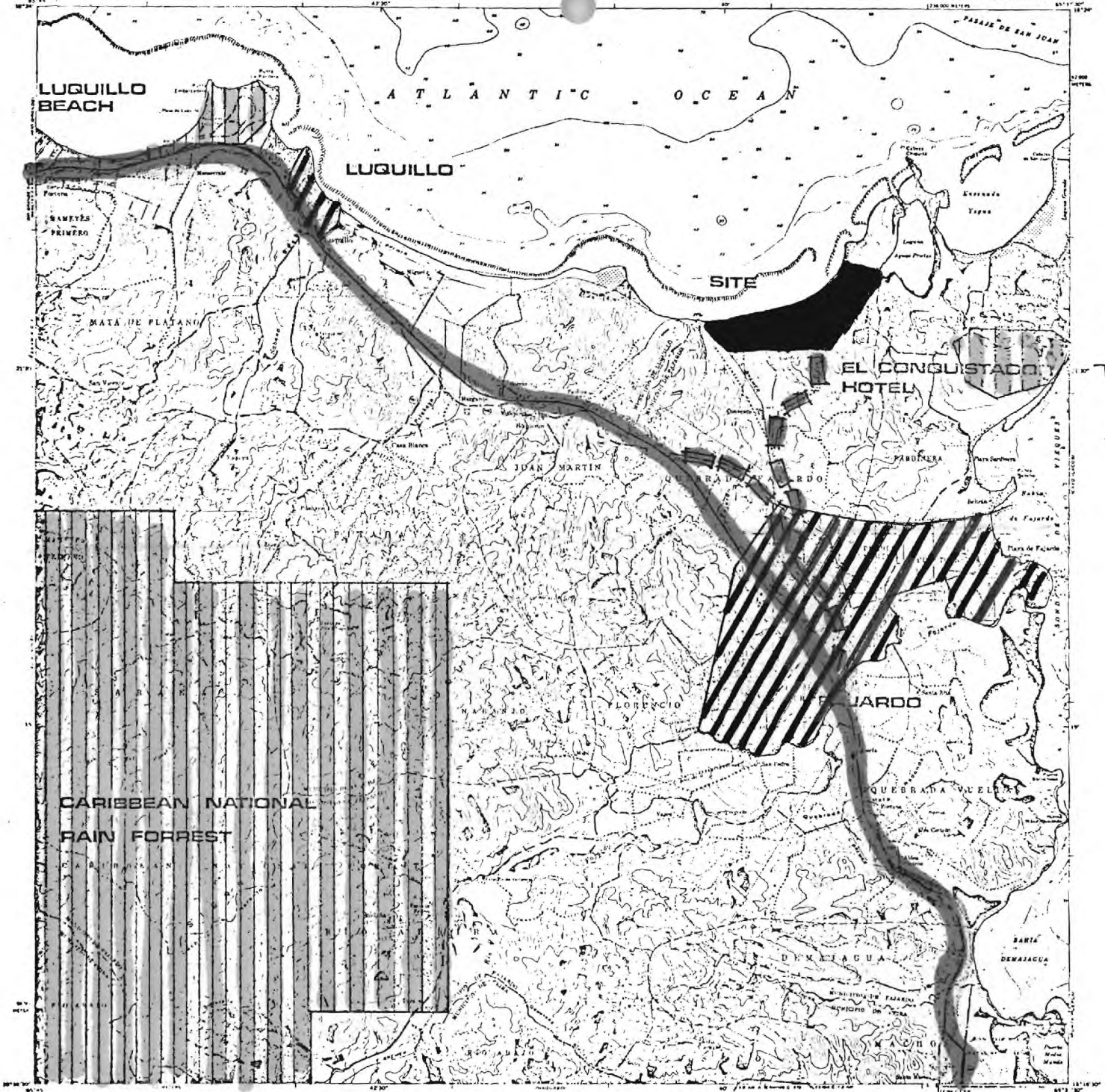
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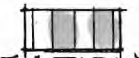
LEGEND



SITE



MAJOR URBAN CENTERS



RECREATIONAL & TOURIST FACILITIES



PRESENT ACCESS TO SITE

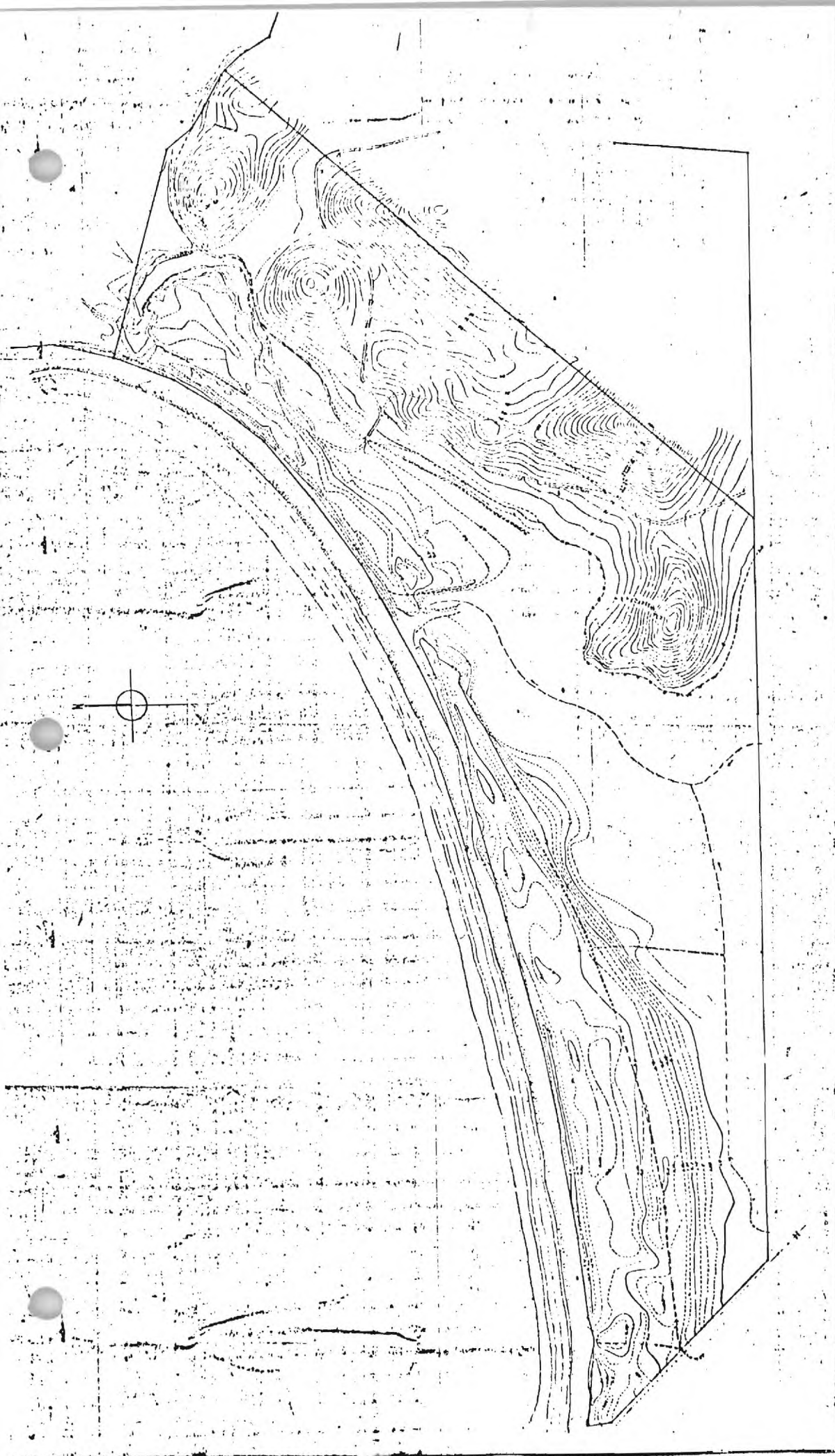


MAJOR HIGHWAY

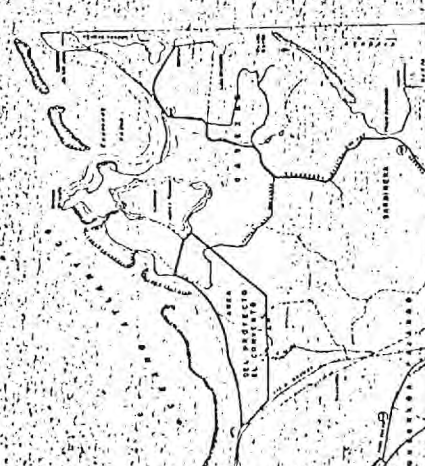
Map and notes published by the Geological Survey
Copyright 1955 and 1956
Topographic data derived from aerial
photographs taken 1945 and 1950
and 1955
Base map published 1955
Scale 1:50,000
Contour interval 10 meters
Shaded relief by hachure marks
Map not to scale
This information is not intended to
be used for navigation

SCALE 1:50,000
1 inch = 1.25 miles
1 centimeter = 0.39 inches
CONTOUR INTERVAL 10 METERS
SHADED RELIEF BY HACHURE MARKS
Map not to scale
This information is not intended to
be used for navigation

ROAD CLASSIFICATION
Primary
Secondary
Unimproved



TOPOGRAPHY



AREA: 101.30 HA MC 0 280.000 CUERDAS

NO.	DESCRIPCION	AREA (HA)	AREA (MC)	AREA (CUERDAS)
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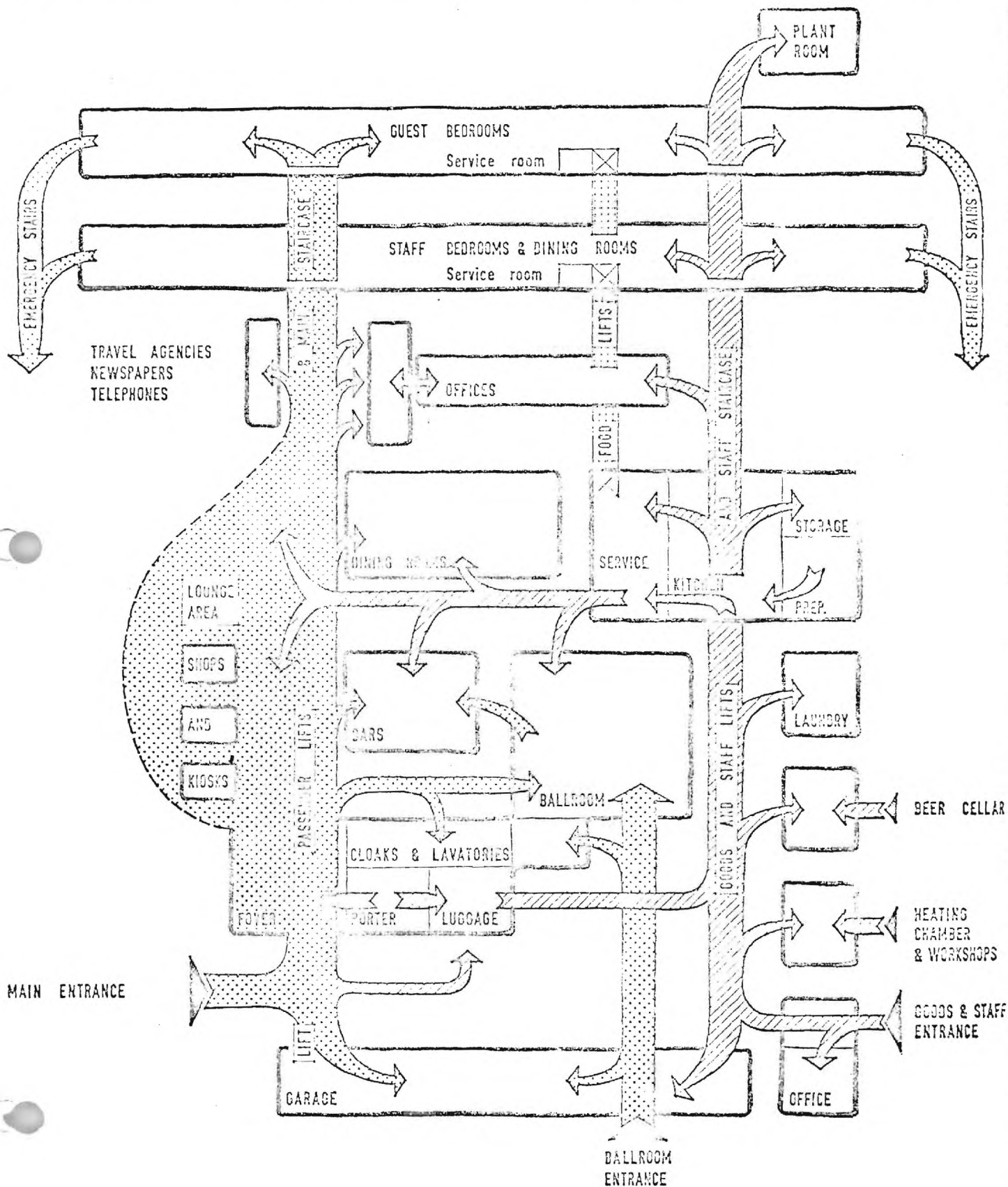
AREA: 260.0015 CUERDAS

HOTELS

THEORETICAL CIRCULATION

PUBLIC CIRCULATION AREAS

STAFF CIRCULATION AREAS



20 Be
3 B
2
1
G
B

HOTELS

APPLIED CIRCULATION

Bedrooms

Public areas

Service areas

Bedrooms

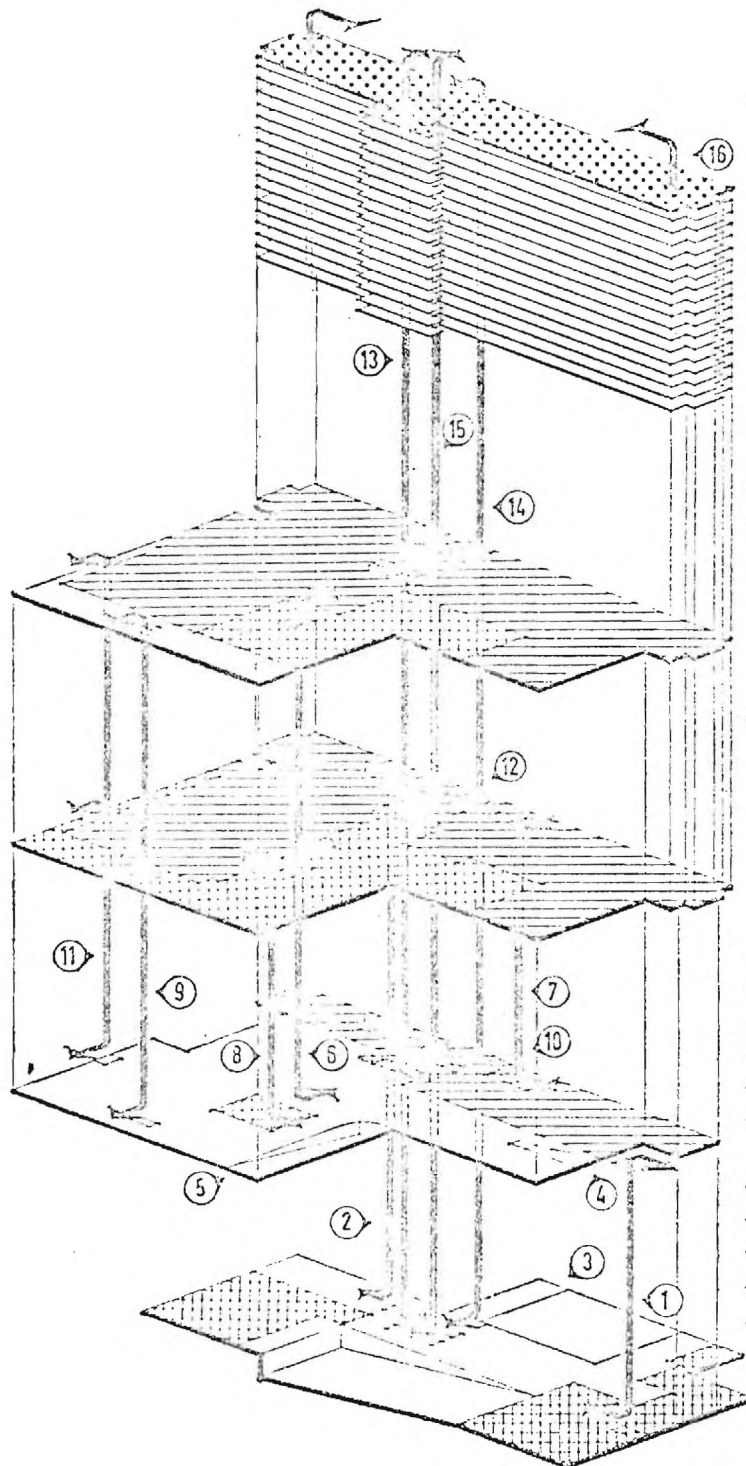
Bedrooms

Dining rooms
Hotel administration
Private offices

Hotel reception
Ballrooms
Assembly rooms
Lounges
Bars & Kitchens

Shops & Stores
Drug store
Grill room

Cafeteria
Coffee house
Beauty shop
Barbers shop
Garage



16 Emergency staircase

15 Passenger lifts & staircase to bedrooms

14 Staff lifts

13 Service lifts & stairs

12 Bridge entrance

11 Service staircase

10 Street level entrance

9 Office lift & staircase

8 Public lift & staircase

7 Public escalators

6 Heavy goods lift

5 Vehicle ramps

4 Vehicle entrance

3 Concourse entrance

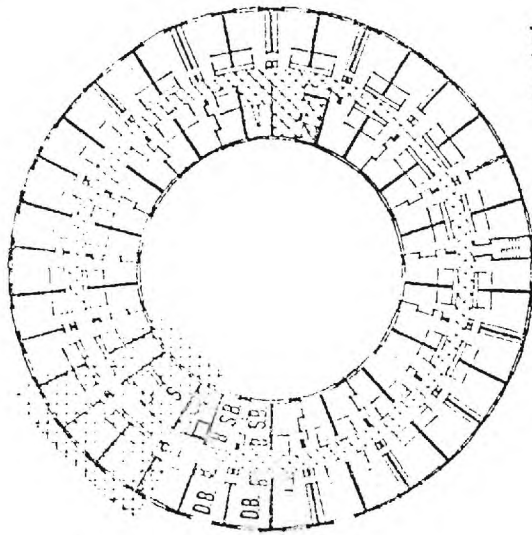
2 Public staircase

1 Staff staircase

THE DENVER HILTON Denver Colorado

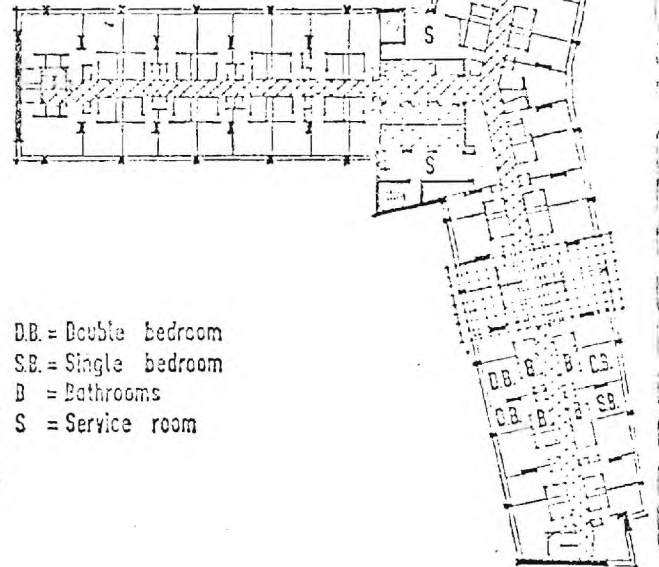
HOTELS

BEDROOM BLOCK PLANS

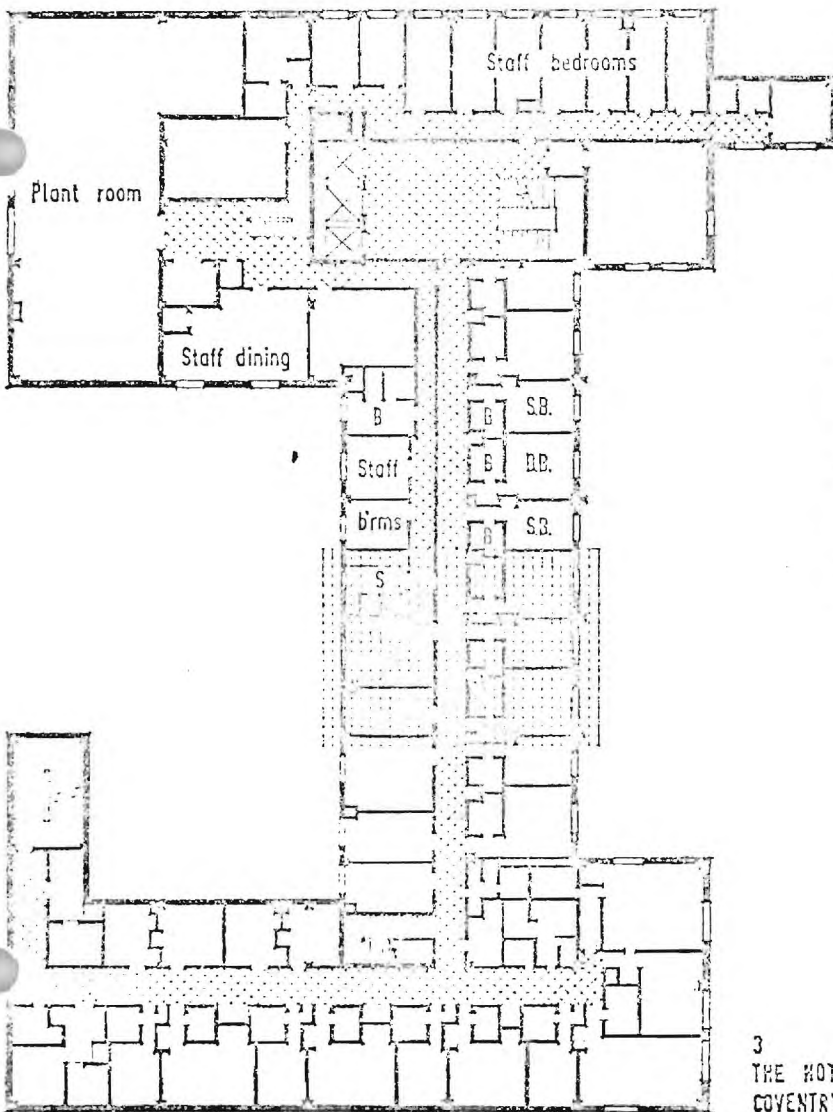


1
THE ARIEL HOTEL
LONDON ENGLAND

2
THE DALLAS STATLER
DALLAS TEXAS U.S.A.

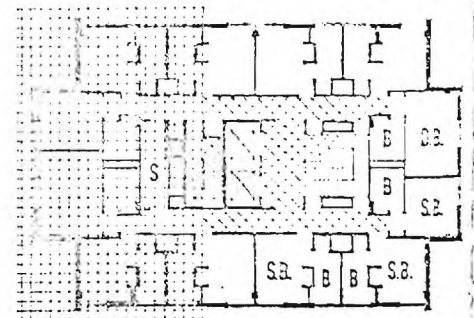


DB. = Double bedroom
SB. = Single bedroom
B = Bathrooms
S = Service room



3
THE HOTEL LECFRIC
COVENTRY ENGLAND

1 2 & 3 although very different in shape are planned on the central corridor principle
4 on a smaller site gives the maximum number of bedrooms per floor within the restricted area. Its design is not a radical departure from the principle, but a sensible modification of it
3 was designed before it was generally accepted in Great Britain that all bedrooms should have private bathrooms
1 & 4 built some years later illustrate how this principle is now accepted



4
THE KIRBY HOTEL
BURNLEY ENGLAND

HOTELS

BEDROOM DETAILS

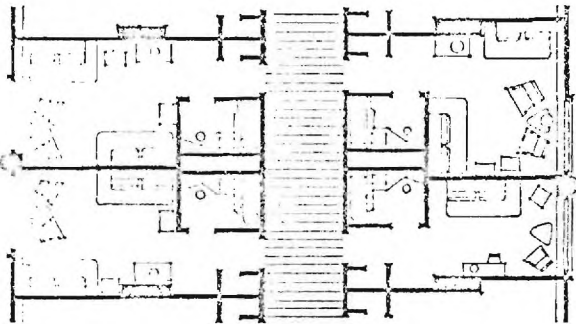
A

Guest bedrooms

Circulation

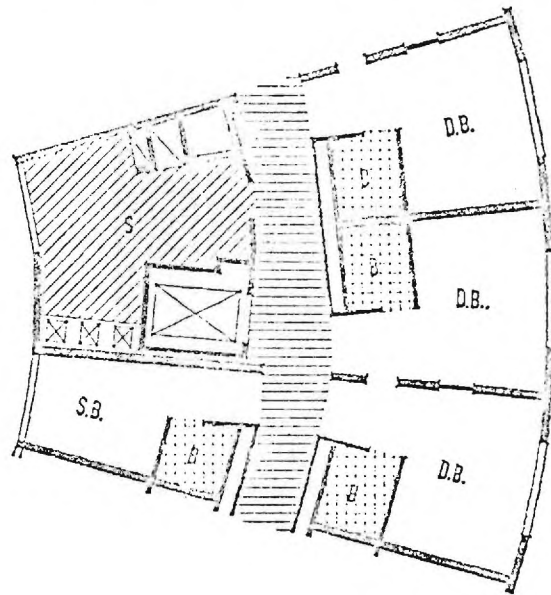
Bathrooms

Service areas



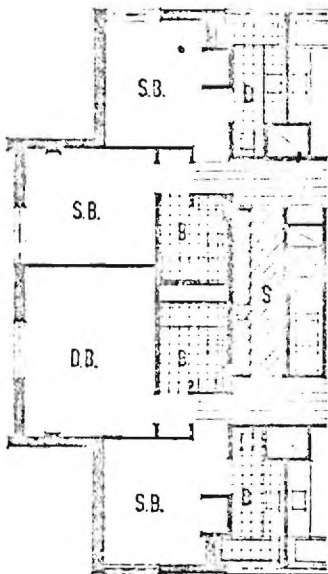
THE DALLAS STATLER HOTEL

Studio bedroom planning allows the bedrooms to be used as sitting rooms during the day

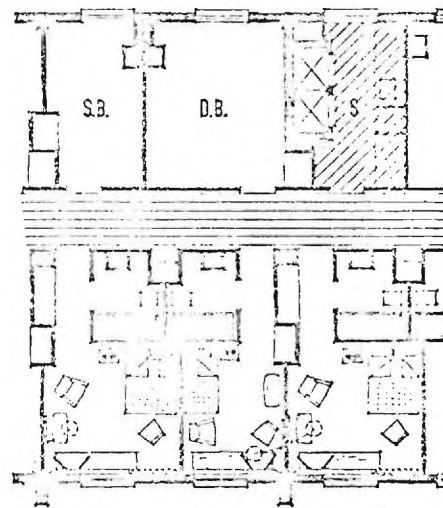


THE ARIEL HOTEL

The circular plan allows the single bedrooms to be planned at the narrow end of the segments with the double bedrooms at the wider end



DB = Double bedroom
SB = Single bedroom
B = Bathrooms
S = Service room



THE HOTEL LEGFRIC

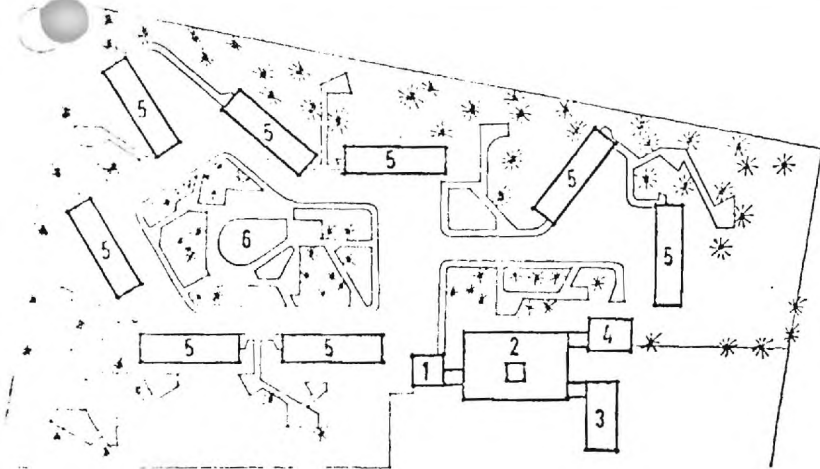
Note the unequal division of the structural grid to give single and double rooms

THE KIRBY HOTEL

area of circulation space per bedroom evident from this plan but this advantage occurs on a very restricted site

MOTELS

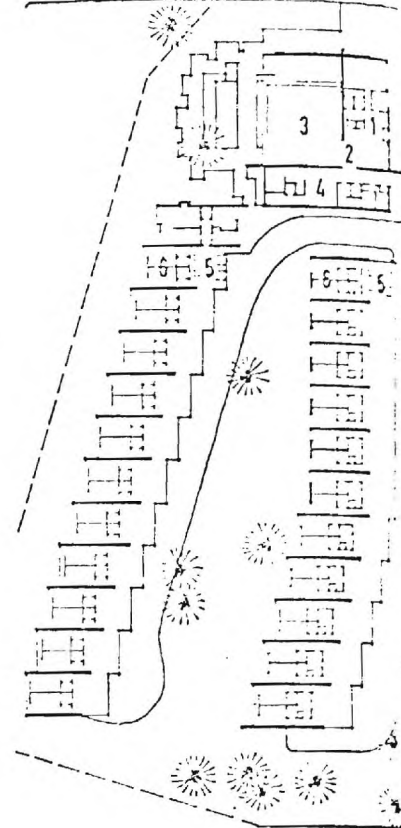
BLOCK PLANS



MOTEL XENIA - LARISSA GREECE

Photographs and details are on pages 56, 73

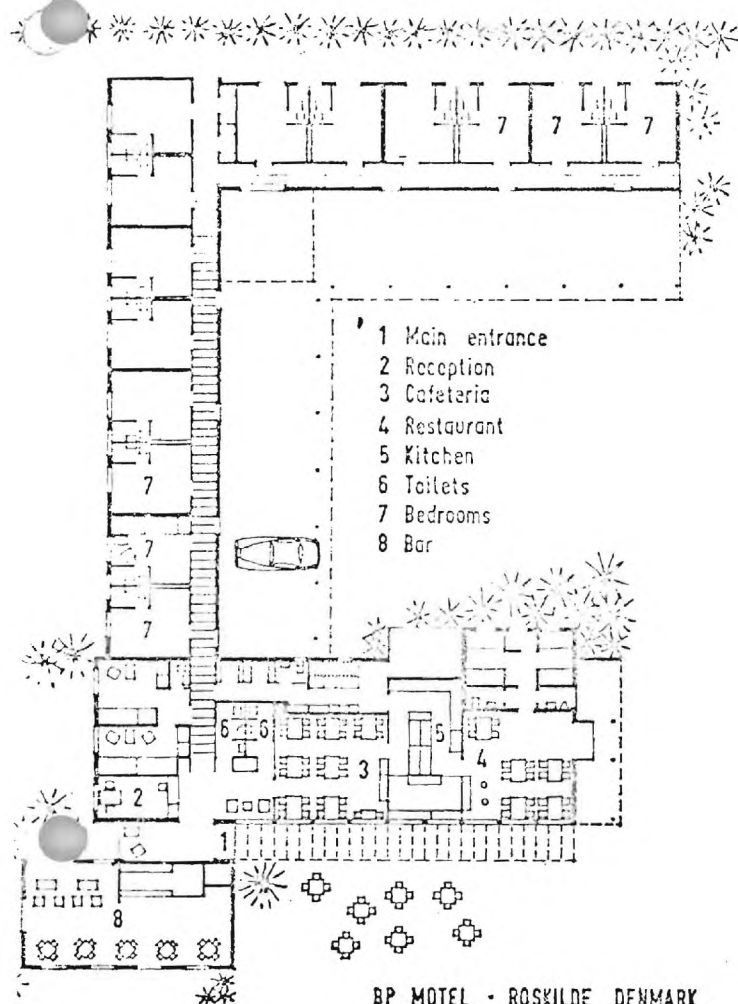
- 1 Entrance
- 2 Restaurant
- 3 Service station
- 4 Manager
- 5 Bedroom blocks
- 6 Swimming pool



- 1 Reception
- 2 Grill
- 3 Restaurant
- 4 Kitchen
- 5 Carport
- 6 Double bedrooms

GYLLENE RATTEN MOTEL - STOCKHOLM, SWEDEN

Photographs and details are on pages 57, 73, 75, 98

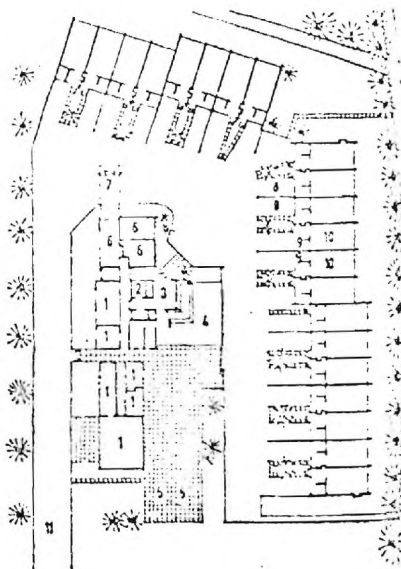


BP MOTEL - ROSKILDE DENMARK

MOTEL AT INTERLAKEN SWITZERLAND

Photographs and details are on page 57

- 1 Shops
- 2 Cold room
- 3 Kitchen
- 4 Restaurant
- 5 Table tennis
- 6 Managers flat
- 7 Tank room
- 8 Parking
- 9 Bathrooms
- 10 Bedrooms
- 11 Entrance



- 4. Bedroo
- 2. Bedroo
- 1. Dining
- 6 Hotel

G

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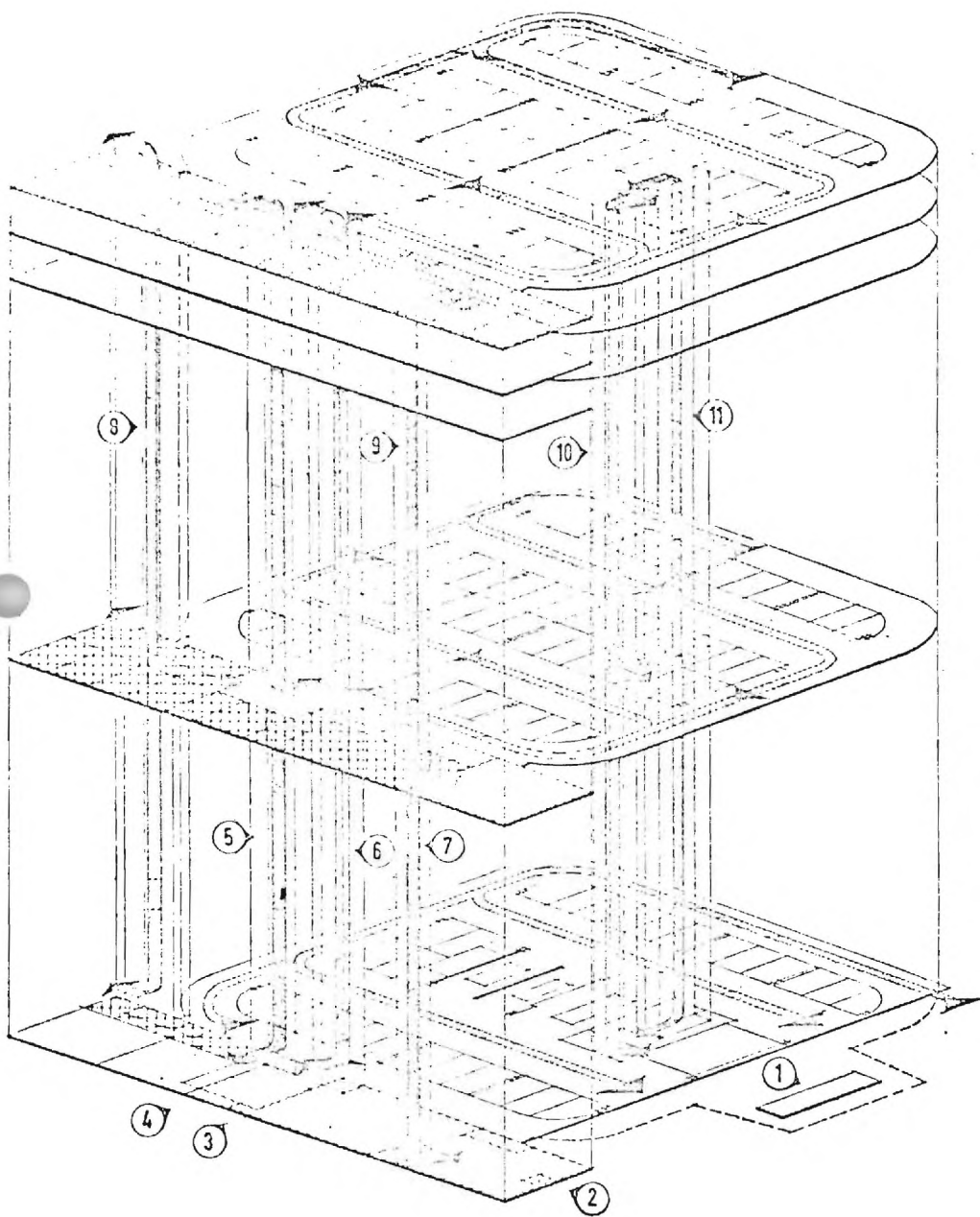
2

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2

MOTELS

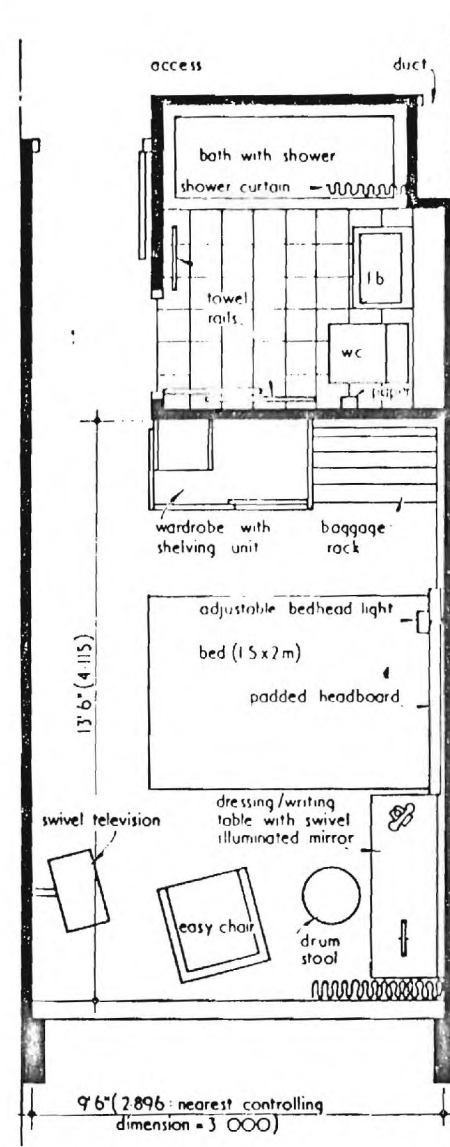
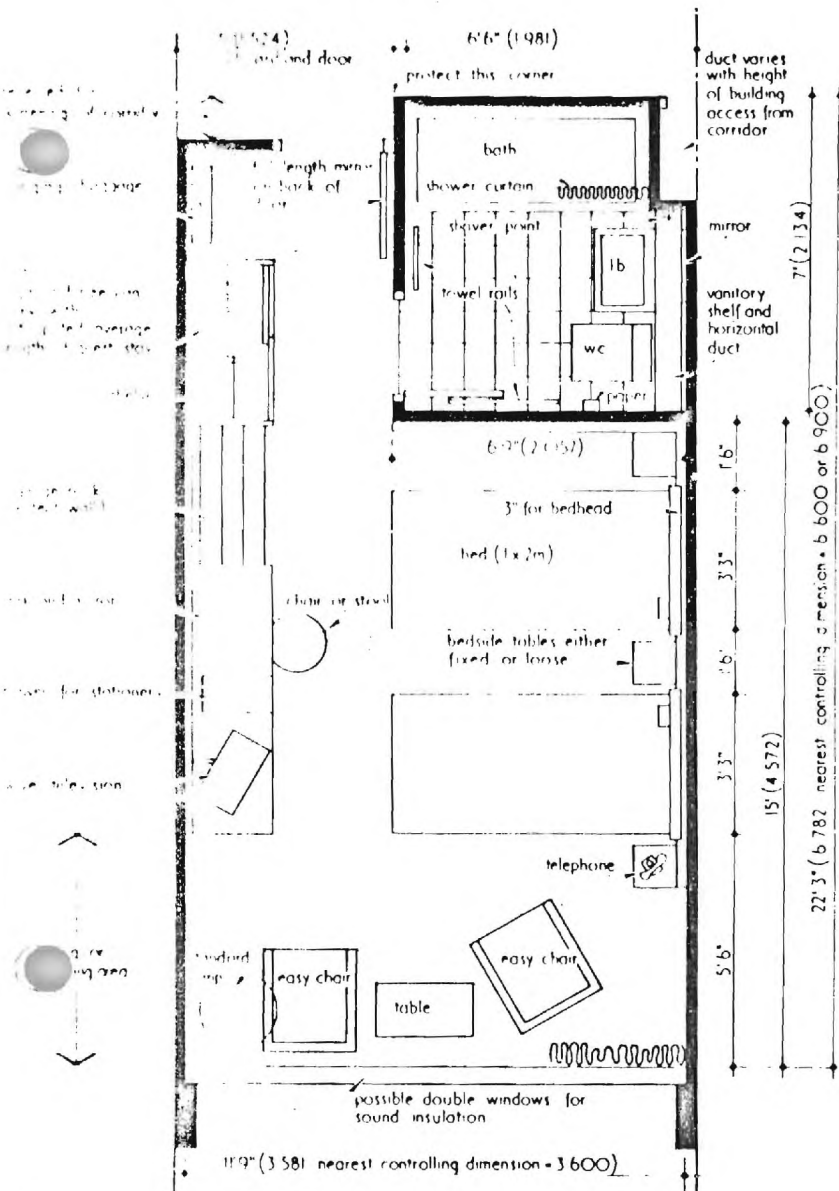
FLOOR PLANS



- ⑪ Public staircase
- ⑩ Passenger lift
- ⑨ Passenger lift
- ⑧ Staircase to bedrooms
- ⑦ Service lift
- ⑥ Passenger lift
- ⑤ Staircase to bedrooms
- ④ Entrance
- ③ Direct access to garage
- ② Entrance
- ① Petrol filling station

Bedrooms
 Bedrooms
 Dining room, Kitchen, Hotel administration
 Hotel reception, Shops, Restaurant and Bars

THE PARKHAUS HOTEL • COLOGNE GERMANY

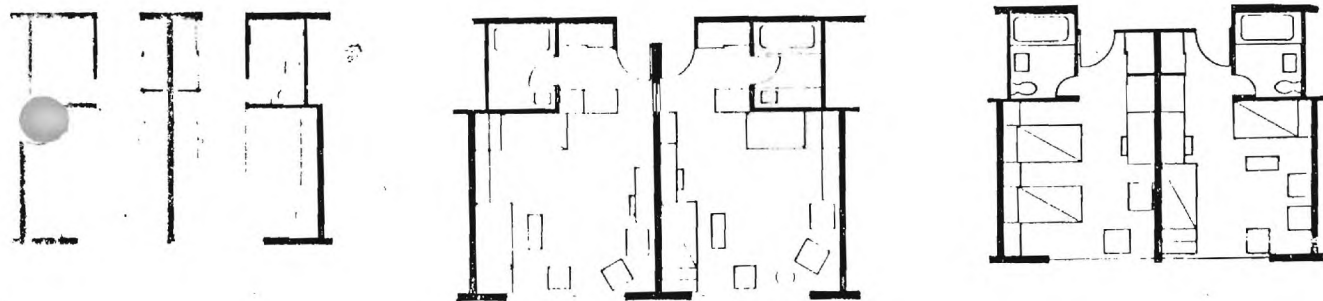


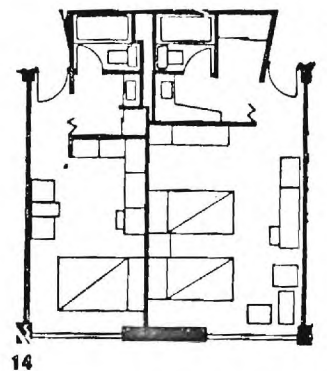
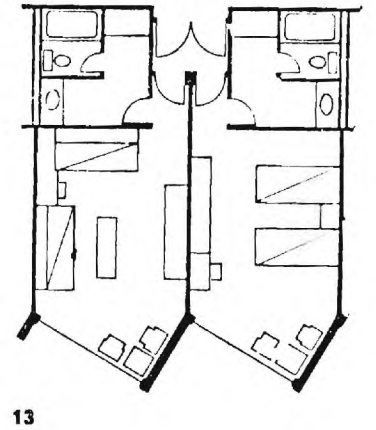
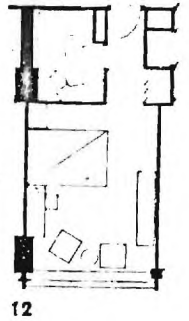
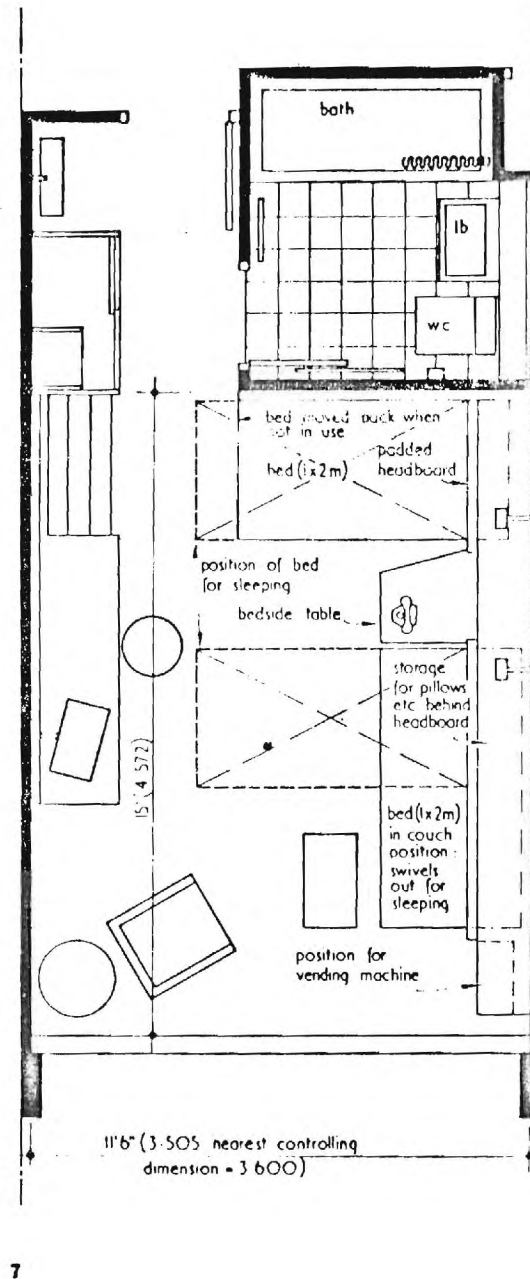
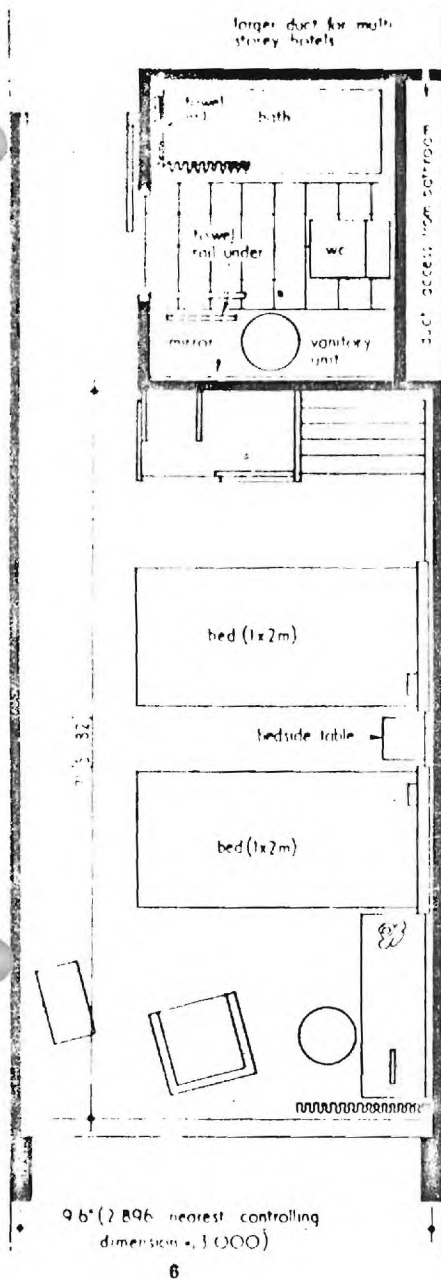
Single or double rooms and suites

1.08 The optimum ratio of single to double rooms will vary from 1:1 to hotel and will be decided by the client at the planning stage, arising out of the market feasibility studies. A city hotel catering mainly for businessmen may require single rooms, single rooms or more. In other situations where there is a greater flexibility of use there may be advantage in providing rooms of standard size fitted with twin beds for either single or double use. Combination rooms facilitate this

interchange by using divan beds which can be readily converted to couches.

1.09 Intercommunicating doors between adjoining rooms will further extend bedroom flexibility. The rooms linked in this way can, if required, form a suite. Difficulties arise from the need to soundproof the connecting doors when the rooms are separated but this can usually be met by fitting two doors in tandem. The doors must also be capable of





4 Typical layout for twin bedded room with clothes storage and dressing table along party wall. Sizes will vary according to standards of luxury and site conditions

5 Layout for single bedroom (note double bed for use as double room if required)

6 Similar layout to 5 but with twin beds. Note vanity unit, layout for bathroom

7 Layout similar to 1 but with studio couch which swings out from wall to form bed

8-14 Some American bedrooms¹, all with internal bathrooms*

8 Typical hotel room (minimum)

9 Typical hotel room (luxury)

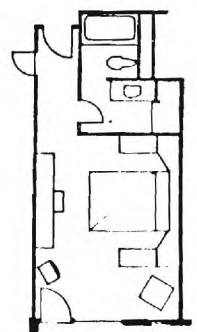
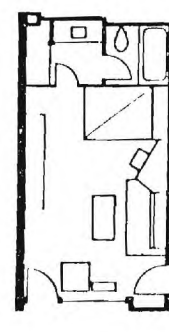
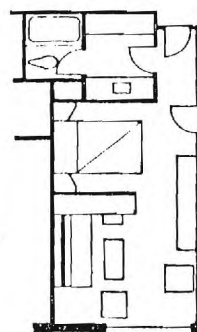
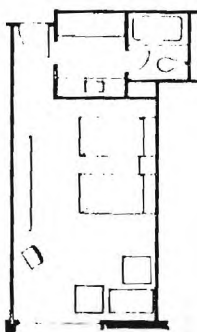
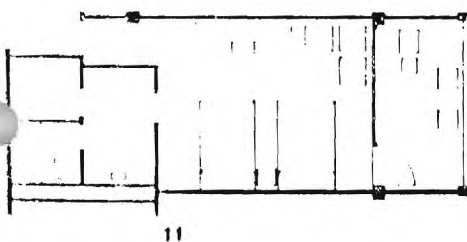
10 Typical hotel room (average)

11 Variations on a basic layout

12 American Hotel, New York

13, 14 Chicopee Motor Inn, Massachusetts

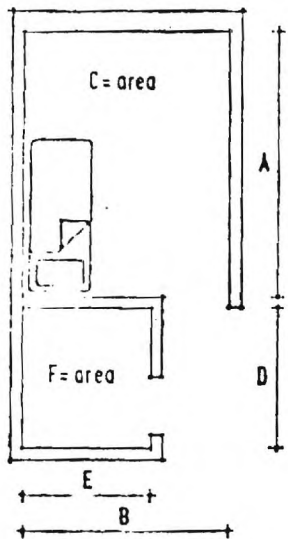
* American baths are usually 4ft 6in (1370mm) or 5ft (1520mm) long



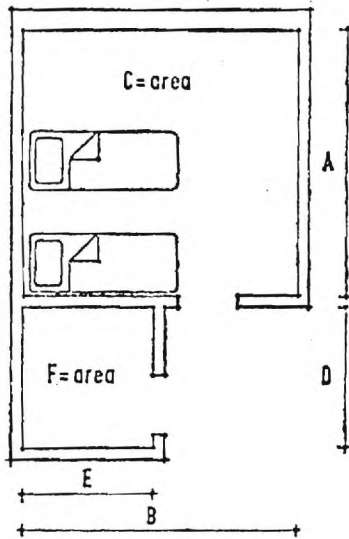
HOTELS

BEDROOMS • BATHROOMS

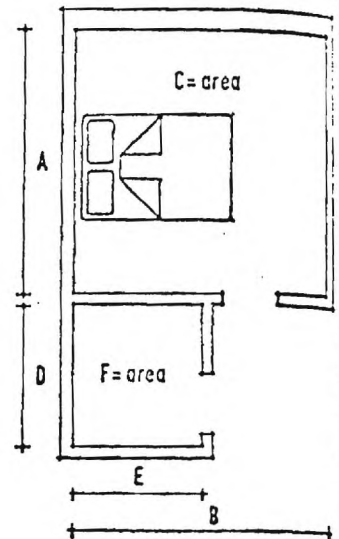
Single Bedroom



Twin Bedroom



Double Bedroom

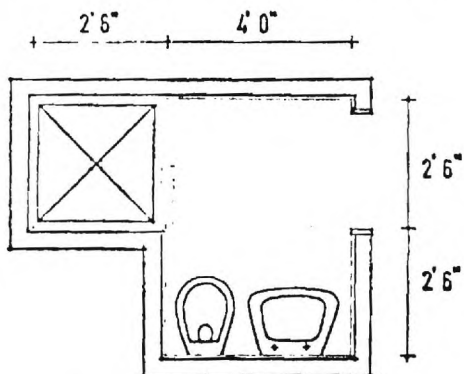


		Bedroom			Bathroom			Shower room			B'm with basin			
		A	B	C	D	E	F	D	E	F				
L class	Single	12'	10'	120	6'6"	7'	59.5	See below for			Should not be permitted			
	Twin	12'	12'	144	9'6"	7'	59.5	minimum sizes						
	Double	20'	15'	300	10'	10'	100	Maximum sizes						
First class	Single	11'	9'	59	7'	6'	42	according to			11'	9'6"	103.25	
	Twin	11'	10'	110	7'	6'	42	space available			11'	10'	110	
	Double	11'	11'6"	126.5	7'	6'	42				11'6"	11'6"	132.25	
Second class	Single	10'	8'	80	6'6"	5'3"	34.125					10'	9'	90
	Twin	11'	9'	99	6'6"	5'3"	34.125					11'	9'	99
	Double	11'	11'	121	6'6"	5'3"	34.125					11'	11'	121
Staff rooms	Single	12'	7'6"	90	6'6"	5'3"	Senior	staff only			12'	7'6"	90	
	Twin	10'	10'	100	-	-					10'	10'	100	

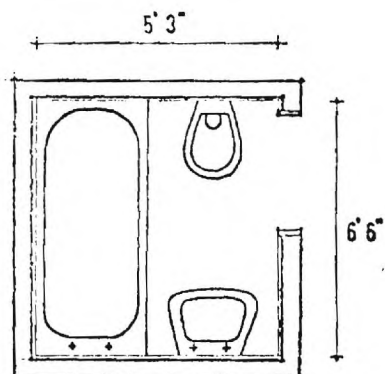
Note

The greatest demand is for single bedrooms. If these are designed so that twin beds can be used in them occasionally, the flexibility of letting will be increased.

MINIMUM DIMENSIONS FOR BATHROOMS

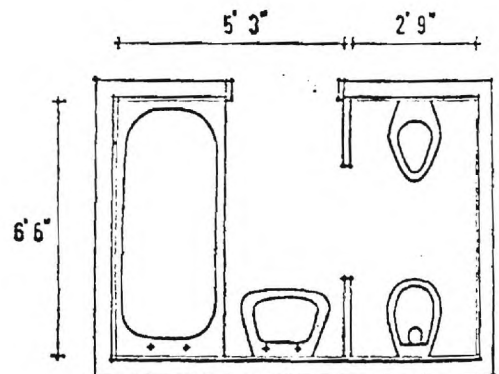


Shower room

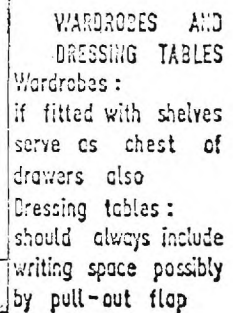
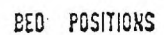
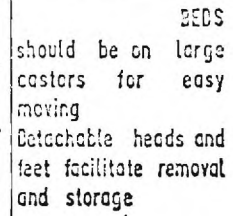


Bathroom

With minimum dimensions it may be necessary to provide a sliding door

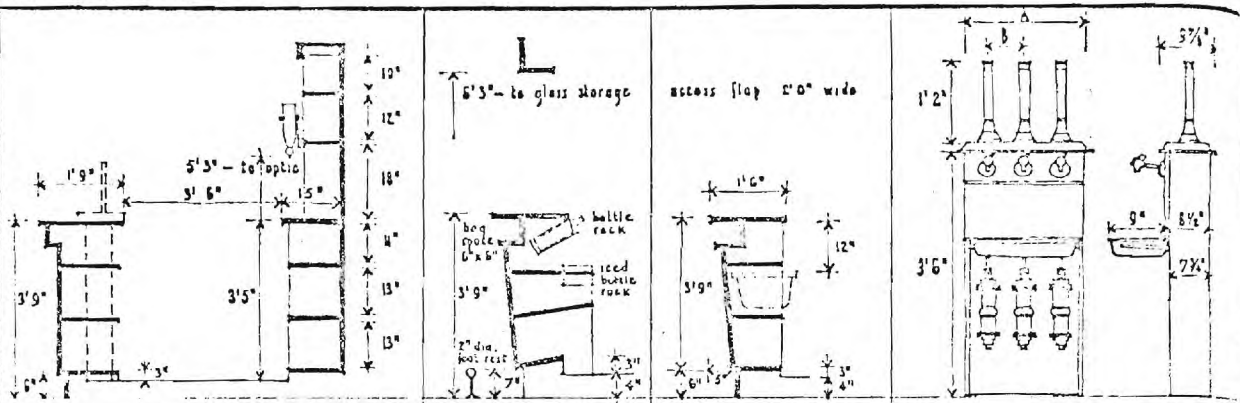


Bathroom with Bidet



BAR FITTINGS

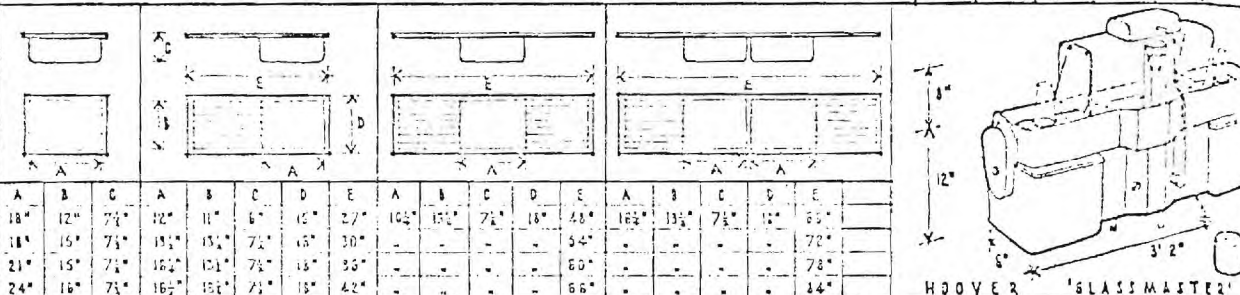
b. floor finishes:-
linoleum, cork, timber,
thermoplastic tiles,
quarry tiles, carpet.



Recommended counter length:
1'0" linear per 25-30 sq. ft. of drinking area

	1 PULL	2 PULL	3 PULL	4 PULL	5 PULL	6 PULL
B	8'-9"	6'-9"	6'-5"	6'-9"	5'-6"	5'-1"
A	1'-14"	1'-10"	2'-2"	2'-3"	2'-3"	2'-3"

usually made of
stainless steel



<p>metal bin STORAGE OF EMPTIES</p> <p>wicker basket STORAGE OF EMPTIES</p>	<p>bottle opener fixed opener</p> <p>BOTTLE OPENER</p>	<p>CASH REGISTER</p>	<p>KEG BEER</p>
<p>REFRIGERATED SHELVES</p>	<p>COMPRESSOR UNIT</p>	<p>CANNED BEER</p>	<p>KEG BEER</p>

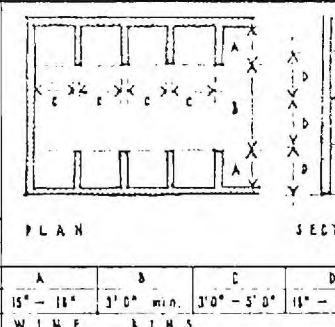
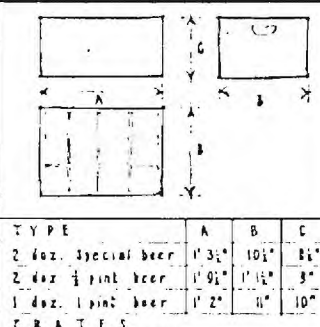
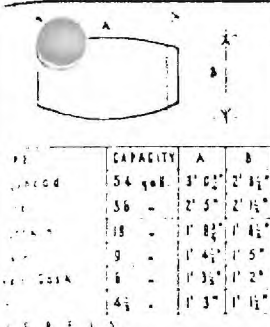
Diagram showing various glass shapes and their corresponding liquid measurements. The glasses are arranged in a row, with their heights indicated by a vertical scale on the left. The scale ranges from 1 inch to 7 inches. The glasses are labeled below: 'martini', 'liqueur', 'champagne', 'spirit', 'bottled beer', '4 pint', '1 pint', 'brandy', 'brandy', and '1 pint'.

A line drawing of various bottles and a sprayer against a height scale from 1 inch to 14 inches. The items are labeled: soda, whisky, 1 pt. beer, 1/2 pt. beer, minerals, cider flagon, gin, and a sprayer.

Item	Approximate Height (inches)
soda	11.5
whisky	12.5
1 pt. beer	10.5
1/2 pt. beer	8.5
minerals	4.5
cider flagon	13.5
gin	9.5
sprayer	13.5

BARS · HOTELS

SERVICE AREAS



Thermal Resistance of Selected Materials.

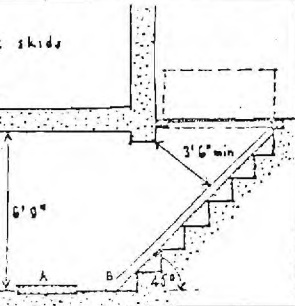
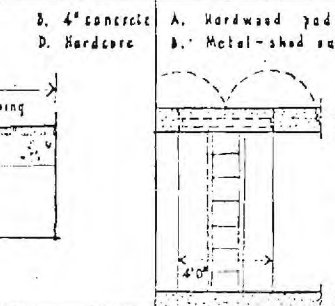
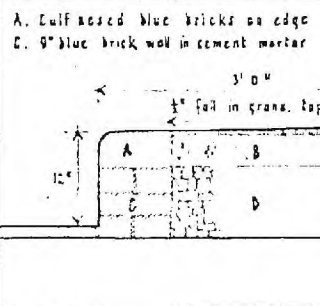
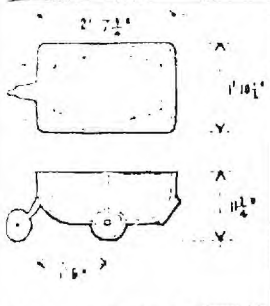
K = No. of B.T.U.s passing through 1" thickness/hour/sq. ft./1°F difference in temp.

MATERIAL	K	Ins./sq. ft.
Brickwork	1.0	112
Concrete block	0.2	140
Slag wall	0.35	11.5
Dark slab (ev.)	0.29	0.0
Wair felt	0.24	17.0

BEER CELLARS

The examples given are typical.

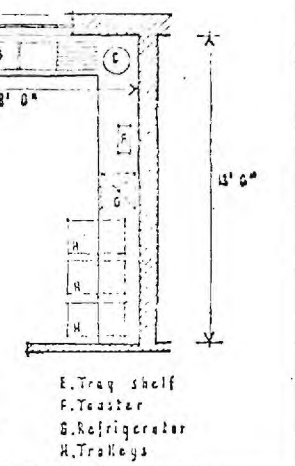
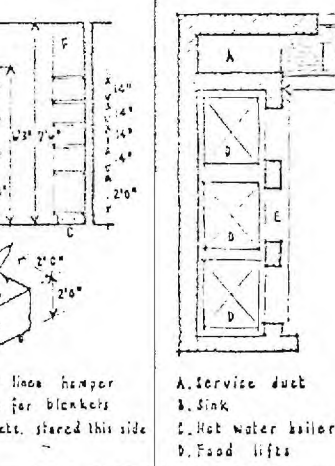
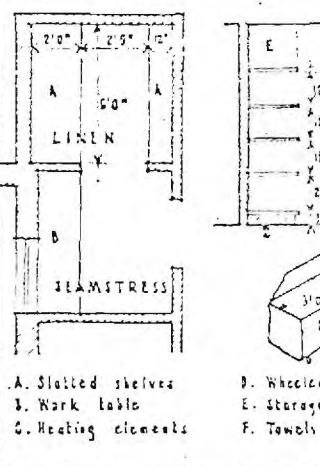
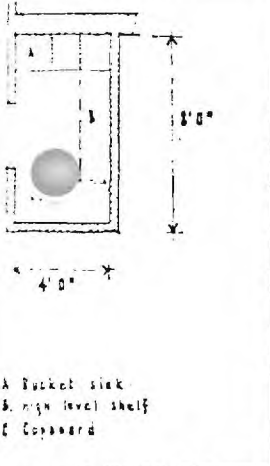
Details of eg. barrel drops and throwls may vary.



BEER STILLAGE

THROWL

BARREL DROP

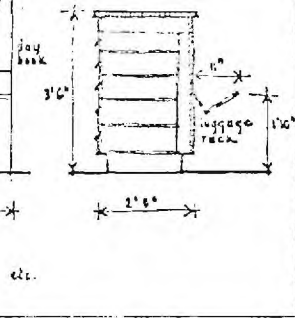
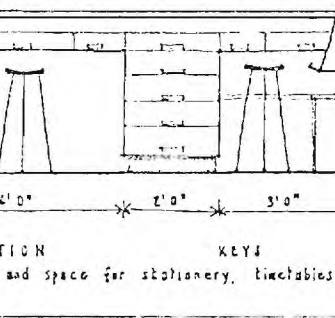
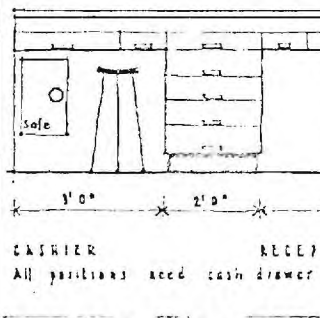
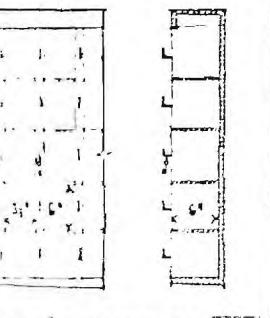


BEERMAIDS' CLOSET

LINEN ROOM

BEERMAIDS' FLOOR SERVICE ROOM

SERVICE ROOMS LINEN ROOMS H.M.C.s

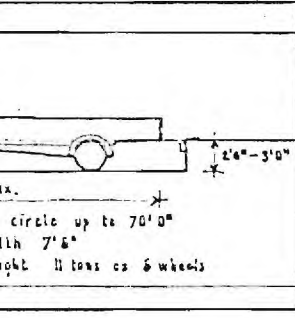
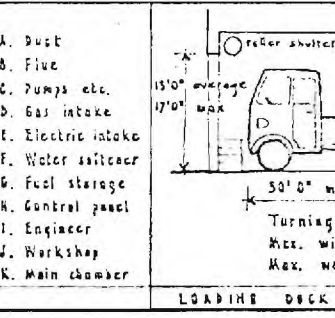
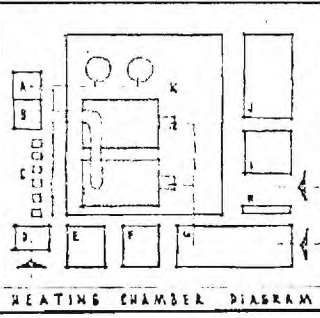
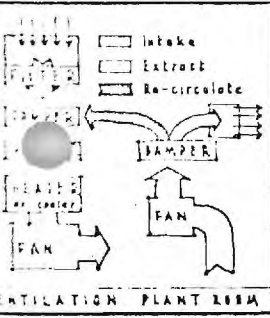


BEERMAIDS' CLOSET

LINEN ROOM

BEERMAIDS' FLOOR SERVICE ROOM

RECEPTION



HEATING PLANT ROOM

HEATING CHAMBER DIAGRAM

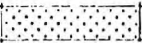
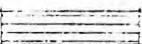
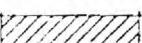
LOADING DOCK

HEATING CHAMBER PLANT ROOM LOADING DOCK

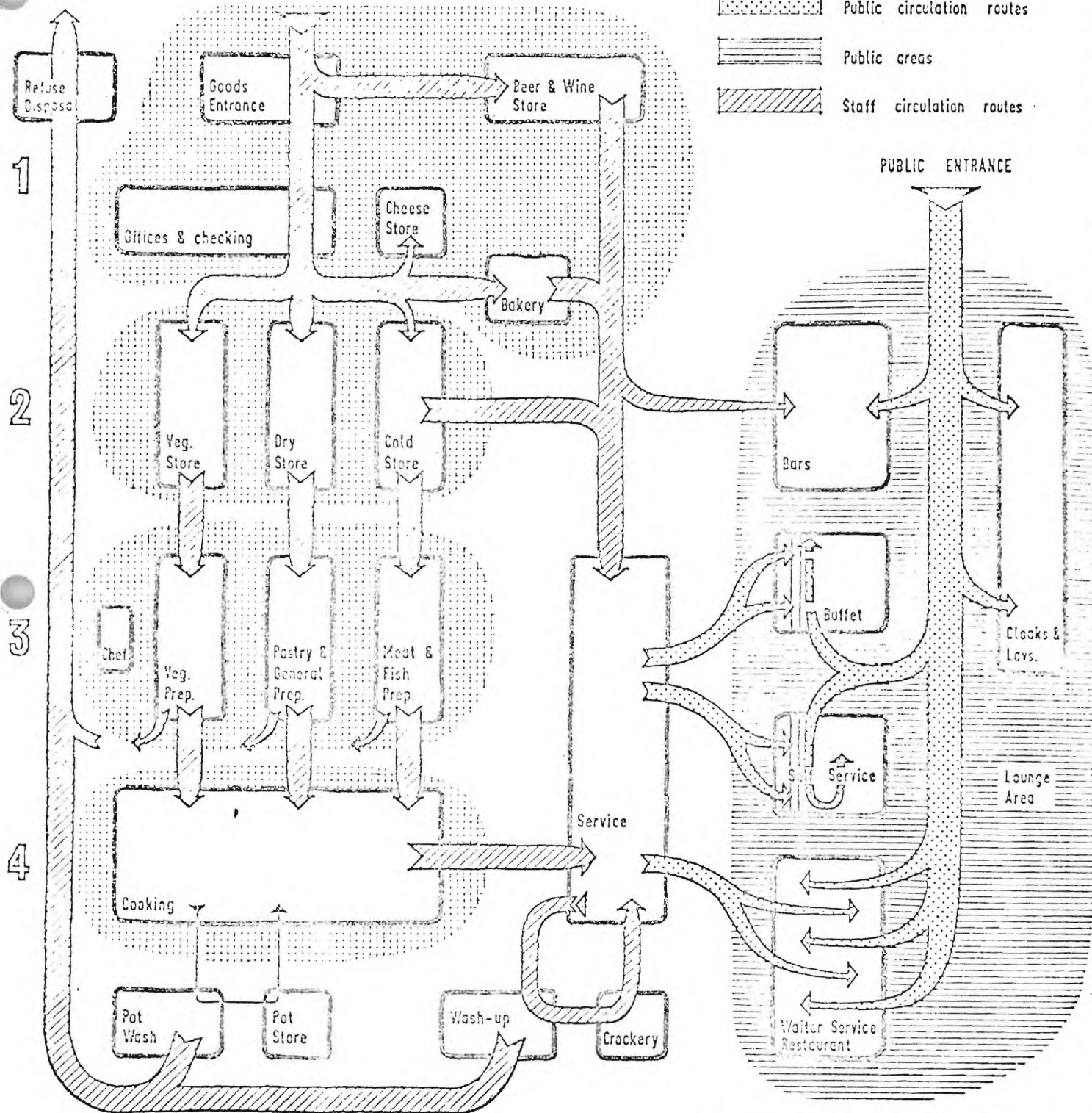
RESTAURANTS

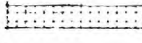
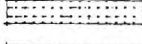
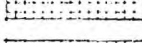
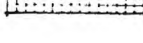
THEORETICAL CIRCULATION

GOODS ENTRANCE

-  Public circulation routes
-  Public areas
-  Staff circulation routes

PUBLIC ENTRANCE

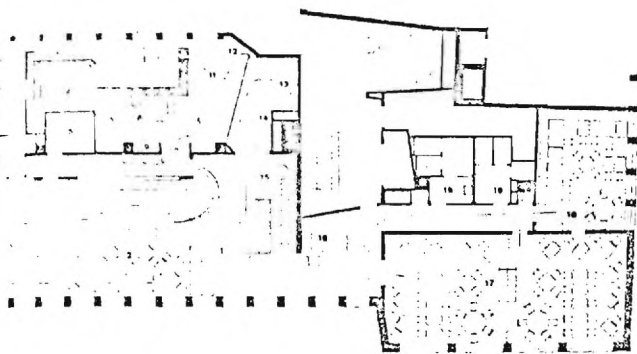


- 1  Reception and checking area
- 2  Storage area
- 3  Preparation area
- 4  Cooking area

RESTAURANTS

APPLIED CIRCULATION

12



FLOOR PLAN

- | | | | |
|----|-----------------|----|---------------|
| 1 | Hall | 11 | Glass washing |
| 2 | Restaurant | 12 | Dish lift |
| 3 | Restaurant | 13 | Telephones |
| 4 | Furniture store | 14 | Cloak room |
| 5 | Compressors | 15 | Office |
| 6 | Lift | 16 | Bar |
| 7 | Pastry | 17 | Restaurant |
| 8 | Beverage & food | 18 | Restaurant |
| 9 | Cash | 19 | Lavatories |
| 10 | Food | | |



2ND FLOOR PLAN

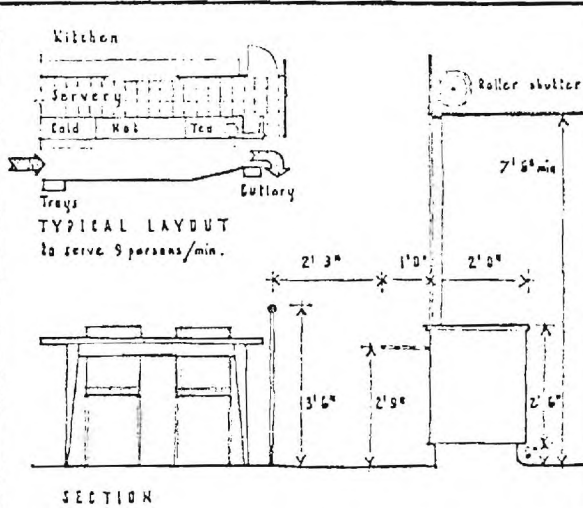
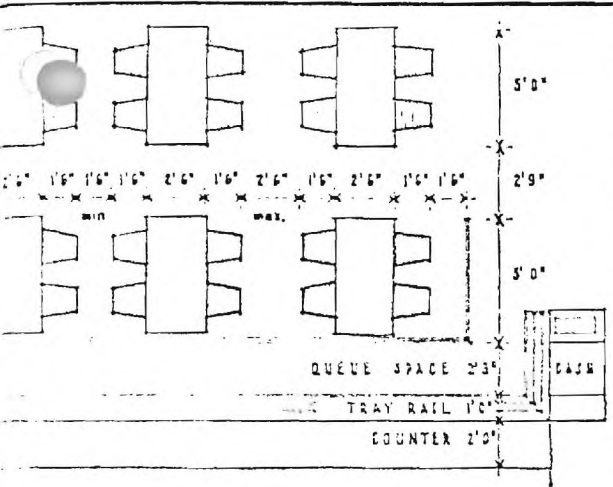
- | | | | |
|--------|----------------------|---------|------------------|
| 1 & 29 | Entrance | 16 | Cold food prep. |
| 2 | Stairs to 1st floor | 17 | Vegetable prep. |
| 3 | Kiosk | 18 & 19 | Steam cooking |
| 4 | Cloaks | 20 & 21 | Pot washing |
| 5 | Restaurant | 22 & 23 | Crockery washing |
| 6 | Display | 24 | Beverage |
| 7 | Snack bar | 25 & 27 | Rotisserie |
| 8 | Coffee | 26 | Fireplace |
| 9 | Cash | 23 | Clocks |
| 10 | Food preparation | 30 | Pastry counter |
| 11 | Cold soups | 31 | Bar |
| 12 | Fridge | 32 | Cashier |
| 13 | Receiving dock | 33 | Sandwich counter |
| 14 | Main cooking Gr.Fl. | | |
| 15 | Main cooking 1st.Fl. | | |



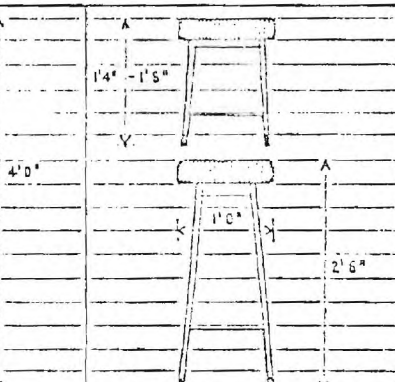
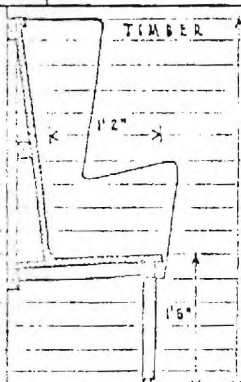
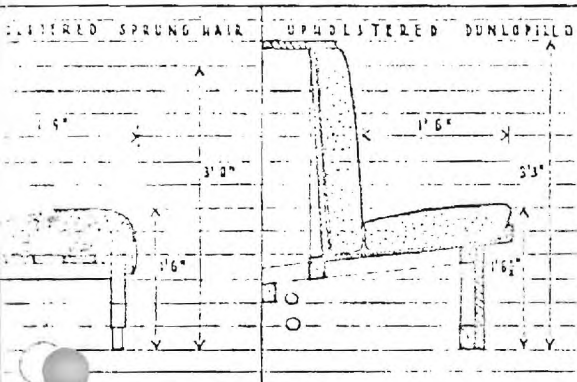
GROUND FLOOR PLAN

- | | | | |
|----|----------------------|----|---------------------|
| 1 | Meat freezer | 15 | Preparation |
| 2 | Bread freezer | 16 | Milk & Fruit fridge |
| 3 | Fish freezer | 17 | Storage |
| 4 | Fish preparation | 18 | Delivery docks |
| 5 | Fish fridge | 19 | Unloading dock |
| 6 | Meat fridge | 20 | Linen store |
| 7 | Fridge | 21 | Cloakrooms |
| 8 | Hora D'oeuvre fridge | 22 | Beer fridge |
| 9 | Potato preparation | 23 | Female lavatories |
| 10 | Icemaking | 24 | Cloakroom |
| 11 | Vegetable fridge | 25 | Male lavatories |
| 12 | Office | 26 | Telephones |
| 13 | Fridge | 27 | Lifts |
| 14 | Office | | |

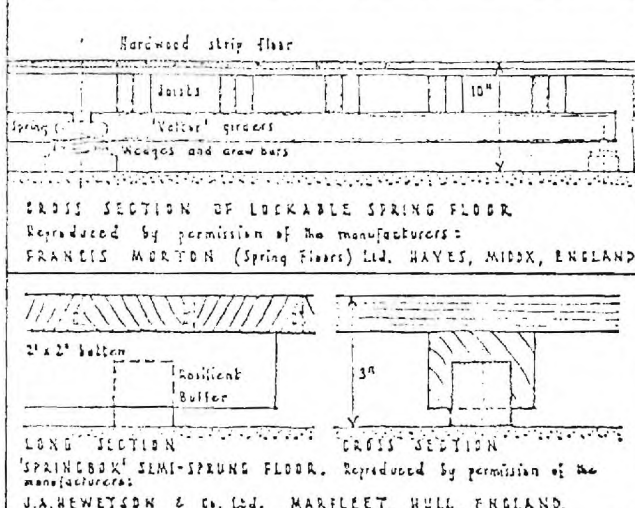
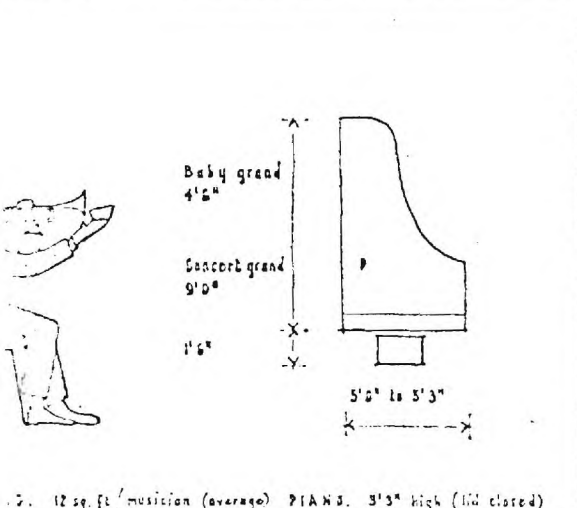
THE MÖVENPICK IN DREIKÖNIG RESTAURANT, ZURICH



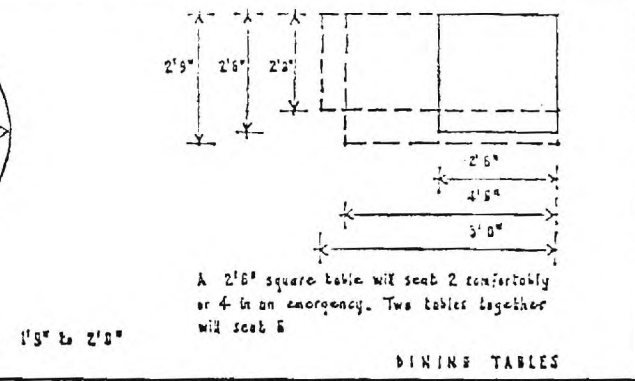
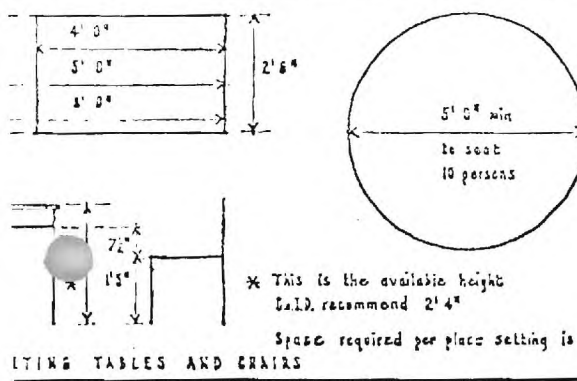
DINING ROOMS
SELF-SERVICE



BAR SEATING



BALLROOMS



FURNITURE

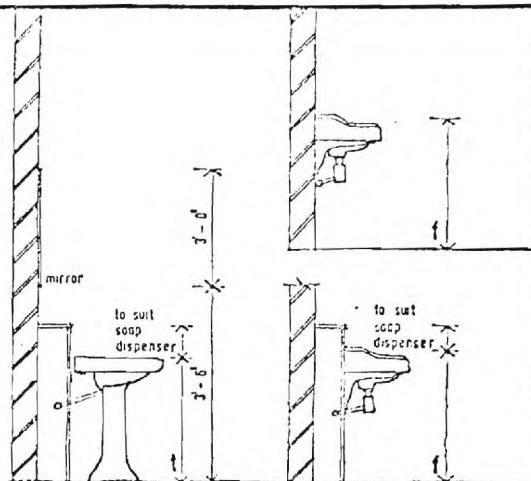
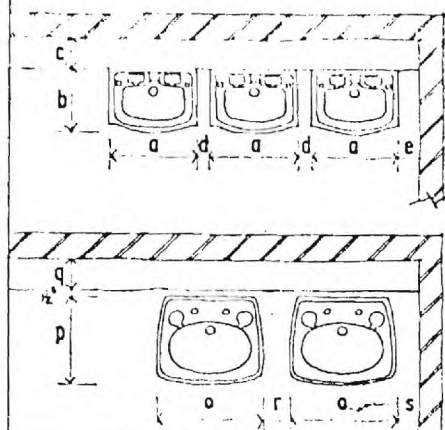
HOTELS · RESTAURANTS · BARS

CLOAKROOM · BATHROOM · LAVATORY · FITTINGS

LAVATORY BASINS

vitreous china or
glazed fireclay

obtainable in white
and colours

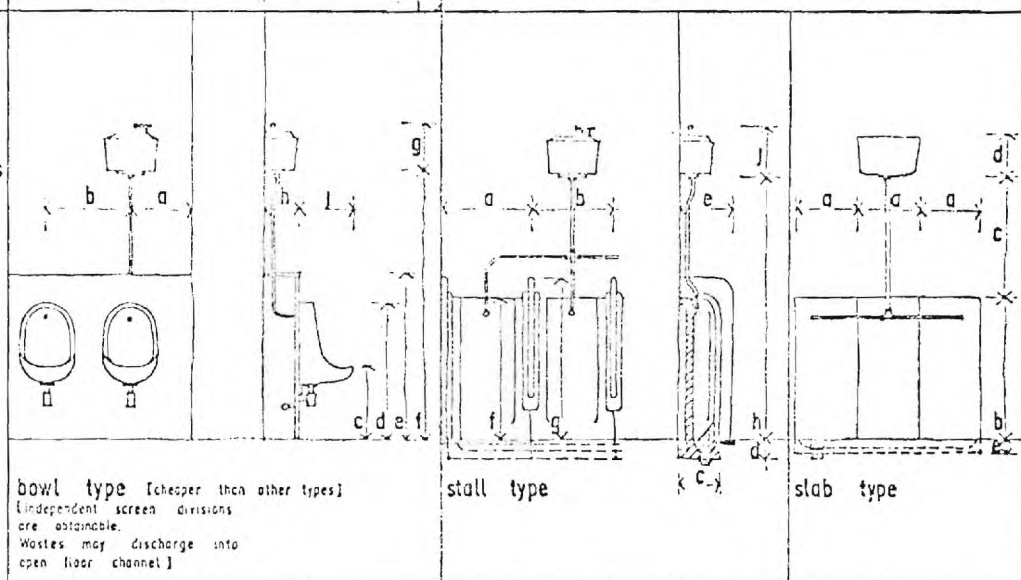


a	12"	24"	24"	24"
b	11"	16"	16"	16"
c	8"	8"	8"	8"
d	4"	4"	4"	4"
e	4"	4"	4"	4"
f	31"	31"	31"	31"
g	22"	24"	25"	27"
h	16"	20"	18"	18"
i	8"	8"	8"	8"
j	4"	4"	4"	4"
k	8"	8"	8"	8"
l	31"	31"	31"	31"

URINALS

bowl type -
vitreous china
stall and slab types
- glazed fireclay

usually white



bowl	stall	slab
a	15"	15"
b	24"	24"
c	11"	11"
d	8"	8"
e	4"	4"
f	31"	31"
g	15"	15"
h	24"	24"
i	11"	11"
j	8"	8"
k	4"	4"
l	31"	31"

bowl type [cheaper than other types]
Independent screen divisions
are obtainable.
Wastes may discharge into
open floor channel]

stall type

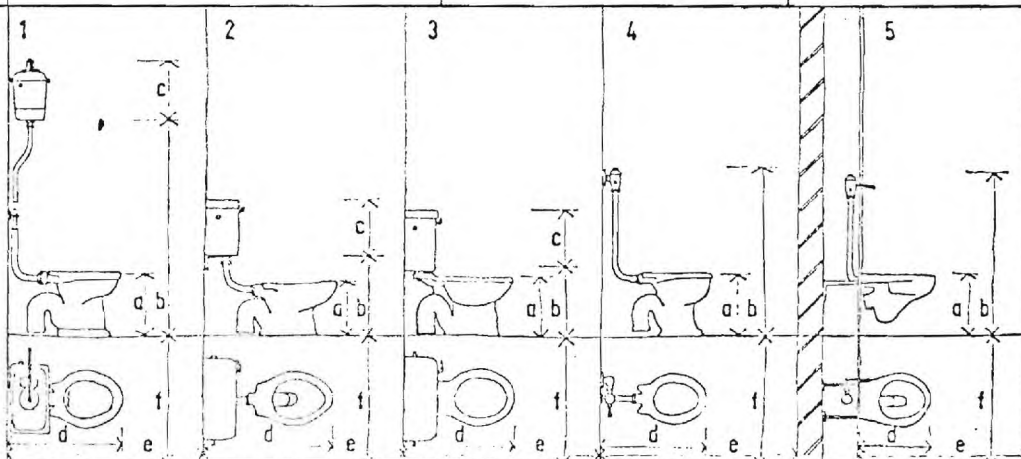
slab type

WATER CLOSETS

vitreous china or
glazed fireclay

obtainable in white
and colours

minimum cubicle
dimensions



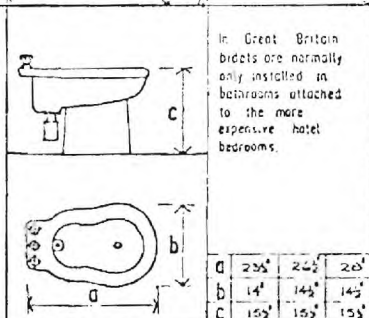
	1	2	3	4	5
a	12"	14"	15"	16"	18"
b	24"	24"	12"	40"	40"
c	10"	14"	15"	-	-
d	20"	20"	20"	27"	27"
e	37"	43"	37"	37"	34"
f	30"	30"	30"	30"	30"

- 1 high level suite
- 2 low level suite
- 3 close-coupled suite
- 4 exposed flushing valve
- 5 concealed flushing valve
with cantilevered closet

BIDETS

vitreous china or
glazed fireclay

obtainable in white
and colours

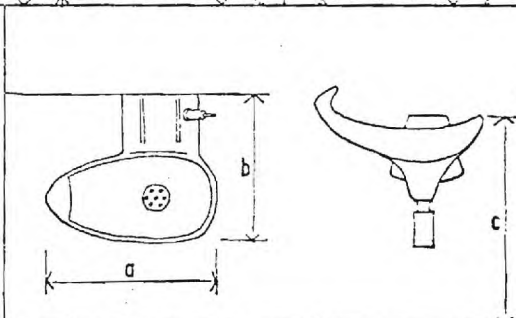


In Great Britain
bidets are normally
only installed in
bathrooms attached
to the more
expensive hotel
bedrooms.

DRINKING FOUNTAINS

vitreous china
or glazed
fireclay

usually white



recommended features

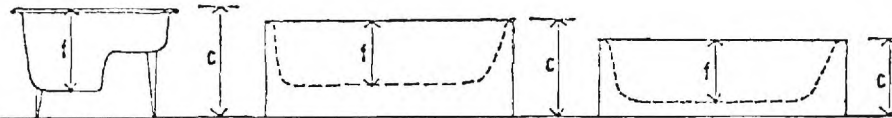
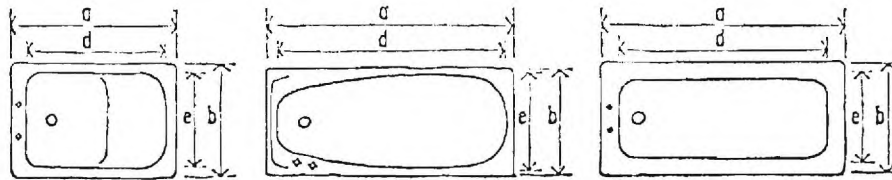
Downward pointing
jet to assist in
keeping it clean
and hygienic.
Push lever spring
loaded self closing
control valve.

a	15"	15"	15"
b	12"	12"	12"
c	31"	31"	31"

bath					
b	c	d	e	f	
2' 0"	2' 0"	2' 0"	2' 0"	10'	
2' 0"	2' 0"	2' 0"	2' 0"	10'	
2' 0"	2' 0"	2' 0"	2' 0"	10'	

short bath					
b	c	d	e	f	
2' 0"	2' 0"	4' 0"	2' 0"	16'	
2' 0"	2' 0"	4' 0"	2' 0"	16'	
2' 0"	2' 0"	4' 0"	2' 0"	17'	

length bath					
b	c	d	e	f	
2' 0"	2' 0"	4' 0"	2' 0"	17'	
2' 0"	2' 0"	4' 0"	2' 0"	18'	
2' 0"	2' 0"	4' 0"	2' 0"	20'	



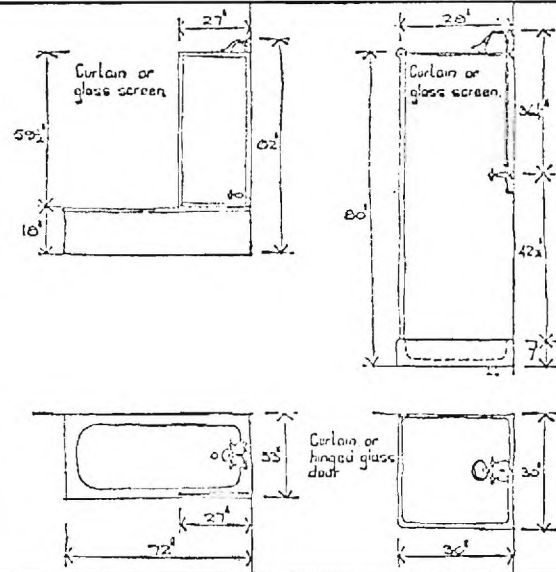
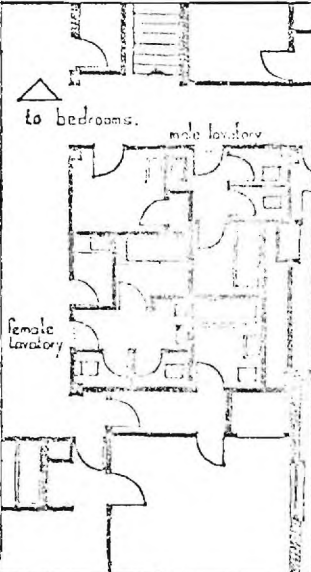
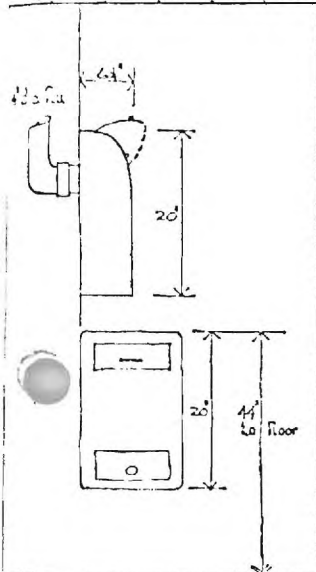
sitz bath short bath full length bath

BATHS

porcelain enamel or stove enamel on steel

exceptionally - glazed fireclay

obtainable in white and colours



SHOWERS BATHROOMS INCINERATOR

shower fittings usually chromium plated metal with rubber flexible connections

recommended provisions

public areas male

- 1 w.c. for every 100 persons
- 1 urinal for every 50 persons
- 1 lavatory basin for every 50 persons

female

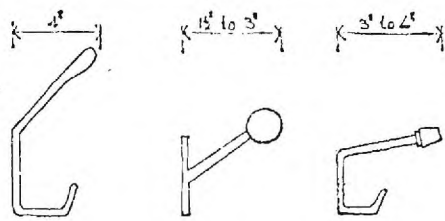
- 1 w.c. for every 50 persons
- 1 lavatory basin for each w.c. provided
- 1 incinerator for up to 5 w.c.s

accommodation for guest bedrooms without private bathrooms

- male
- 1 w.c. for every 25 persons
- minimum 2 w.c.s on each floor
- 1 urinal for every 25 persons
- minimum 3 urinals on each floor
- 1 lavatory basin for each w.c. provided
- basins as for w.c.s

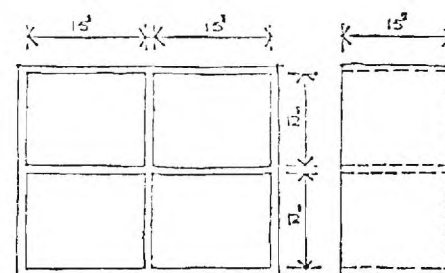
female

- 1 w.c. for every 25 persons
- 2 w.c.s on each floor
- 1 lavatory basin for each w.c. provided
- basins as for w.c.s
- 1 incinerator for up to 5 w.c.s.

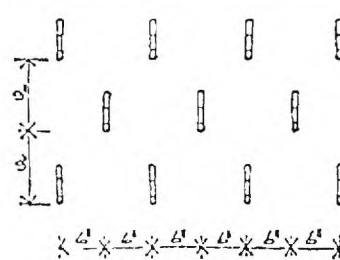


separate combined with rubber buffer

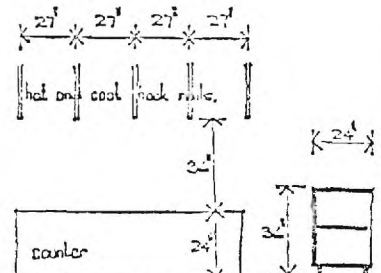
hat and coat hooks



pigeonhole racks for coats



spacing of hat and coat hooks

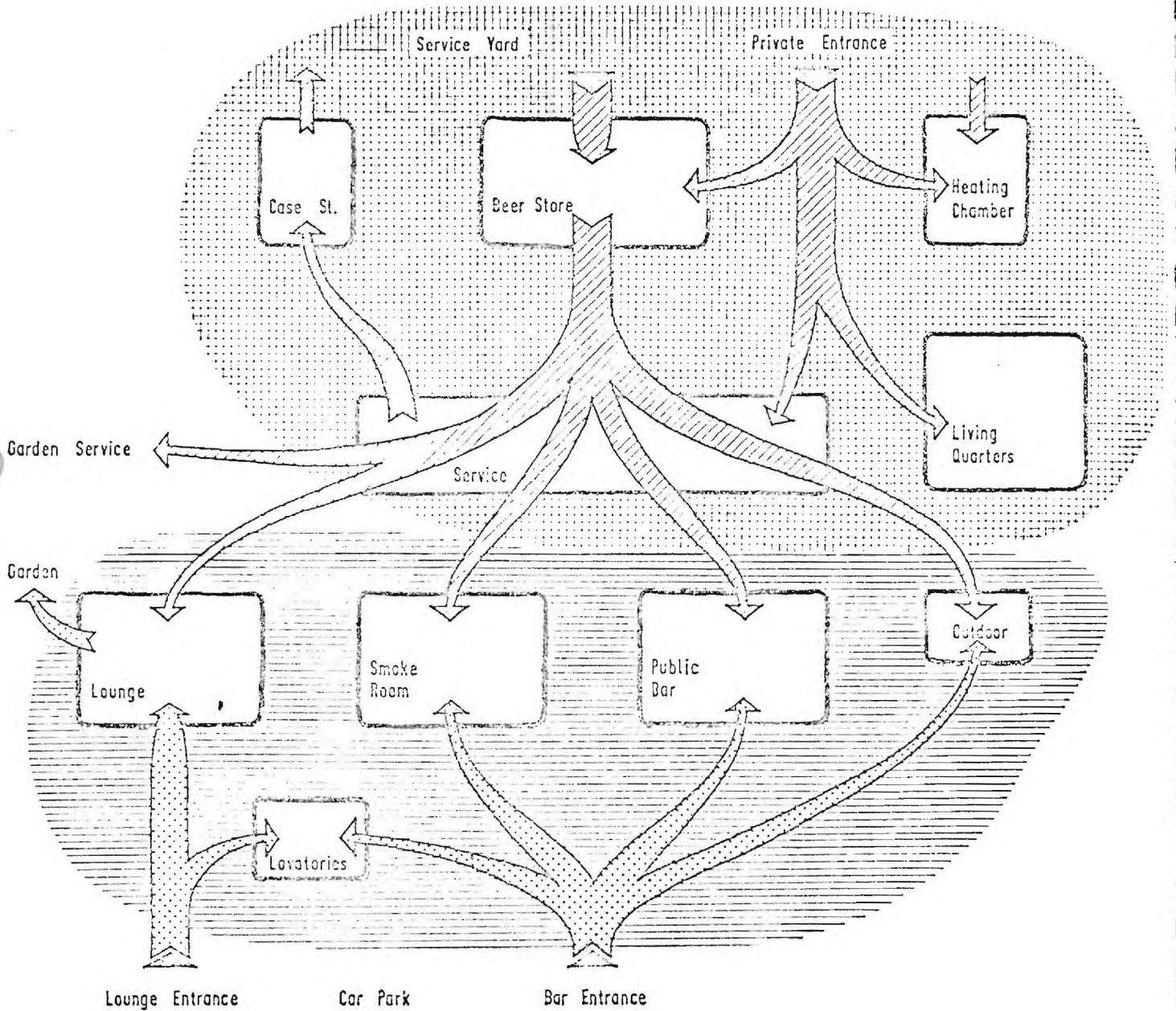
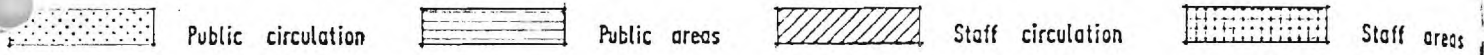


cloakroom counter

CLOAKROOM FITTINGS

BARS

THEORETICAL CIRCULATION

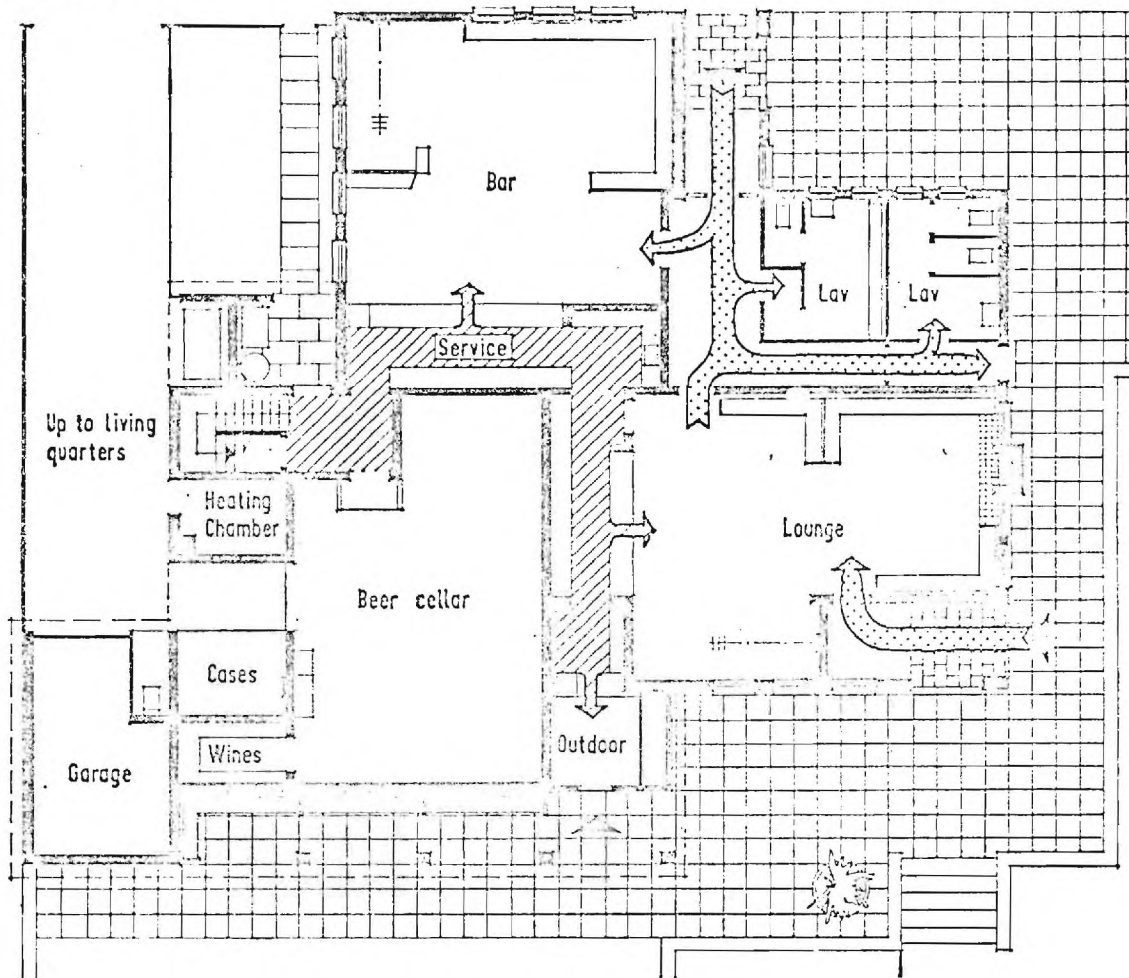




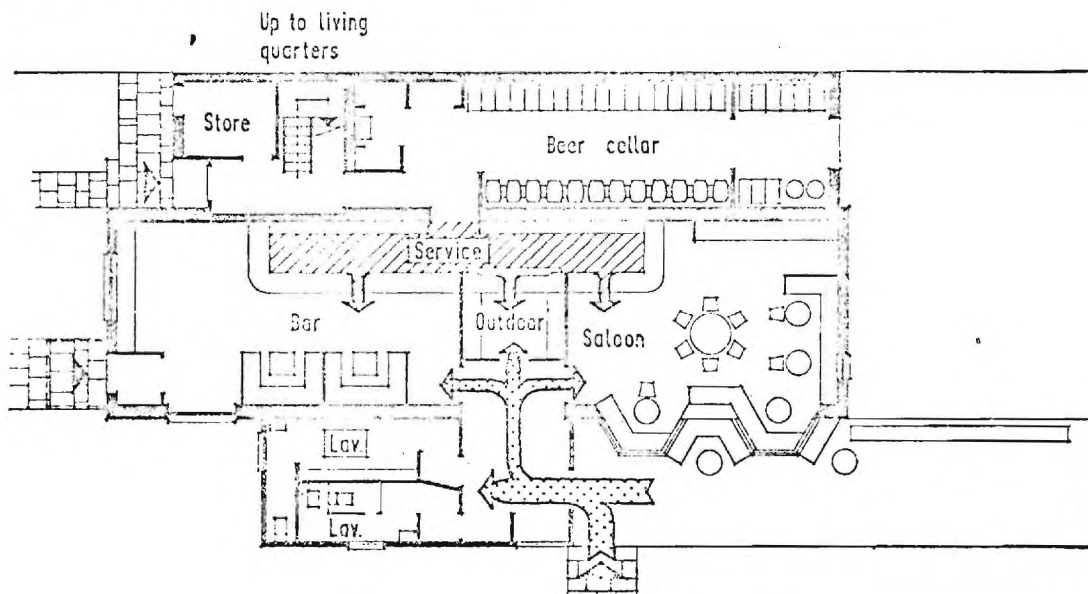
Public circulation



Staff circulation



"THE LIVE AND LET LIVE" - COVENTRY ENGLAND



"THE PRINCE ALBERT INN" - LOWESTOFT ENGLAND

Heating and Ventilating

Design temperatures

Area	Design temperature when outside is 30°F (See Note 5)	Air changes/ hour (See Note 6)	Notes
Entrance foyer	60°F	3	
Dining rooms	65°F	3	2
Lounges	65°F	2	
Bars	60°F	2	
Bedrooms	60°F	2	
Bathrooms	65°F	1	
Lavatories	60°F	2-10	1 and 3
Kitchens	—	20-40	1 and 4
Offices	65°F	2	
Staff bedrooms	60°F	2	
Staff dining rooms	65°F	2	2
Staff sitting rooms	65°F	2	
Changing rooms	65°F	2	

Notes

- 1 Except in the cases of the lavatories and kitchens, the air change figures given are those for which allowance must be made in designing the heating.
- 2 Dining rooms may require a greater rate of ventilation, especially if they are underground when air conditioning may be essential.
- 3 Lavatories without windows may require up to 10 air changes per hour.
- 4 The ventilation required in kitchens depends upon the amount of equipment in relation to space and whether the walls are exposed to the atmosphere. If in a basement, they may need the upper limit or more.
- 5 The design temperatures are based on an outside temperature of 30°F so systems designed on this basis are capable of giving higher room temperatures for a great part of the year. There is a tendency to expect higher room temperatures today—68° or 70°F—but the design basis has remained unchanged because of this 'built-in' margin.
- 6 In summer higher air change rates are required and are normally achieved by opening windows. A building with sealed windows needs higher air changes and some artificial cooling during the summer.

Heating load

A rule of thumb assessment is 4 B.T.U.s/hour per 1,000 cubic feet of building.

Cooling load

1 ton of refrigeration is equivalent to the extraction of heat at the rate of 12,000 B.T.U.s/hour.

A rule of thumb assessment of cooling load for U.K. conditions is $\frac{1}{2}$ ton of refrigeration per bedroom or 6,000 B.T.U.s/hour. For areas such as dining rooms, ballrooms, etc., a rough assessment would be 25 B.T.U.s per square foot of floor area per hour.

Ductwork

The cross-sectional area of ducts in a low velocity system will be approximately four times that of a modern high velocity system.

Cold water service

An hotel of 200 bedrooms will require between 5,000 and 10,000 gallons water storage.

An hotel of 25 bedrooms will require between 500 and 1,000 gallons.

The actual storage needed will depend upon the number of showers and bathrooms.

At least 24 hours' supply should be provided.

Lighting standards

In the design stage and for the purpose of assessing the electrical load, it is wise to allow an intensity of approximately 30 foot candles in the public rooms, but the intensities required are as below:

Area	Intensity in foot candles
Dining rooms	10
Bars	5-10
Lounges	5-10
Bedrooms	5
Lavatories	5
Kitchens	15
Corridors	5
Offices	15

Lifts

Passenger lift cars should hold between 10 and 20 persons according to the number of lifts, number of floors, number of bedrooms and the speed of the lifts.

As a guide, the following may be used:

No. of floors	Car speed in feet per minute
2	100
3-4	100-150
5-6	200-300
7-9	300-400
10 and above	400-500
Service lifts	100

For speeds over 300 feet per minute, gearless machines must be used, but these are expensive and therefore justifiable only in tall buildings.

Aide-mémoire

In the design stage, the following points need consideration:

- 1 Type of heating, i.e.

Low pressure hot water	Electricity
High pressure hot water	Heated air
Steam	
- 2 The method of heating, i.e.

Radiators	Heated ceiling
Convectors	Air circulation
Heated floor	
- 3 The size of the

Boiler house	}	See sheet No. 19
Fuel storage area		
Plant rooms		
Tank rooms		
- 4 The provisions within the building for services, i.e.
 - Vertical ducts (a duct less than 12" x 18" is useless)
 - Space above suspended ceilings
 - Recesses in walls

Note. An allowance of about 12" should be left above the suspended ceiling and below the underside of the structure for running services. If there are to be air ducts in this space, too, it should be increased accordingly.

- 5 The drainage system, i.e. whether prefabricated vertical plumbing stacks will be used, and if so, how they will travel to below ground.
- 6 The size and positions of the gas and electrical intake rooms.
- 7 The positions of electrical risers and distribution boards.
- 8 The number and position of the lifts; passenger, goods and food and the space required for the motor room.
- 9 The size and position of the water storage tanks, water softening plant and booster pumps.
- 10 The fire fighting provisions, i.e. Dry or wet risers
Hose reels
Extinguisher banks
- 11 The method of disposing of rainwater.
- 12 Provision for telephones, radio and television.
- 13 Provision for hotel services, i.e. Cash carrying system
Beer dispensing equipment
Waste disposal

Costs, U.K.

The total cost of the Mechanical and Electrical Services for an average sized building with hot water, central heating, normal lighting and power and, say, two lifts would be between 20% and 30% of the total cost of the building, i.e. perhaps 30s. per square foot of the gross floor area.

If air conditioning and/or mechanical ventilation is required

throughout the building, then the cost would be in the region of 40 to 45s. per square foot of the gross floor area.

Total owning and operating costs with air conditioning throughout would be between 3s. 6d. and 5s. per square foot of gross floor area per year.

Total owning and operating costs with normal central heating would be about 1s. 9d. per square foot of gross floor area per year.

These figures in practice show that the room 'rate' is increased by about 5% for air conditioning or a very good standard of heating and ventilating.

Costs, U.S.A.

Total owning and operating costs of new hotel and motel buildings in dollars per square foot of gross floor area per year:

	dollars
Building	3.6
Equipment and Supplies	1.9
Salaries and Wages	3.5
Air Conditioning throughout	1.0
20% profit	2.0
	<hr/>
	12.0
	<hr/>

TECHNICAL DATA

FIRE RESISTANCE OF BUILDINGS

Fire grading of buildings

General grading

For the purpose of defining requirements for fire precautions in buildings (except for means of escape), occupancies should be graded on the basis of fire load as follows:

- 1 Occupancies of Low Fire Load—less than an average of 100,000 B.T.U.s/square foot of net floor area of any one compartment and less than an average of 200,000 B.T.U.s/square foot on limited, suitably enclosed, isolated areas.
- 2 Occupancies of Moderate Fire Load—an average between 100,000 and 200,000 B.T.U.s/square foot of net floor area of any one compartment and less than an average of 400,000 B.T.U.s/square foot on limited, suitably enclosed, isolated areas.
- 3 Occupancies of High Fire Load—an average between 200,000 and 400,000 B.T.U.s/square foot of net floor area of any one compartment and less than an average of 800,000 B.T.U.s/square foot on limited, suitably enclosed, isolated areas.

Fire load

Possible number of B.T.U.s liberated per square foot of floor area of a compartment by the combustion of the contents and any combustible parts of the building.

e.g. 4,000 lb of combustible material, calorific value

8,000 B.T.U.s per lb distributed over 1,000 square feet

$$\text{Fire load} = \frac{4,000 \times 8,000}{1,000} = 32,000 \text{ B.T.U.s/square foot}$$

Typical calorific values in B.T.U.s/lb

Coal Anthracite	13,300	Petrol	20,000
Bituminous	14,000	Oil (Fuel)	18,900
Coke	12,500	Paraffin	18,600
Paper (av)	7,000	Wood (av)	17,000

Occupancies

Normal—if the fire load presents no special features.

Abnormal—if the materials contained are of a hazardous nature, i.e.—petrol, fats, oil.

Grading of buildings

The British Standard 476 : 1932 enables various elements of structure to be graded according to the time for which they resist a certain standard of fire severity determined by a time/temperature curve based on observations in actual fires.

- Grade A Compliance with test conditions for 6 hours.
 Grade B Compliance with test conditions for 4 hours.
 Grade C Compliance with test conditions for 2 hours.
 Grade D Compliance with test conditions for 1 hour.
 Grade E Compliance with test conditions for ½ hour.

TABLE 1. Equivalent severities of building fires (American results)

COMBUSTIBLE CONTENT		EQUIVALENT SEVERITY OF FIRE IN HOURS OF STANDARD TEST
Weight lb/sq. ft	Fire Load* B.T.U.s/sq. ft	
10	80,000	1
15	120,000	1½
20	160,000	2
30	240,000	3
40	320,000	4½
50	380,000	6
60	432,000	7

*Calorific value of materials 7,000–8,000 B.T.U.s/lb.

TABLE 2. Grading of occupancies by fire load

Examples of Occupancies of Low Fire Load	NORMAL		ABNORMAL
	Flats Offices Restaurants Hotels Hospitals	Schools Museums Public Libraries Institutional and Administrative Buildings	Factories and Workshops in which special risks arise through the presence or use of limited quantities of recognised hazardous materials and processes but which would otherwise be graded as 'Low Fire Load—Normal'.
	Factories and Workshops in which the materials and processes used are of a recognised non-hazardous nature, i.e. the materials involved are in general incombustible.		
Examples of Occupancies of Moderate Fire Load	NORMAL		ABNORMAL
	Retail Shops, e.g. Footwear, Clothing, Furniture, Groceries.		Retail Shops and Factories and Workshops in which special risks arise through the presence of large quantities of recognised hazardous materials or of recognised hazardous processes.
	Factories and Workshops generally.		
Examples of Occupancies of High Fire Load	NORMAL		ABNORMAL
	Warehouses and other buildings used for the storage in bulk of commodities of a recognised non-hazardous nature.*		Warehouses and other buildings used for the storage in bulk of commodities of a recognised hazardous nature.

* Classified lists of materials have been prepared by the Fire Officers' Committee.

TABLE 3. Assumed equivalent severities of building fires

FIRE LOAD B.T.U.s/sq. ft	EQUIVALENT SEVERITY OF FIRE IN HOURS OF STANDARD TEST
Less than 100,000, i.e. low fire load	1
100,000-200,000, i.e. moderate fire load	2
200,000-400,000, i.e. high fire load	4

Fully protected construction

In a building of low fire load a fire resistance of 1 hour in the elements of structure would enable the building to withstand a complete burn out without collapse. Similarly, in a building of moderate fire load a fire resistance of 2 hours would be adequate, and for high fire loads 4 hours.

The necessary basis has therefore been established on which to formulate requirements for that grade of building which should resist a complete burn-out without failure and which can be called fully protected construction.

For the purpose of grading buildings according to their resistance to the effects of fire, the following 7 types of construction are used:

Types 1, 2 and 3: Incombustible fire resisting construction: fully or partially protected according to the fire load of the occupancy.

Type 4: Fire resisting construction: internal construction not necessarily incombustible and may therefore include combustible floor and roof.

Type 5: Externally protected construction.

Type 6: Unprotected incombustible construction.

Type 7: Combustible construction.

Minimum requirements

TABLE 4. Proposed minimum fire resistance requirements for graded types of construction

GRADING OF CONSTRUCTION	MINIMUM FIRE RESISTANCE (IN HOURS) OF MAIN ELEMENTS OF STRUCTURE					EXAMPLES OF CONSTRUCTION† CONFORMING TO TYPE
	WALLS, AND COLUMNS AND BEAMS SUPPORTING WALLS				FLOORS AND ROOFS AND COLUMNS AND BEAMS SUPPORTING FLOORS AND ROOFS	
	External	Separating	Division	Other F.R. or Load-Bearing		
Type 1. Incombustible, fire resisting construction. To be considered fully protected in relation to High Fire Loads, e.g. large warehouses.	4	4	4	4	4	Steel frame with 2½ inches concrete protection. Walls of brickwork 9 inches thick. Filler joist or reinforced concrete floors 6 inches thick or hollow tile floor of equivalent fire resistance.
Type 2. Incombustible fire resisting construction. To be considered fully protected in relation to Moderate Fire Loads, e.g. shops and factories.	2	4	2 4†	2	2	As above but 2 inches protection to steel, filler joist or reinforced concrete floors 5 inches thick or hollow tile or other floors of equivalent fire resistance.
Type 3. Incombustible fire resisting construction. To be considered fully protected in relation to Low Fire Loads only, e.g. office and residential buildings.	2*	4	2 4†	1	1	As above but 1 inch protection to steel or 1 inch cement mortar on expanded metal. Concrete floors 3½ inches thick, or equivalent.
Type 4. Fire resisting construction but not necessarily incombustible and may therefore include timber floors and timber roof construction. Partially protected only in relation to all fire loads.	2*	4	2 4†	1	½	Load-bearing brick walls. Timber floors and roof, protected by plaster ceilings on expanded metal. Fire retardant roof covering.
Type 5. Externally protected construction. Fire resisting incombustible external walls, non fire resisting internal construction.	2	4	2 4†	1	—	Load-bearing brick walls. Timber floors and roofs. Fire retardant roof covering.
Type 6. Non fire resisting construction. Incombustible.	—	4	2 4†	—	—	Unprotected steel frame and roof trusses, clad externally with corrugated sheeting.
Type 7. Non fire resisting construction. Combustible.	—	4	2 4†	—	—	Timber framed and/or clad external walls. Timber floors and roof with fire retardant covering.

* 1 hour for low fire load occupancies in framed buildings not exceeding 50 feet in height.

† If occupancy is of high fire load.

‡ It should be appreciated that these are intended as examples only, and any other form of construction which complies with the recommended grades could be used.

FIRE RESISTANCE OF BUILDINGS

TABLE 5. Minimum fire resistance (in hours) of elements of structure in buildings regarded as fully protected

TYPE OF CONSTRUCTION	MINIMUM FIRE RESISTANCE IN HOURS								
	WALLS				COLUMNS AND BEAMS SUPPORTING				STAIRCASES, FLOORS AND FLAT ROOFS
	External	Separating	Division	Other Fire Resisting or Load-bearing Walls	External Walls	Division Walls	Other Fire Resisting or Load-bearing Walls	Floors	
Type 1	4	4	4	4	4	4	4	4	4
Type 2	2	4	2	2	2	2	2	2	2
Type 3	1* 2†	4	2	1	1* 2†	2	1	1	1

* In buildings of framed construction when height does not exceed 50 feet.

† Minimum for load-bearing walls, and other walls exceeding 50 feet in height.

One- or two-storey domestic scale buildings (e.g. public houses and inns)

The exposed surfaces of walls and ceilings should conform with the following tabulated recommendations.

TABLE 6. Recommended uses for wall and ceiling linings

CLASS 1*	CLASS 2*	CLASS 3*
May be used in any situation.	May be used in any situation, except on walls and ceilings of staircases and passages.	Should be used only in living rooms and bedrooms but not rooms in the roof, and only as a lining to solid walls and partitions. Not on staircases or corridors.

* Classification according to surface spread of flame as defined in B.S. 476.

Walls

All external and internal walls should have an adequate grade of fire resistance, sufficient at least to ensure that there is no risk of failure before the occupants have escaped, i.e. not less than Grade E ($\frac{1}{2}$ hour). Where full structural resistance against collapse is required the fire resistance should not be less than Grade D (1 hour).

Separating walls

Incombustible material with a fire resistance of not less than Grade D (1 hour) must be used.

Additional precautions

Every building or division except those containing occupancies of low normal fire load should be equipped with an approved sprinkler installation if the floor area exceeds 10,000 square feet or with an approved fire alarm system if the floor area does not exceed this figure, but the cubic capacity of the whole building or division exceeds 250,000 cubic feet.

Siting of buildings

Distance between buildings

20 feet to 50 feet Grade E.

10 feet to 20 feet Grade D.

40 feet minimum for fire fighting.

60 feet if window openings are more than 50% of external elevation.

Less than 20 feet no openings permissible.

Grade D protection to windows—1 hour

i.e. fire resisting glazing and automatic drenchers or fire resisting shutters.

Grade E protection to windows— $\frac{1}{2}$ hour

i.e. fire resisting glazing or fire resisting shutters.

Tables of gradings

TABLE 7. Walls and Partitions. Fire Resistance Gradings

CONSTRUCTION AND MATERIALS		GRADE A 6 HOURS	GRADE B 4 HOURS	GRADE C 2 HOURS	GRADE D 1 HOUR	GRADE E $\frac{1}{2}$ HOUR
		MINIMUM THICKNESS IN INCHES EXCLUSIVE OF PLASTERING TO ATTAIN INDICATED GRADE				
Solid bricks of clay, concrete or sand-lime	Solid wall. No plaster	$8\frac{1}{2}$	$8\frac{1}{2}$	$8\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$
	Solid wall plastered on both sides	$8\frac{1}{2}$	$8\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$
	Cavity wall. No plaster (2 inch cavity)	$10\frac{1}{2}$	$10\frac{1}{2}$	$10\frac{1}{2}$	—	—
Solid concrete blocks (conforming to B.S. 492)	Class 1 (a) Aggregates	—	—	4	3	$2\frac{1}{2}$
	Solid wall. No plaster	—	4	3	2	2
	Class 1 (b) Aggregates	—	—	4	3	$2\frac{1}{2}$
	Solid wall. No plaster	—	—	4	$2\frac{1}{2}$	2
	Class 2 Aggregates	—	—	—	4	3
	Solid wall. No plaster	—	—	4	3	2
Reinforced concrete*	Class 1 Aggregates	8	6	4	3	3
	Class 2 Aggregates	9	7	4	3	3
Hollow clay blocks (A).† Shells not less than $\frac{3}{4}$ inch thick	All plastered $\frac{1}{2}$ inch thick on both sides	—	—	—	4	3
	1 cell in thickness; not less than 50% solid	—	—	—	6	—
	1 cell in thickness; not less than 30% solid	—	—	—	6	—
	2 cells in thickness; not less than 50% solid	—	—	$8\frac{1}{2}$	4	—
	2 cells in thickness; not less than 45% solid	—	—	—	6	—
Hollow concrete blocks (A) (conforming to B.S. 728 or 834)	Plastered $\frac{1}{2}$ inch thick on both sides.	—	—	—	—	—
	1 cell in wall thickness	—	—	—	—	—
	Class 1 (a) Aggregates	—	$8\frac{1}{2}$	4	$2\frac{1}{2}$	—
	Class 1 (b) Aggregates	—	$8\frac{1}{2}$	$4\frac{1}{2}$	3	$2\frac{1}{2}$
	Class 2 Aggregates	—	—	—	$8\frac{1}{2}$	3
Solid blocks of gypsum (A)	No plaster	—	—	4	3	2
	$\frac{1}{2}$ inch plaster both sides	—	—	3	2	2
Hollow blocks of gypsum (not less than 70% solid) (A)	No plaster	—	—	4	3	2
	$\frac{1}{2}$ inch plaster both sides	—	—	3	2	2
Solid wood wool slabs	$\frac{1}{2}$ inch plaster both sides	—	—	3	2	2
Solid plaster	Central reinforcement of metal lath on steel rods or studs	—	—	—	2	2
Plasterboard supported top and bottom edges in steel channels	$\frac{3}{4}$ inch gypsum plaster on both sides	—	—	—	$\frac{3}{4}$	—
Glass blocks	Not exceeding 5 x 5 feet with expansion joint	—	—	—	4	—

* Walls to be reinforced vertically and horizontally at not more than 6 inch centres, and reinforcement to be not less than .2% of volume.
Walls less than 5 inches thick to have single layer of reinforcement in middle of wall.

Walls more than 5 inches thick to have two layers of reinforcement, not less than 1 inch from each face.

† Gradings of elements followed by (A) are derived mainly from American sources.

FIRE RESISTANCE OF BUILDINGS

TABLE 7. Walls and Partitions. Fire Resistance Gradings (continued)

HOLLOW PARTITIONS		GRADE OF FIRE RESISTANCE (HOURS)
Plaster** on expanded metal on steel or timber studding (A)†	Gypsum, Portland Cement or Cement Lime Plaster $\frac{1}{2}$ inch thick on each side $\frac{3}{4}$ inch thick on each side	$\frac{1}{2}$ 1
Plaster on wood lathing on timber studding (A)†	Gypsum, Portland Cement or Cement Lime Plaster $\frac{1}{2}$ inch thick on each side	$\frac{1}{2}$
Plasterboard with or without gypsum plaster on timber studding	$\frac{3}{8}$ inch plasterboard with $\frac{3}{4}$ inch neat plaster	$\frac{1}{2}$
	$\frac{1}{2}$ inch plasterboard with no plaster	$\frac{1}{2}$
	$\frac{1}{2}$ inch plasterboard with $\frac{3}{8}$ inch plaster $\frac{3}{4}$ inch plasterboard	1 1
Fibreboard on timber studding (A)†	$\frac{1}{2}$ inch fibreboard with $\frac{1}{2}$ inch plaster	$\frac{1}{2}$

** Thickness of plaster measured from outer face of lathing.

† Gradings of elements followed by (A) are derived mainly from American sources.

TABLE 8. Floors and roof. Fire Resistance Gradings

CONSTRUCTION AND MATERIALS	GRADE A 6 HOURS	GRADE B 4 HOURS	GRADE C 2 HOURS	GRADE D 1 HOUR	GRADE E $\frac{1}{2}$ HOUR
	MINIMUM THICKNESS IN INCHES FOR INDICATED GRADINGS				
<i>Concrete Floors or Roofs</i>					
(a) <i>Filler Joist</i> . Maximum spacing of joists as allowed for structural requirements. Any aggregate. Minimum slab thickness Minimum cover on flanges of joists	7	6	5	4	$3\frac{1}{2}$
Top	—	1	1	—	—
Bottom	—	1	1	$\frac{1}{2}$	$\frac{1}{2}$
(b) <i>Solid Reinforced Concrete Slab</i> Minimum slab thickness	7	6	5	4	$3\frac{1}{2}$
(c) <i>Hollow Tile</i> Minimum thickness of incombustible material, i.e. thickness of concrete slab and of solid material in tiles Minimum cover to steel	— —	5 1	$3\frac{1}{2}$ $\frac{1}{4}$	3 $\frac{1}{4}$	$2\frac{1}{2}$ $\frac{1}{2}$
<i>Wood Floors or Roofs</i> $\frac{7}{8}$ inch boards on wood joists 9 by 2 inches (nominal) (i) T. and G. boarding with wood lath and plaster ceiling (ii) Plain edge boarding with metal lath and plaster ceiling (iii) T. and G. boarding with wood lath and plaster pugged with 3 inches ashes (Scottish practice)	Minimum thickness of plaster				$\frac{3}{8}$ inch

TABLE 9. Tentative gradings for reinforced concrete columns in accordance with the British codes of practice for reinforced concrete

SIZE OF COLUMN (Overall Diameter of Round Columns or Side of Square Columns)	TENTATIVE GRADE OF FIRE RESISTANCE (HOURS)	
	Class 1 Aggregates (Limestone, Blast Furnace Slag)	Class 2 Aggregates
10 inches up to 12 inches	2	1 hour or 2 hours if light 2 inch mesh reinforcement placed centrally in concrete cover to main reinforcement.
Over 12 inches up to 20 inches (Data not available for columns more than 20 inches diameter or side.)	4	2 hours or 4 hours if light 2 inch mesh reinforcement placed centrally in concrete cover to main reinforcement.

TABLE 10. Steel columns and beams. Protection required

CONSTRUCTION AND MATERIALS	GRADE A 6 HOURS	GRADE B 4 HOURS	GRADE C 2 HOURS	GRADE D 1 HOUR	GRADE E $\frac{1}{2}$ HOUR
	MINIMUM THICKNESS IN INCHES OF PROTECTION OUTSIDE STEEL FOR INDICATED GRADINGS				
<i>Solid Protection</i> Brickwork with filling of brick and mortar, all properly bonded	$4\frac{1}{2}$	3	2	—	—
Concrete Not leaner than 1 : 2 : 4 mix. Reinforced centrally with steel mesh or } Class 1 aggregates with wire } Class 2 aggregates	4 4	$2\frac{1}{2}$ $2\frac{1}{2}$	$1\frac{1}{2}$ 2	1 1	— —
Gypsum Concrete (7 parts gypsum, 1 part wood chips, poured <i>in situ</i>) (A)†	3	2	$1\frac{1}{2}$	1	—
Hollow Clay Tile with interior filling of concrete—thickness of solid material	—	—	—	—	$1\frac{1}{2}$
Foamed Slag Blocks with interior filling of concrete or blocks and mortar. Wire reinforcement in every horizontal joint	4	$2\frac{1}{2}$	2	2	—
Gypsum Blocks with interior filling. Wire reinforcement in every horizontal joint	3	2	—	—	—
Sprayed Asbestos	—	2	1	$\frac{1}{2}$	$\frac{3}{4}$
<i>Hollow Protection</i> Brickwork or solid clay blocks with wire reinforcement in every horizontal joint	—	$4\frac{1}{2}$ (Reinforced every fourth joint)	3	2	—
Foamed Slag Blocks with wire reinforcement in every horizontal joint	4	3	2	2	—
Gypsum Blocks with wire reinforcement in each horizontal joint (A)†	—	3	2	2	—
Moulded Asbestos held in position with nichrome wire	$3\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{2}$	1	—
Plaster on expanded metal lathing wired to joist with wire netting over first coat Plaster on expanded metal lathing	— —	— —	— —	1 —	— $\frac{3}{4}$
Gypsum plaster on plasterboard with wire binding	—	—	$\frac{1}{2}$ inch plaster on $\frac{1}{2}$ inch plaster-board	$\frac{1}{2}$ inch plaster on $\frac{3}{4}$ inch plaster-board	$\frac{3}{8}$ inch plaster on $\frac{3}{8}$ inch plaster-board

Note: All methods of protection may not be suitable for beams. No data for solid steel columns are available.

† Gradings of elements followed by (A) are derived mainly from American sources.

Acknowledgement

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DESIGN DATA

Because there are so many variable factors it is not possible to design a standard hotel. Yet it would be invaluable to know right from the start what area is required for, say, the heating chamber. From the information given on sheet No. 17 it can be calculated that the B.T.U. rating of the boilers required is:

$$\frac{\text{Cubic content of the building in feet}}{1,000} \times \frac{4}{\text{number of boilers}}$$

Reference to a catalogue will give the dimensions of the boilers. The heating chamber can then be planned to accommodate these boilers with all their ancillary equipment. But this information is not readily available in the early stages of design.

In an attempt to provide the information at a glance, one particular hotel has been analysed and the elements have been listed below. These figures are, it must be stressed, only usable as a guide, but they do give a basis on which to design a building which, due to varying reasons, may eventually prove to be quite different from this one.

The building analysed is a British provincial city hotel for which the authors were the Architects.

'A' General description	The hotel, with 108 bedrooms, is in the centre of a city of some 300,000 inhabitants. It is built on a sloping site so that there is access at the front at ground floor level and at the rear at lower ground floor level. Approximately half of the site at ground and lower ground floor levels is occupied by shops. A large public car park adjoins the rear entrance. At one end of the building there is a public house (The White Lion) operated as a separate entity but sharing with the hotel the heating, ventilating, electrical, plumbing and cooking services.	
Element	Description	Comments
'B' Structure	<p><i>In situ</i> reinforced concrete columns, beams and floor slabs. The grid size is 20' 8" x 20' 0" on the bedroom floors and 20' 8" x 24' 0" clear of the bedroom floors</p> <p>The floor to floor heights are: Lower ground—Ground 11' 0" average Ground—First 15' 0" First—Second 13' 0" † Second—Third 11' 0" * Third—Fourth 11' 0" Fourth—Fifth 11' 0" Fifth—Sixth 10' 4" Sixth—Roof 18' 7" (Tanks and Lift Motor Rooms)</p>	<p>The site area, floor to floor heights and the shape of the building were pre-determined by the Town Planning Authorities. The reduction in the grid size on the upper floors effected economies in cost.</p> <p>† This floor was too low to accommodate services satisfactorily above the suspended ceilings. * The height of the ballroom is 20' 0" from floor to ceiling.</p>
'C' Mechanical Services		
1 HEATING	Low pressure hot water heating by convectors in the public areas, radiators in the bedrooms and service areas and heated metal tile ceilings in the foyer and reception area	
2 VENTILATING	Warm air intake and mechanical extract to public areas and kitchen. Extract ventilation only to lavatories and bathrooms	
3 ELECTRIC LIGHTING	Tungsten fittings throughout with an emergency lighting system to public areas, bedroom corridors and staircases	
4 ELECTRIC POWER	13 amp ring main circuits	
5 COMMUNICATIONS	G.P.O. telephones in all bedrooms and in kiosks in rear foyer, main foyer and reception area Internal telephone system linking all staff and service areas. Staff call system in all bedrooms Radio service to all bedrooms Conduit installed in building to permit television service to all bedrooms Paging system (which can also be used for music) in all public areas	

Element	Description	Comments
6 LIFTS	(a) Three automatic passenger lifts in one bank. Each car capable of carrying 8 persons. One lift only serves lower ground floor rear entrance (b) One 20 cwt goods lift (c) Eight electrically operated food lifts in four banks as follows: 2 lifts running between kitchen and bedroom service rooms 1 lift between kitchen and staff dining room 3 lifts between kitchen and ground floor servery to grill room 2 lifts between grill room servery and White Lion lounge (d) One platform crate hoist from beer cellar to White Lion public bar	Lifts can be altered to attendant control for peak periods.
7 HOT WATER SERVICE	Softened water supply heated by calorifiers with primary circuit off the heating boilers	
8 COLD WATER SERVICE	Unsoftened supply throughout. Drinking water points directly off rising main in kitchen. Separate tanked supply to W.C. flushing valves	
9 GAS SERVICE	Gas is supplied to some of the cooking equipment in the kitchen	
10 STEAM SUPPLY	Two steam boilers supply the laundry and kitchen	
11 CASH CARRIER SYSTEM	Tubes routed between bill office and dining rooms and between dining rooms and kitchen	
12 FIRE EQUIPMENT	There are three dry risers in the building and a hose reel on each floor with fire alarm buttons interconnected to the cold water supply booster pumps	
13 SOIL DRAINAGE	In prefabricated copper plumbing stacks, each stack taking two bathrooms per floor. The stacks terminate in cast iron drains in a horizontal walk-way duct below the lower ground floor	
14 RAINWATER DISPOSAL	In prefabricated copper stacks run within the building	
15 REFRIGERATION	Cooling units are provided in the beer cellars, a cold room opens off the main kitchen and cooled shelves are provided to the bar back fittings There is no provision for cooling on the air intake system	This should be provided where cost allows.

Element	Description	Area in sq. ft or size	Comments
'D' Planning for the guest			
1 ENTRANCES	(a) Main entrance and foyer at ground floor level (including porter's desk) (b) Rear entrance foyer from car park (including staircase)	1,375 675	Inter-connected by stairs and lift.
2 RECEPTION	(See 'Planning for the Staff' for areas of offices, etc.) Reception area including first floor foyer	800	At first floor level with stairs and lifts immediately adjacent.
3 LOUNGE	At first floor level adjacent to reception and forming the approach to the French restaurant. A small area is screened off for T.V. viewing	1,500	Opens on to a terrace overlooking the city centre and is divided into areas by show-cases.
4 CONFERENCE ROOM	Fitted with a sideboard unit with hot plates and can be used as a private dining room	400	A good revenue-producing room.

DESIGN DATA

Element	Description	Area in sq. ft or size	Comments
5 DINING ROOMS	(a) Grill room on ground floor	1,800	Served by lifts from kitchen on first floor through an adjacent servery.
	(b) French restaurant on first floor	1,850	Served directly from the kitchen. Opens on to a terrace overlooking the city centre.
6 BARS	(a) Snack bar on ground floor (including counter area)	1,875	Approached from the hotel foyer and from a separate entrance. Served by lifts from kitchen.
	(b) Cocktail lounge and bar on ground floor	1,100	Forms part of the foyer.
	(c) Cocktail bar on first floor	300	See 'Ballroom'.
	(d) In reception to ballroom		
7 BALLROOM SUITE	On first floor with balcony on two sides. Approached from the hotel through a reception area with a bar. There is an alternative entrance direct from outside through the public house entrance		
	(a) Reception	1,825	Opens on to a terrace.
	(b) Ballroom	5,000	
	(c) Balcony	1,300	With lockable sprung floor.
	(d) Dancing area	60' x 46'	
	(e) Band platform	20' x 8'	
8 LAVATORIES	(a) Male, ground floor (serving grill room, cocktail lounge and snack bar)		
	Area	180	There should be at least 3 washbasins and the area is too small.
	W.Cs. 2		
	Urinals 4		
	Washbasins 2		
	(b) Male, first floor (serving French restaurant, lounge, cocktail bar and ballroom)		
	Area	200	Net area, approach is through cloakroom.
	W.Cs. 3		
	Urinals 9		
	Washbasins 4		
	(c) Female, ground floor		
	Area of lavatory	125	
	Area of powder room	125	
	W.Cs. 3		
	Washbasins 3		
	(d) Female, first floor		
	Area of lavatory	250	Net area, approach is through cloakroom.
	Area of powder room	90	
	W.Cs. 5		
	Washbasins 4		
9 CLOAKROOMS	(a) Attended cloakroom on ground floor	140	Behind porter's desk.
	(b) Unattended cloakrooms on first floor (provision is made for attendance during functions in the ballroom)		
	(i) Male	600	
	(ii) Female	400	

Element	Description	Comments	
10 GUEST BEDROOMS	(a) Single rooms with private bathroom 32	The proportion of double bedrooms is higher than is now thought correct. 25% doubles to 75% singles is usually found to be more correct. { The disposition of the bedrooms was dictated by the plan shape pre-determined by the Town Planning Authorities.	
	(b) Double rooms with private bathroom 42		
	(c) Single rooms without bathroom 20		
	(d) Double rooms without bathroom 10		
	(e) Bedrooms in suites 4		
	108		
	The bedrooms are disposed as follows:		
	Single/Bath Double/Bath Single Double		
	Second floor 10 11 4 —		
	Third floor 10 11 8 5		
Fourth floor 12 12 8 5			
Fifth floor — 8 — —			
1 suite with 1 double bedroom, 1 single bedroom, sitting room and bathroom.			
1 suite with 1 double bedroom, 1 single bedroom and bathroom.			
11 BATHROOMS	Description	Area in sq. ft or size	Comments
	Sizes: Single rooms (a)	8' 8" x 11' 0"	Fifth floor suites.
	(b)	10' 0" x 11' 0"	
	Double rooms (a)	11' 4" x 11' 0"	Fifth floor suites.
	(b)	14' 2" x 11' 0"	
	(c)	15' 2" x 11' 0"	
	(a) Private bathrooms with bath (sometimes with shower fitting), W.C. and wash basin	7' 2" x 6' 0"	Including vertical plumbing duct.
	(b) Private bathrooms in fifth floor suites with bath (with shower fitting), W.C., bidet and washbasin	6' 0" x 8' 0"	Excluding duct.
	(c) Public bathrooms, one on each bedroom floor (except 5th) each having:		
	Male Female		
W.Cs. 2 2			
Bath 1 1			
Washbasin 1 2			
	Area	320	Including ironing room and housemaids' closets.
'E' Planning for the staff			
1 BEDROOMS	On second floor segregated from guest bedrooms		The accommodation is insufficient. 12 more staff bedrooms are required.
(a) Male Single rooms 2	8' 0" x 9' 9"		
Double rooms 5	10' 0" x 9' 9"		
(b) Female Single rooms 10	7' 6" x 15' 8"		
	Double rooms —		
2 BATHROOMS	(a) Male Bath 1	120	
	W.C. 1		
	Urinal 1		
	Washbasin 3		
	(b) Female Bath 1	156	
	W.C. 2		
	Washbasin 3		
3 LAVATORIES	(a) Off goods entrance		
	(i) Male W.C. 1	72	
	Urinal 1		
	Washbasin 1		
	(ii) Female W.C. 2	120	
	Washbasin 1		
	(b) Off kitchen		
	(i) Male W.C. 1	90	
	Urinal 1		
	Washbasin 1		
	(ii) Female W.C. 2	90	
	Washbasin 1		

DESIGN DATA

Element	Description	Area in sq. ft or size	Comments
4 MANAGER'S ACCOMMODATION	Flat containing sitting room, two double bedrooms and bathroom	680	It is desirable to include a small kitchen in the Manager's flat.
5 RECEPTION AND OFFICES	(a) Counter area (b) Bill office (c) Manager's office (d) Admin. office	180 190 120 132	The admin. office accommodation is insufficient. About 500 sq. ft is required.
6 DINING ROOMS	(a) On first floor off kitchen (b) On second floor in bedroom area	250 300	Served by a food lift from the kitchen.
7 CASUAL STAFF CHANGING ROOMS	(a) Male (b) Female	240 260	Not large enough. 500 sq. ft each would be better.
8 LINEN ROOMS	(a) Linen store (b) Seamstresses' room	70 50	One on each bedroom floor.
9 BEDROOM SERVICE ROOMS	Area excluding food lifts	80	Two on each bedroom floor.
10 DINING ROOM SERVERIES	(a) Grill room servery (b) Snack bar servery (c) French restaurant servery (d) Banquet servery to ballroom (e) Dispense room to lounge	1,000 175 160 240 250	Also serves White Lion restaurant and some cooking is done here. Incorporated in main kitchen.
11 HOUSEMAIDS' CLOSETS	One on each bedroom floor	25	50 sq. ft would be better.
12 LAUNDRY		828	
13 BEER CELLAR		1,300	
14 KITCHEN	At first floor level with service direct to French restaurant, ballroom and ballroom reception and with lift service to bedroom floors, staff dining room, grill room and White Lion. (a) Main kitchen area (b) Bakery (c) Bakery preparation (d) Pot wash (e) Vegetable and fish preparation (f) Cold store (g) Dry store (h) Cheese store (i) Vegetable store (j) Wash-up (in 2 areas) (k) Silver wash-up and storage (l) Chef's office	1,638 168 312 96 320 220 275 64 120 250 200 80	
15 TELEPHONE EXCHANGE		60	
'F' Planning for the services 1 THE HEATING CHAMBER	(a) Main heating chamber (b) Engineer's office (c) Gas meter room (d) Electrical intake room (e) Fuel storage tank room (f) Water softening plant (g) Salt storage (h) Workshop area	1,550 65 50 160 450 75 75 180	Approached from outside the heating chamber. Underground below heating chamber.

Element	Description	Area in sq. ft or size	Comments
2 PLANT ROOMS	(a) At second floor level (b) Bathroom and lavatory extract fan rooms	1,500 75	
3 DUCTS	(a) The area of the vertical ducts (other than bathroom drainage ducts) rising through the building is approx: (b) Each bathroom duct, serving two bathrooms on each floor is:	100 2' 0" x 2' 6"	
4 TANK ROOM		440	
5 LIFTS	(a) Lift well sizes: (i) Three passenger lifts (ii) One goods lift (iii) Two food lifts (b) Lift motor room areas: (i) Passenger lifts (ii) Goods lift	20' 0" x 8' 0" 8' 0" x 8' 0" 8' 0" x 4' 0" 400 160	Note height required (item B). + 320 sq. ft access and storage area. Net size, access is from staff staircase landing.
6 CASH CARRIER PLANT ROOM		50	Must have good ventilation.
7 AUTOMATIC INTERNAL TELEPHONE EXCHANGE		80	
'G' 1/1 White Lion public house	(a) Basement* (i) Male lavatory Area W.C. 4 Urinal 5 Washbasin 3 (ii) Male cloakrooms (iii) Beer cellar (iv) Refrigeration compressor room (b) Lower ground floor* (i) Public bar (ii) Smoke room (iii) Lounge bar † (iv) Manager's office (v) Female lavatory Area W.C. 6 Washbasin 4 (vi) Female cloaks (c) Ground floor* (i) Dining room (ii) Band platform and cashier's office The dining room is served from a servery immediately adjacent (which also serves the hotel grill room) connected to the main hotel kitchen at first floor level by food lifts	280 280 1,500 200 500 480 1,600 64 280 280 280 1,900 400	With crate hoist to public bar. Must have good ventilation. Including service and counter area. † With emergency exit and food lift service from hotel kitchen. With unsprung dance floor 46' 0" x 24' 0". * Floor level designation is that of hotel building.

Note. All areas are net within rooms unless noted to the contrary, e.g. bedroom corridors are not included.

The cost of constructing greens will vary with the amount of preliminary earth moving and other soil preparation involved, the size of the greens, and whether they will be brought in from seed, stolons or sod. Building a green from seed is the least expensive method, but it requires the longest period of time. Stolonizing a green is quicker but more expensive than seeding, while building a green from sod is quickest but most expensive.

Putting Greens

An increasing number of hotels are building putting greens to help fill the need for additional space.

Putts from tee to cup range from 10 to 60 feet. Distances in excess of 60 feet add little interest and may lead to excessive divot taking, with some enthusiasts even practicing their iron shots on distances too long for putters.

Because turf around hole cups, to stay anywhere near perfect, requires a rest after 300 rounds, each hole has to be changed often. The entire layout may be rotated every week or so to another part of the putting surface or to a separate green.

Practice greens range from 1,000 square feet, at a 20-room hotel, to almost two acres, at a green in Scotland, but the average area comprises from 3,000 to 12,000 square feet. While some guests play only rarely, others play several times a day, so that the daily number of rounds at resort hotels sometimes exceeds the number of guests. Since the putting greens may take a worse beating than those at a country club, it is important to keep the greens large whenever space permits.

Because sod costs from 20c to 30c per square foot, sodded greens cost much more, as do greens built in courts and garden areas not accessible to mechanized equipment where work has to be done entirely by hand. This cost range includes topsoil purchased at \$4 per cubic yard, other materials, labor and hiring equipment, but excludes the special putting green mower, hole changer, flag standards and putters. For patching in future years it is well to establish a small turf nursery elsewhere on the grounds, treating the soil and maintaining the grass in the same manner as the green.

Maintenance Check List

To be at its best once it is established, a putting turf requires pampering. Here are 12 items which require attention during the growing season whether greens are new or old.

- (1) Mowing 3 times weekly.
- (2) Frequent changing of cups.
- (3) Fertilizing at least twice a month.
- (4) One to three top dressings with a screened loam.
- (5) Watering during dry periods.

(6) At least one aeration, that is, relieving soil compaction with a garden fork or special aerating device.

(7) Addition of lime if a soil test has shown a need.

(8) Chemical control of ants, earthworms and grubs.

(9) Periodic application of fungicides to prevent Brownpatch and other diseases.

(10) Removal of dew by poling with a bamboo pole in early morning.

(11) Manual removal of weeds and crabgrass or chemical control if extreme care is taken.

(12) Restricting high heels and traffic across the green by non-players.

In addition to these items, many southern greens have to be converted to winter use by seeding with a quick germinating grass such as Italian rye onto the Bermuda in autumn.

Remember, quality counts on any putting green. If you build it properly it will, with adequate care, be a permanent asset.

APPENDIX A

Suggested Equipment List for Construction and Maintenance of 9- and 18-Hole Golf Course

FAIRWAYS AND ROUGHS

9-hole Course

- 1 80-in. rotary-type rough mower
- 1 36-in. sickle-bar type mower
- 1 3- or 5-gang fairway mower
- 1 farm-type tractor
- 1 power edger
- 1 8-ft fertilizer spreader
- 1 150-gallon power sprayer
- 1 steel dragmat
- 1 6-ft aerifying machine
- 1 2-section roller attachment
- 1 set of combs to fit fairway mowers
- 1 fairway sweeper

18-hole Course

- 1 80-in. rotary type rough mower
- 1 36-in. sickle-bar type mower
- 1 5- or 7-gang fairway mower
- 1 set of combs to fit fairway mower
- 1 farm-type tractor
- 1 golf course tractor
- 1 power edger
- 1 8 or 10-ft fertilizer spreader
- 1 150-gallon power sprayer
- 1 steel dragmat
- 1 3-unit aerifying machine
- 1 3-unit gang roller attachment

GREENS AND TEES

9-hole Course

- 1 27-in. power tee mower
- 1 30-in. rotary mower
- 2 or 3 power greens mowers
- 2 hand mowers

18-hole Course

- 1 76-in. 3-unit power tee mower
- 1 30-in. rotary mower
- 5 or 6 power greens mowers
- 2 or 3 hand mowers

1 36-in. spreader
 2 seed spreaders
 1 hand compression sprayer
 1 junior size aerifying machine
 1 roller attachment
 1 steel dragmat
 1 thatch control machine
 4 2-in. sod pluggers
 2 4-in. sod pluggers
 1 bundle bamboo whips
 3 soil sampling tools
 1 hand sweeper

1 36-in. spreader
 2 to 4 seed spreaders
 1 or 2 hand compression sprayers
 1 power aerifying machine
 1 roller attachment
 1 steel dragmat
 2 thatch control machines
 8 2-in. sod pluggers
 4 4-in. sod pluggers
 1 bundle bamboo whips
 6 soil sampling tools
 1 hand sweeper

EQUIPMENT FOR THE GAME

9-hole Course
 27 hole cups
 2 cup extractors
 2 cup setters
 9 poles and flags
 18 practice green markers
 2 sets tee markers
 4 golf ball washers
 2 drums ball washer soap
 6 doz. tee towels

18-hole Course
 36 hole cups
 3 cup extractors
 3 cup setters
 18 poles and flags
 18 practice green markers
 2 sets tee markers
 8 golf ball washers
 4 drums ball washer soap
 12 doz. tee towels

SUPPLIES FOR THE COURSE

Seed and vegetative material for greens
 Seed and vegetative material for fairways
 Lime
 Peat or peat moss for greens
 Weed-killers

Insecticides

Seed and vegetative material for tees
 Fertilizer for greens
 Fertilizer for tees and fairways
 Fungicides
 Soil sterilants for topdressing

EQUIPMENT FOR COURSE MAINTENANCE SHOP

1 regrinding machine complete
 1 lathe
 1 band saw
 1 air compressor
 1 machine washer
 1 flat knife grinder
 1 drill press
 1 pipe threader

1 paint sprayer
 1 forge
 1 hand sickle grinder
 1 arbor press
 1 power (tree) saw
 1 welding outfit
 1 hand electric drill

GENERAL REPAIR HAND TOOLS

Electrical equipment
 Refrigeration
 Roadways
 Roofs
 Plumbing
 Sewers

Water systems
 Plaster
 Drains
 Paint
 Cement

OTHER EQUIPMENT

1 sod cutter
 1 compost grinder (3-6 cu yd capacity)
 scales

HAND TOOLS

9-hole Course
 1 wheel barrow
 2 pointed shovels
 1 spade
 2 scoop shovels
 2 hand rakes (steel)
 2 hand rakes (wood)
 2 aerating forks

18-hole Course
 2 wheel barrows
 4 pointed shovels
 2 spades
 4 scoop shovels
 4 hand rakes (steel)
 2 hand rakes (wood)
 4 aerating forks

MISCELLANEOUS ITEMS

Animal traps
 Sod lifters
 Snaths
 Adzes
 Hoists
 Pullers
 Burners
 Pruners
 Hose tools
 Pumps
 Forks
 Wrenches

Soil test kits
 Snath blades
 Crowbars
 Tree tools
 Dusters
 Funnels
 Snath Stones
 Ladders
 Jacks
 Gas cans
 Axes

GENERAL USE ITEMS

2 trucks
 1 Rotovator
 1 cement mixer

1 jeep
 1 soil screen

WATERING SYSTEM

9-hole Course

Pipe estimate — 6-in.	— 1,000 ft
4-in.	— 5,000 ft
3-in.	— 3,000 ft
2-in.	— 2,000 ft
1½-in.	— 1,000 ft

1 Pump, capacity 500 gpm
125# pressure

Sprinkler equipment

85 fairway valves
5 fairway sprinklers
45 tee and green valves
10 tee and green sprinklers
4 hose sprinklers
8 50-ft sections 1-in. hose

18-hole Course

Pipe estimate — 6-in.	— 2,150 ft
4-in.	— 11,300 ft
3-in.	— 10,000 ft
2-in.	— 10,000 ft
1½-in.	— 1,500 ft

2 Pumps, for total of 1,000 gpm
125# pressure

Sprinkler equipment

185 fairway valves
10 fairway sprinklers
95 tee and green valves
20 tee and green sprinklers
12 hose sprinklers
1,000-ft 1-in. hose

APPENDIX B

Miniature golf course equipment suppliers

Daco Golf Products, 222 N. Cicero Avenue, Chicago 44, Illinois

Eastern Golf Company, 2537 Boston Road, Bronx 67, New York

Northern Golf Ball Co., 2350 W. Roscoe Street, Chicago 18, Illinois

Lauman Golf Supply Co., 785 Belmont Blvd., Kitchener, Ont., Canada

Par Light Mfg. Co., 13 Hillcrest, Milan, Illinois

Southern Golf Distributors, 3007 Fort Bragg Road, P. O. Box 3103, Fayetteville, N. C.

Wittek Golf Range Supply Co., 5128 W. North Avenue, Chicago 39, Illinois

Additional sources for fairway and putting surface materials

Davis Felt and Carpet Co., Casimir and Miller Sts., Philadelphia 37, Pa.

Taylor Brothers, 79 Ackley Avenue, Johnson City, New York

Sources of information and assistance on the planning and construction of Miniature Putting Courses, Golf Driving Ranges, and Par-3 Courses:

Arland Engineering and Construction, 7 Toby Lane, Jericho, L.I., New York

Designers and builders of miniature golf courses, lighted short courses. Report having built as many courses in 39 states and overseas. Have plans and actual construction work. 125 various types of holes.

Holmes Cook Miniature Golf Co., 583 Tenth Ave.,
Consultant-designer and builder of miniature golf ranges.

Fairways Miniature Golf, 223 N. Clarendon Ave., Miami

Designers and builders of custom-designed 18-hole courses completely constructed by Fairways staff, and the course. Also, golf hazards built to fit any open space. Counter and alarm systems. Write for free brochure.

Niagara Sport Center, Inc., 553 River Road, North Tonawanda

Builders of miniature golf courses, golf driving ranges. Also have all-steel construction, portable indoor archery range.

Par Light Mfg. Co., Milan, Illinois

Build miniature golf courses, golf driving ranges, distribute complete line of equipment for these courses, lighting equipment.

Taylor Brothers, 79 Ackley Avenue, Johnson City, New York

Designers and builders of custom, prefabricated miniature golf courses. This company has perfected a somewhat unique design which includes a felt-carpeted putting surface and attractive surroundings.

Twenty years' experience building, selling and installing miniature golf courses. Selection of 18 outstanding attractive models. Finest course sells for \$23,000 complete and ready to install. Small model sells for \$15,000 complete. Small course offered on 1/4 acre of land for as little as \$3,750 complete.

Standard model requires from 12,000 to 17,000 sq. ft. clubhouse area. Obstacles and runways can be placed in clubhouse area. Price includes supervision and labor to erect course on site selected but leaves contractor in completing the course. Course built and completed for \$10,000 and less.

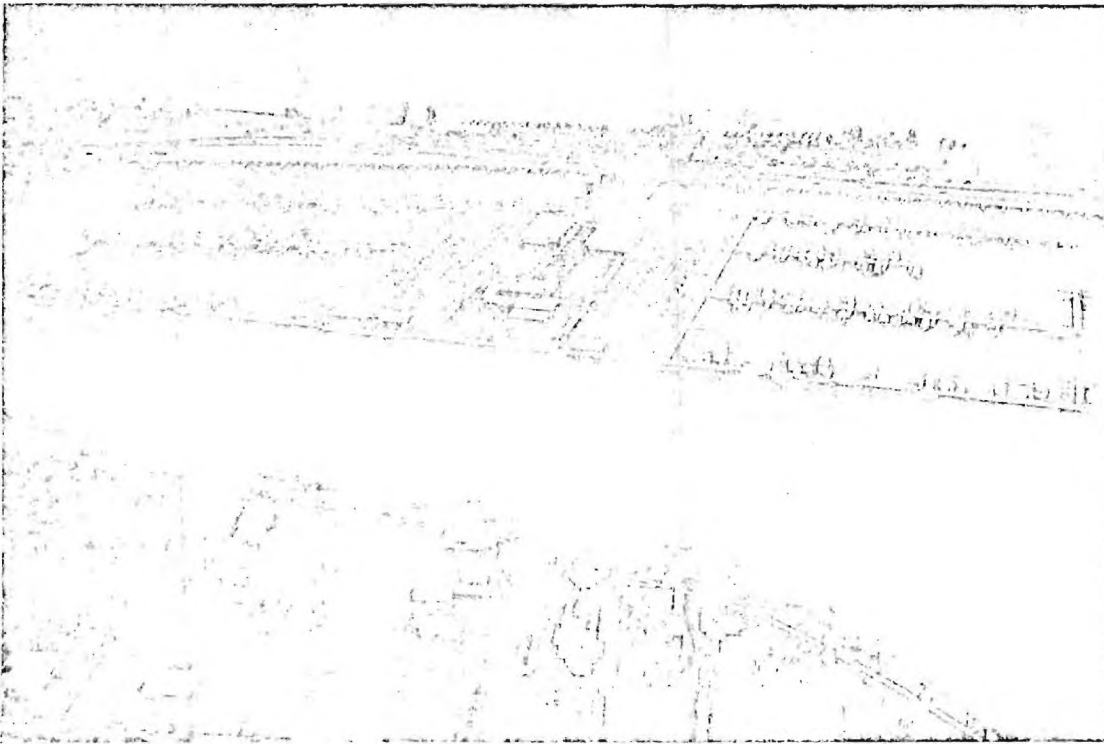
Additional sources of information and assistance on the construction of Miniature Putting Courses, Golf Driving Ranges, and Par-3 Courses:

Lauman Golf Supply Co., 785 Belmont Blvd., Kitchener, Ontario, Canada

Builders and designers of miniature golf courses in Canada only.

Marinas—Their Planning and Development

By C. A. CHANEY



Bahia-Mar Yacht Basin, Fort Lauderdale, Florida.

Editor's Note

In May 1950, the Urban Land Institute published an article on marinas which pointed out their place in community development and traced their growth throughout the United States. The present document is designed as a guide for cities, city planning officials, real estate men, and others interested in evaluating the planning and developmental aspects of marinas with relation to community needs, land acquisition, and general land use.

Mr. C. A. Chaney, Consulting Engineer of Washington, D. C., is considered by many as the outstanding authority on marina development in the United

States. He has prepared this bulletin for the Institute based upon many years of wide and varied experience in pier, dock, bridge, and marina design and construction. Within recent years, Mr. Chaney has served as consultant on marina planning and development in over 50 American cities, and is technical advisor to the National Association of Engine and Boat Manufacturers, The National Marina Forum, and other marina organizations. We believe that this Bulletin forms a valuable and authentic contribution to the subject of marinas and their place in community planning.

Marinas—Their Planning and Development

By C. A. CHANEY

INTRODUCTION

The May 1950 issue of *Urban Land* carried an interesting and enlightening article entitled "Today's Marina and Community Planning" by Joseph E. Choate, Secretary of the National Association of Engine and Boat Manufacturers, Inc. In preparing his article, Mr. Choate drew upon the vast store of information in his Association's files and furnished some surprising statistics regarding the tremendous development which has taken place in recreational boating during the past few years.

This contribution by Mr. Choate illustrates what has been accomplished in providing for this activity in just a few of the many hundred waterfront communities along our coasts and the large system of lakes and inland waterways. As secretary of the National Association, Mr. Choate is fully informed as to the continuing growth of pleasure boating and is equally cognizant of the inadequacies of existing harbor facilities to accommodate the present fleets. He stresses the importance of constructing marinas commensurate with the demand and with provision for expansion as the increase in home fleets and transient boats may require.

A brief review of the financial and intangible benefits which the community and its citizens might expect from the construction of a modern marina was also included by Mr. Choate.

The primary purpose of this Technical Bulletin is the presentation of sufficient basic data, descriptions and discussions concerning the planning and operation of marinas to permit municipal authorities and civic leaders to determine the nature and extent of structures required and the ultimate benefit to be derived by the boat owners, the local government and the citizens and industries of the community. Information will also be supplied upon which the planners may develop a tentative survey of the problem including the size of prospective fleet, the amount of business to be anticipated and a reasonable estimate of elements which determine the worth of the local waterfront as a harbor for small boats.

The preliminary investigations involved in the development of the waterfront are equally as important as the final planning and construction, probably more so. The selection of an unfavorable site, the provision of inadequate and improper facilities, or failure to provide for future expansion are some of the items which may detrimentally influence the opinion of boat owners regarding the marina. It is a well established fact that the facilities of a marina must be in use most of the boating season if the project is to be successful and such use is contingent upon either the favor of the boat owners or upon dire necessity. The planner must take this into account because, in the long-run, the success of the marina as measured by a benefit-cost ratio is the factor in which he is vitally interested.

The preliminary studies and planning for the marina should not be considered as simple operations following along a quickly solved formula. Quite to the contrary, each locality provides its own particular problem although the subjects to be considered are essentially the same in all cases. The more important of these are: size of fleet to be accommodated; location; extent of construction; nature of the business or operation expected; types of structures; initial and operating costs; and the benefits to be derived. Generally it will be found advantageous to conduct studies of all of these items simultaneously since they are to a large extent dependent upon each other and even a seemingly independent item such as location cannot be wisely determined without full consideration of all of the other contributing factors.

DEFINITIONS AND EXPLANATIONS

Prior to discussions of studies and planning, it appears desirable that a complete understanding be had of some of the terms used in this bulletin. The first of these relate to the various types of marinas. The order in which they are given should not be interpreted as a designation of their importance as local conditions are so varied that any one of these types may

prove of most consequence to the locality under consideration. They are given herewith.

Types of Marinas

A municipal type of marina is one which is primarily for slip rental and open to all boat owners. It is planned to be a definite asset in the improvement and beautification of the water front and has a minimum of sales and service facilities. A municipal type of marina is generally built and operated by the municipality but may be so classed if privately built and operated as previously stated. These marinas often have a very large investment for beautification and accordingly show a profit only when these large costs are charged off against the general improvement of the water front.

The club type of marina is one which is operated for the exclusive benefit of the members of a boat club. The grounds, buildings and off-shore installations need not be owned by the club but may be leased from some other organization. The grounds are generally landscaped but there is seldom as large an investment for beautification as in the municipal type marinas. Except for club house activities, the business is slip rental and there are rarely sales, repairs or other commercial activities. These units seldom operate for profit, the charges usually covering rent, cost retirement, operation, maintenance and a fund for future replacements.

The commercial type of marina is one operated, but not necessarily owned, by an individual or private organization. It must operate at a reasonable profit in order to exist. The activities usually conducted in this type may be slip rentals, hull and engine repairs, boat building, boat and accessory sales, packaged food sales, restaurants, various personal services or any combination of these. The

nature of the business conducted in these units frequently is such as to indicate the undesirability of their location adjacent to park or residential areas.

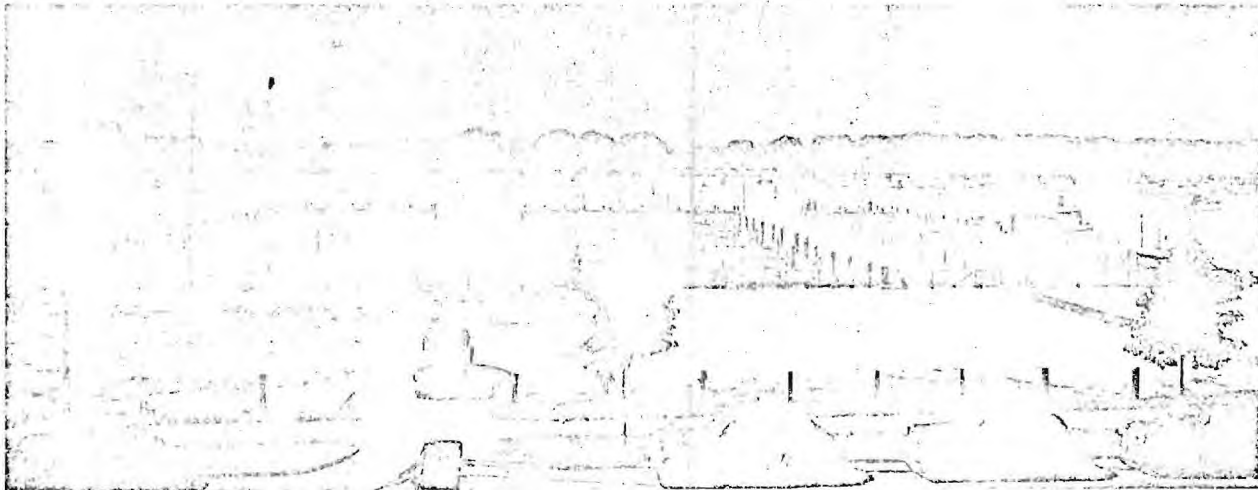
The name "Concession" as sometimes applied to designate a type of marina is used in this text solely to indicate that the improvement has been placed in the hands of other parties for operation. It may include any of the foregoing types and the nature of the business conducted is limited only by the terms of the agreement between the two parties.

A second group of definitions is included for the purpose of classifying or grouping boats with reference to uses being made of them without regard to ownership. They are as follows:

Classification of Boats

The largest group are those boats used solely for the enjoyment of their owners and guests during cruises, fishing trips and similar recreational and restful activities. They are the owners' home afloat. In this paper they will be designated as "pleasure boats" or "pleasure craft". This grouping is sufficiently broad to include private boats, yachts, motor boats, cruisers, outboard boats, sail boats and many other designations in common use.

A second class of boats is that generally known as the "charter boat". These boats are similar in design to those of the large group of pleasure boats but their use is sufficiently different as to justify separate consideration when providing space in the marina. They are rented to other parties for sightseeing, fishing, cruising and other similar purposes and thereby become closely related to the common carrier. As such they should be located at a reasonable distance from the boats occupied by owners and guests.



MARINA NO. 2 ON WASHINGTON CHANNEL, WASHINGTON, D. C.

This view was taken during construction and clearly shows the alignment and neat arrangement. All outer walks support wood plank breakwater structures. Note the ornamental fence and parking lot in the foreground.

The name "recreational boat" includes both "pleasure craft" and "charter boats" and is introduced to include all small boats except those used exclusively for commercial purposes.

Commercial boats comprise the third group to be considered. These boats are used exclusively for such operations as commercial fishing, crabbing, oystering and shrimping. In some communities these boats are numerous and for obvious reasons it is necessary that they be berthed at a reasonable distance from all recreational boats if the project is to be a success.

AIMS TO BE ACCOMPLISHED

The past experience of large numbers of waterfront communities throughout all parts of the country has proved that well planned marinas are definite and real assets to the community and have justified the effort and expenditures necessary in their construction. It has also been demonstrated that the benefits from a waterfront improvement are not confined to one group but are widespread. In a typical community it should be expected that, in addition to the boatman and the owners of the marina, many others including merchants, taxpayers, entertainers and the mechanics working for their daily wage would find their situation improved. The benefits derived from a harbor project are, to a large extent, proportional to the quality and quantity of accommodations furnished. The location and type of construction selected also bear a direct influence upon the net benefit to boatmen and the community in general.

During the initial planning stages, the planners no doubt, have at least one purpose in mind which they hope to accomplish through the improvement. Their aims may be a betterment of conditions for boatmen, a financial gain for themselves or an improvement of the local waterfront. Actually the improvement should be so developed that the maximum practicable benefit will be derived by all parties, whether directly or only mildly interested. The ensuing paragraphs will contain brief discussions of some of the more important purposes or reasons for the improvement. Local conditions may indicate any one of these as of greater importance than others but in the final analysis it will be recognized that the improvement must meet reasonable requirements for the safety of boats and convenience of boat owners if the facilities are to render maximum benefits.

One of the first thoughts concerns the types of boats, considering usage, which will be accommodated in the marina. When in home ports it is not unusual for pleasure boat owners to live aboard during much of the boating season and when on cruises this becomes general. They accordingly desire pleasant, quiet surroundings and at night, in particular, prefer to have only other boats of the same type in the immediate vicinity. Charter boats attracting large groups of enthusiasts therefore are objectionable by reason of encroaching upon the privacy of the owners and guests on the pleasure craft. These two types should therefore be separated at least to the extent of assigning them to separate parts of the marina. Operators of charter boats seldom object to the presence of the pleasure craft, but it is recommended that some logical separation be made of these two types in order to attract the more numerous group.

When commercial type small boats are present or anticipated in an appreciable number, the problem facing the planners becomes more complicated. It is considered unwise to place the recreational craft and the commercial boats in close proximity in the marina, in fact, it is preferable that the two groups be assigned to widely separated parts of the harbor. The interests of the boat owners of one group are so divergent from the interests of owners in the other that activities of both would be seriously handicapped or curtailed if the two groups were forced to operate from the same marina.

No attempt should be made to place the blame for this condition upon either group since the attitude of each is based upon logic and reason. On the one hand, the owner of the recreational boat takes pride in his neat, trim craft with its polished mahogany and shining brass work. He desires the quietude of a beautiful harbor and while aboard wants to be as far as practicable from all signs of commercialism which remind him of his work-day life. Also odors which at times originate from fishing fleets and packing houses are objectionable. On the other hand, the owner of a commercial boat has equal reasons to take pride in his sturdy powerful sea-worthy boat even though it might be painted an unattractive gray. He generally does not care to be disturbed by curi-

ous on-lookers and dreads the risk of collision in the marina with the speedy but more frail pleasure craft.

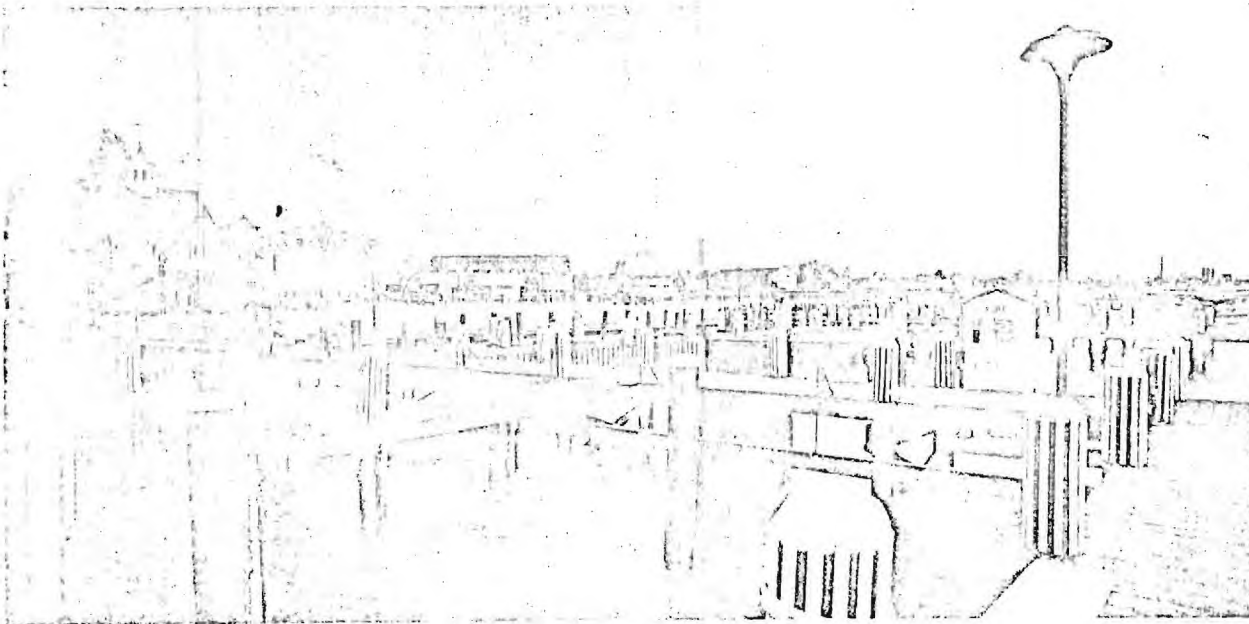
If the planner considers the foregoing and possibly other equally sound objections to intermingling these types of boats, he will readily make all efforts to provide suitable space for each type consistent with local policies and conditions. Plans which adequately provide for the several types of boats will result in an increasing demand for the facilities with correspondingly larger dividends.

Size of the Marina

Having established the types of boats to be provided for in the marina, the next purpose of the planner concerns the extent of construction or approximately the number of boats to be provided for. If the numerous factors which enter into this problem are set up in order, a reasonably acceptable answer may be arrived at with very little effort. One basic thought should be kept to the fore at all times: namely, that the entire marina need not be constructed immediately; and frequently it is even advisable to delay some portions of the work. Illustrating, it is unprofitable to build too far in excess of

the demand. Knowledge of cruising trends may indicate a large volume of transient business will develop at the new marina in the near future but advantage can be taken of a time-lag and some construction funds held back for one or two years. Repair facilities may not be justified initially but future increases in the number of boats at the site could warrant such construction a short time later. Boat styles, construction materials and methods, or conditions at the site may undergo changes which may be provided better by the postponement of construction not immediately required.

Knowledge as to the size and nature of the home fleet and other boats which regularly stop at the port is essential since this fleet becomes the principal measure for the first installment of construction. Efforts should also be made to provide sufficient facilities to accommodate additional permanent and transient craft attracted by the improvement. Future installations are made as required in the space set aside during the planning of the marina. The procedure for analyzing the results of the boat survey are outlined in the section hereof entitled "Survey of the Fleet".



DETAILS IN TYPICAL MARINA

In this view may be seen firehose cabinets, traveler bars, and flood light standards. Piles are capped. White strips tacked to piles serve to protect clothing and outline the walks at night. In the left background is a one ton crane for launching dinghys and outboard boats.

Generally it will be found that cost studies and estimates of contemplated construction are necessary to hold the costs within the limit of funds contemplated. Serious thought should be given this matter during the first stages of planning and a program set up under which funds will become available for the planning and construction as needed. When the work is to be financed by a sale of bonds or stock or other similar means, it is recommended that at least six months be allowed for the completion of this process.

In addition to providing for the bare necessities such as bulkheads, docks, walks and a breakwater, the planners will no doubt contemplate some other features for safe-guarding the boats and adding to the convenience and comfort of the boatmen. Marinas are competitive business enterprises and the addition of some attractive features, often at small cost, will do much to increase the patronage and the net income. Shop buildings may be badly needed at the site. An attractive administration building, with a lobby, restrooms, showers and locker rooms will be an added incentive for using the marina. Floodlights, and electrical and water connections for the boats are much in demand. Adequate fire protection, garbage receptacles, and convenient sanitary accommodations add so much to the rating of the marina that their inclusion by the planners is nearly mandatory.

It is also suggested that the creation of the marina be made the opportunity for increasing the general attractiveness of the locality. Areas adjacent to a water front, because of the nature of business conducted, and at times through neglect, frequently present an appearance much below the standard of the rest of the community. Plans should include the removal of dilapidated tumble-down structures in both land and water areas and in their place the construction of well arranged harbor installations, park and recreational areas, walks, driveways and shrubbery. Dredging operations present the opportunity of filling unsightly, useless swamplands, thereby creating a valuable asset. Projects of this nature increase the value of adjacent property and open sites for new or expanding industry and commerce. The benefits derived through this re-evaluation of the waterfront are widespread. Property owners have their assets increased, businessmen reap the profits from an enlarged volume of business and the municipal

government is repaid in the form of larger tax collections on the more valuable property.

SURVEY OF FLEET

The natural starting point in the planning of the marina is the determination of the number, sizes and types of boats to be provided for under the project. First to be considered are those which are now based in the harbor and such transients as have usually made this a port-of-call during boating or fishing season. Second, would be those boats owned by citizens of the community but presently berthed elsewhere due to lack of local facilities, plus other craft now owned and berthed elsewhere which will be attracted immediately to the new marina due to its modern accommodations. Lastly, would be those boats representing a natural future growth in the home fleet plus additional transients stopping over during cruises to take advantage of the safety and conveniences offered.

A few suggestions are made at this time for consideration as the study of fleet progresses.

- a. Provide first those facilities which are most needed.
- b. Do not attempt to stretch the funds by ignoring safety requirements or unduly reducing standards of quality.
- c. Provide such conveniences and sanitary facilities as will establish a sound reputation.
- d. An insufficient number of slips simply reduces the volume of business, but unsafe slips will drive patrons elsewhere.
- e. Encourage the transients. Many of them spend more for repairs, food, supplies and entertainment in one month than a local boat owner spends in eleven months at home for these items. The local boat owner becomes the transient at another locality.

Prior to making the survey, tabulation sheets should be prepared, so arranged that all of the desired data can be quickly entered. One form of tabulation sheet which has served its purpose well is as shown in Table 1:

The names and registration numbers of the boats are used only to prevent duplications and to assure a complete listing. The class is recorded for use in subdividing the fleet for advantageously placing the boats in the harbor. The boat power is recorded since it occasionally is necessary to assign sailboats to special positions in the marina due to the direction of prevailing winds. Length and beam dimensions are used in determining the sizes for the slips. The draft becomes a gauge for dredging while

TABLE 1. TABULATION-SURVEY OF FLEET

No. or name	Class	Power	Hull length	Gross length	Beam	Draft	Mast height
31508	charter	sail	93'-0	108'-0	17'-6	12'-0	65'-0
Susan	pleasure	motor	38'-0	38'-0	11'-0	3'-2	9'-6
50Y3	commercial	motor	68'-0	69'-0	14'-6	6'-9	18'-0
439	pleasure	aux.	33'-0	39'-0	10'-6	6'-0	35'-0
etc.							
etc.							

the mast height is useful when there are bridges over the waterway.

In addition to the boats listed by counting, other boats anticipated through future growth and as transients are included. The number and sizes of these boats must be estimated from trends at adjacent popular harbors and from records of boats usually cruising in the nearby waters. The complete list of boats should then be separated into their respective classes and tabular summary prepared for each class. A summary for pleasure craft prepared for a particular community on one of our eastern rivers is presented here as a typical tabulation.

Similar tabulations for the charter and commercial boat classes can also be prepared. It should be borne in mind that most of the narrow boats are quite a few years old and whenever practicable, wide slips only should be provided. The percentages obtained as in Table 2 will be exact for the local fleet. On the other hand the increases allowed for growth in the home fleet and the expected transient business are estimates based on studies and the experience of the planners, and are correct only when the assumed conditions remain unchanged. A greater use of the marina by boats of sufficient size for long cruises would create a demand for larger slips.

Another possibility which could cause a more serious condition could develop locally because of the construction of the marina. Some of the local boat owners may await the new facilities for the purchase of larger boats and other citizens of the community no doubt will become boat minded after viewing the improvement. The increase in business along the waterfront will also do much to encourage others to purchase new boats. A reasonable allowance should be made for these increases in the initial construction. The elapse in time before constructing additional sections of the marina will permit a study of these trends so that proper adjustment may be made in the numbers and sizes of the slips.

SELECTION OF SITE

The selection of a location for the proposed marina which will be most advantageous to all of the parties concerned is probably the most important and, at the same time, the most difficult problem facing the planners. As previously indicated the site eventually chosen must be the one that most nearly accomplishes the purposes in mind at the initiation of the program. There must be a maximum of those advantages which are peculiar only to a partic-

TABLE 2. SUMMARY OF BOAT COUNT SHOWING LENGTH AND BEAM SEGREGATION

Length up to	Number of boats	Wide boats		Narrow boats		Combined %
		No.	%	No.	%	
25 ft.	21	16	11.1	5	3.5	14.6
30 ft.	25	21	14.6	4	2.8	17.4
35 ft.	28	22	15.2	6	4.2	19.4
40 ft.	33	25	17.4	8	5.5	22.9
45 ft.	14	12	8.3	2	1.4	9.7
50 ft.	12	10	6.9	2	1.4	8.3
60 ft.	6	3	2.1	3	2.1	4.2
70 ft.	5	3	2.1	2	1.4	3.5
Totals	144	112	77.7	32	22.3	100.0

ular site, such as considerations of safety, sanitation, accessibility, foundations and relation to overall planning. Type, quality, arrangement and costs for accessory structures on land and off-shore, as discussed in succeeding sections, should also be given due consideration when evaluating the available sites.

It should be expected that some conflicting interests and ideas will come to the fore in the study. For this reason it is suggested that studies of contemplated sites on the one hand, and consideration of the City Master Plan and existing adjacent activities on the other hand, be conducted concurrently for the most satisfactory results.

A complete field inspection and study of the entire available waterfront and adjacent land areas is now in order. Being mindful of the type of marina to be provided and nature of business to be conducted therein, the planners should take special note of the neighborhood, nature and amount of industry, commercial activities and heavy shipping, and the proximity of residences, parks, recreational and entertainment facilities and similar existing or planned shore installations. Utility systems, access roads, and the nature and extent of nearby harbor structures might also come under observation.

Undeveloped waterfront sections, particularly marsh land or other frontage which has little present intrinsic value could prove an ideal location for the marina whether for recreational, or commercial uses, provided other conditions are satisfactory. It is readily seen that utilization of such a site would be a real boon to the community, by providing an orderly, profitable structure in lieu of the unsightly and near valueless area. A good example is the case of a southern city which is now planning for a marina to cost several hundred thousand dollars on approximately five hundred acres of mosquito breeding swamp land to be donated free of costs by its present owner.

At times physical conditions may indicate a particular site as most desirable for the marina, while the community's overall plan indicates the area as reserved for use of a different nature. There are only two possible courses in this case namely: either select some other site for the marina or modify the zoning regu-

lations. Local circumstances must govern such decisions. Usually some arrangement can be made whereby this lucrative business can be adequately provided for without undue harm to other persons and industries and frequently with advantage to many.

Adherence to a few basic principles will be a means of avoiding future unpleasantness and possibly financial losses due to disruption of business activities or unreasonable encroachment into restricted zones. A few suggestions for consideration are presented herewith:

Waters adjacent to park areas are ideal for pleasure craft and there is little objection from any source when these boats are within a short distance of residential districts. Owners of pleasure craft prefer berthing their boats elsewhere than in commercial areas and strongly object to areas adjacent to dusty, smoky manufacturing districts and railroad tracks and yards.

Operators of charter boats prefer locations adjacent to park areas, or near the center of the community in locations easily reached by sight seers and fishing parties. Locations in which these boats accumulate dust and dirt cause a loss of business and are undesirable. There is little objection to the charter boat by any one except the pleasure boat owner when at the same dock.

Managers of commercial marinas devoted primarily to repairs, sales, services and storage mostly prefer a location accessible to stores and shops to facilitate their operations. These marinas are inconsistent with park and residential districts with respect both to their appearance and the nature of their work, and to so locate them would probably result in strong objections from many other citizens of the community.

In quite a few of the waterfront cities and towns there exist one or more unofficial or semi-official organizations working diligently for the improvement of their community. They serve with no financial reimbursement for their time and labor and frequently carry out extensive improvements at the sole cost of the organization and contributions made for the particular purpose. These groups can be of considerable assistance and should be consulted on certain phases of the planning in order to retain their continued good will and assistance especially for landscaping and beautification of the abutting public areas.

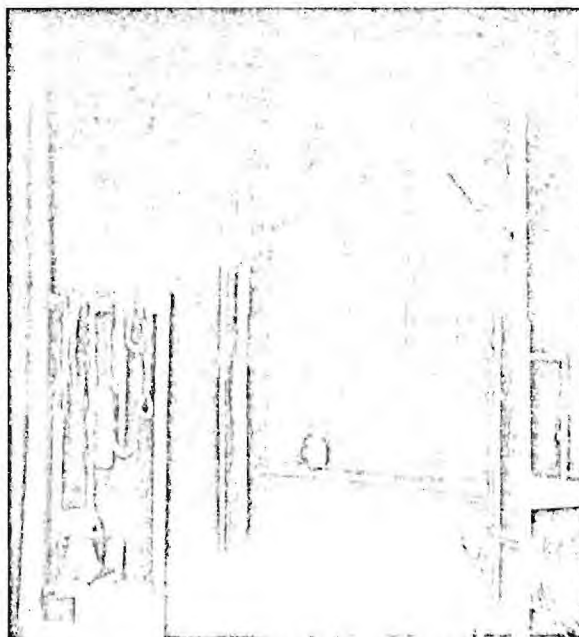
Soil Conditions

Only rarely is a community fortunate enough to have a site at hand which can be used without a quantity of dredging and grading. This

portion of the construction of the marina sometimes is rather costly particularly when it is necessary to transport spoil material over long distances. It is more profitable to acquire some nearby plot of land which requires filling, thereby creating usable land which can later be sold to offset some of the construction costs. Dredged silts, mud and clay when deposited as fill have very little value immediately for development purposes but materials containing high percentages of sand, gravel and shells make excellent filling, and areas so filled may be put to use within a few weeks. The amount of dredging, the quality of the material and the use to which it is put become important factors in the choice of site for both physical and financial reasons.

Another phase of the investigation of the soil concerns the material remaining after dredging to required depth is completed. This matter is the suitability of the material to support the structures placed thereon. It is considered safe to state that a marina of acceptable design and proportions can be constructed irrespective of the type, quality, depth or mixture of the subsoil encountered. However, the nature of this material has tremendous influence upon both the type and costs of the construction. Subsoil material consisting of well graded mixtures of mud, sand and gravel permits the use of moderately long piles and provides adequate bearing capacity and stability. Deep mud bottoms such as are found in many rivers require excessive lengths of piles at higher cost. Compact beds of gravel and shell formations often are effective barriers against the driving of piles, and water jets at additional cost are frequently required for setting the piles sufficiently deep to secure stiffness for the structures.

Contingent upon the quality of the subsoil an embedment of piles ranging from 6 feet up to 30 or more feet is required to stiffen the structure for normal use especially when no batter piles are used. It is readily seen that if ledge rock be encountered before such depth is obtained, pile driving is impracticable and other types of docks, possibly costing more, must be planned. Considering the light loads superimposed upon the berthing docks and catwalks it is uneconomical to use concrete caissons to rock but this type of construction may be advantageously used for service and repair docks.



**COVERED SLIPS, MUNICIPAL YACHT BASIN,
CHARLESTON, S. C.**

This view shows well designed and serviceable yet inexpensive covered slips. These shelters are desirable as protection against factory smoke and dust.

Protection Against Hazards

Safety for the boat is the primary purpose for the marina. Except for fire hazards discussed subsequently, wind, waves, flood waters, and ice in northern climates are the common elements of danger. It is good planning to take the fullest practicable advantage of the natural surroundings to gain needed protection but in most localities natural formations must be supplemented by man-made barriers.

There is very little which can be done as protection against strong winds except to locate the marina in a cove where higher land, trees or tall buildings may break the force of wind from one or more directions. Coves or lagoons are also the principal protection for boats from raging torrents produced by floods and very little can be done by artificial means to add to this protection except at prohibitive costs. Water levels which simply rise and fall as a result of adjacent flood waters are of little moment. Tie lines are adjusted as required, and docks which become submerged are cleaned after the water recedes.

Waves of even one to two feet in height can make life aboard a small boat very uncomfortable and can do damage. When they increase

in height, the danger is pronounced and definite steps must be taken to break them up before they enter the marina. Depending upon the amount of open water facing the marina, the breakwater will vary in strength from timber sheeting attached to the outer face of the dock, to heavy riprap stone walls, or to rock, gravel or sand filling placed between rows of sturdy sheet piling. Some of these structures are costly to build especially in water deep enough to permit waves of damaging intensity. Varying combinations of depth of water, expanse of open water, direction of prevailing wind, contour of the shore line and possibly other local conditions render it unwise to even approximate a limiting depth within which a breakwater is practical. Each structure must be considered on its worth as a protective measure when compared to the estimated construction cost.

Moving ice floes in some localities are serious when not broken up and the ice diverted from the marina structures. Substantial ice breakers are very effective at times but too much dependence should not be placed upon them since piled up ice driven by a flowing stream has destroyed many structures far sturdier than the best marina.

The foregoing statement regarding the elements of nature will show the futility of attempting to furnish protection except when the forces are very small. It is far better to select a site which is so located as to be free of the more extreme hazards.

Occasionally, harbor facilities are provided for on an inland body of water which has no navigable connection to other waterways, but in the vast majority of cases accessibility to a navigable waterway for cruising and fishing purposes is paramount. The success of the marina is a direct function of its use and ready access to favorite waterways is an incentive for the growth of the home fleet and encourages the entrance of transient craft. Ability of skippers to make a speedy run to port in case of storm enhances the value of the harbor and further increases its popularity among boat owners.

Pollution

Many of the rivers and inland bodies of water of the country, especially in the vicinity of large metropolitan centers have their waters badly

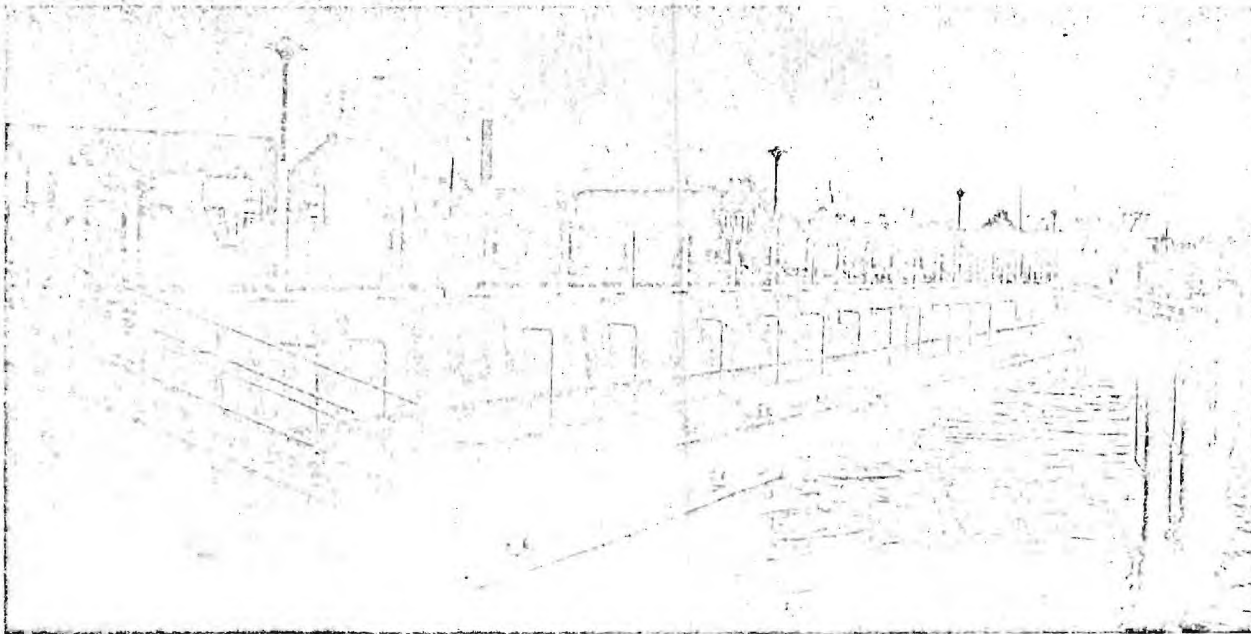
polluted by the dumping therein of commercial wastes and sanitary sewage. When an enclosed marina is constructed the pollution greatly increases unless positive means are provided for the prevention of the pollution and the continuous changing of the water in the harbor. Some of the States have laws which either prohibit or regulate the discharge of foreign matter in its waters, and many other States have similar measures under consideration so that the future may witness a steady clarifying of our lakes and streams.

Many boatmen are conscious of the ill effects of this contamination and have demonstrated a cooperative spirit. It is regretted that others are careless in this matter to such extent that corrective measures are still recommended. Locating the marina on a stream of moving water, when one is available, is the best means of keeping the waters reasonably clear. On the larger bodies of water with no appreciable current a well planned arrangement of flushing channels and automatic flood or tide gates is of some assistance but continuous policing to enforce regulations appears necessary in most localities at this time.

Accessibility

At least one paved highway or all-weather road from the marina to the shopping and theatre section of town is a virtual necessity. Inhabitants of the community who own boats will make numerous trips to the waterfront at all seasons of the year for purpose of inspection, repairs, repainting or possibly to visit fellow enthusiasts in addition to the times they cast-off for a cruise or a fishing trip. Visiting boatmen will also wish to make almost daily trips to the business section of town. They require repairs, accessories and provisions to store aboard and may have other business to conduct. During their leisure time they will probably visit the points of interest, theatres, and other attractions or visit friends in the community. If on long cruises they may decide to patronize the local restaurants and hotels during most of their stop-over.

Some of the visiting owners arrange for their automobiles to meet the boat at all ports visited while others hire a locally owned automobile for the duration of the visit. Most of these visitors however depend upon a public convey-



FLOATS AND RAMP FOR SMALL BOATS

These floats are supported on wrought iron drums and held in position by traveler bars attached to the bulkhead walls. Note the nautical type steel cable guard on top of the bulkhead wall.

ance for transportation to and from the marina. Some prefer the privacy of taxicabs while others choose bus transportation especially when the route is nearby and service is good.

A street or highway capable of carrying high speed traffic is desirable from the viewpoint of police and fire protection. Large investments are made in the marina structures and in the boats occupying the slips, and many of the marinas are located at much greater distances from the police and fire stations than is the case of other property of comparable value but without the hazards of the power driven boats. A marina site within ready access of these public facilities with paved connecting roads is much preferred by the boat owners, and these facts receive favorable consideration by fire insurance companies.

Comparison of Sites

Some communities are fortunate in having available more than one site from which to choose, and as a result often select a location which has many definite advantages for all of the interested parties. There are occasions, though, when the existence of several possible sites complicates the planner's problem, and at other times, each of the locations under con-

sideration can be credited by the same number of natural and physical advantages. In this event it would seem that the results of studies of construction and operating costs and anticipated net financial benefits would influence the choice. Reasonable care should be exercised when preparing estimates of costs and benefits for competitive sites so that the results will represent the true comparative values. Carelessness and intentional unfairness in evaluating the items will render the computations valueless and probably result in lower earnings or actual financial losses by the investor. Some suggestions to assist the planners in preparing the estimates of costs for construction and operation and in determining the net benefits are presented in the section marked "Financial" which will follow.

INFLUENCE OF LOCAL CONDITIONS ON TYPES OF CONSTRUCTION

Many small communities are ideally located for boating activities of such extent and volume that the cost of providing sufficient modern facilities far exceeds the municipal resources available for the construction. Pending the construction of a large marina, the municipal government, local businessmen and citizens are

being deprived of the benefits and profits of a lucrative business. This condition suggests obtaining financial aid from other sources such as private investors or the county, state or Federal government.

Obtaining such funds is not an easy matter even when there is no doubt as to the benefits to be derived. Requirements regulating investments in these projects will be found to vary considerably among these groups, but basically they are the same. In all cases the applicant must make a thorough study of the problem and present a report in required form showing controlling conditions, purposes, estimates of cost and benefits to be derived. This operation is of utmost importance to those planning the program and should be carried out only by some one thoroughly familiar with the technical aspects of the problem. Funds obtained from many sources may be applied to all parts of the improvement but Federal aid, in most cases, is for dredging of navigation channels and deepening existing harbors except when the Federal Government has a particular interest in the development of the harbor.

Construction Types Available

Bulkhead walls along the shore line are among the more costly items of marina construction, at times amounting to twenty-five or more percent of the total. They serve three principal purposes, namely: conservation of usable water or land area, prevention of shore erosion, and creating a neat and orderly appearance to the facility. Every community desires its marina to be one of the show spots and certainly has no intention of permitting erosion of



CLUB HOUSE FOR SMALL MARINA

This type of building is suitable for clubs with 100 to 150 members and is not costly to construct.

the bank to limit the usefulness of the project. However, conservation of land or water area, in some instances, is not as important as the conservation of construction funds. When plenty of water and land space is available, the expensive bulkhead wall of normal design may be omitted and rip-rap stones placed on the slope after dressing it to smooth lines. This construction will protect the shore against erosion and present a pleasing appearance. The large saving in cost can be applied on some of the other badly needed items.

As previously developed, berthing docks and catwalks supported on moderate length wood piles driven into a firm bottom are highly desirable structures. Conditions in some locations, however, are such as to require other types. Extremely soft and deep bottoms necessitate piles of excessive length or prohibit their use entirely in which case floating docks are necessary. Floats at slips are also recommended when the bottom is ledge rock and piles cannot be driven. Fixed walks on piles are serviceable for changes in water level up to about four and one half feet but their use for greater changes results in difficulty and risk when attempting to board or come ashore when the water level is low. Some of our rivers have large water fluctuations while in some of the artificial flood control lakes such as those constructed by the Tennessee Valley Authority the water level varies more than one hundred feet. Floating docks controlled by an extensive counterweight system are used in these places quite successfully.

Protective Measures

Small boats tied up in slips are subject to damage through fires in addition to wind, floods, ice and waves, and wash from larger boats passing by. The elimination of fires or success in fighting those which occur is primarily a matter of inspection, policing and the physical removal of any boat or material and the correction of any condition which might be the cause of fires or explosions. It accordingly appears that danger from this source can be reduced to approximately the same degree in all marinas if the authorities so desire. It is suggested that all planners and operators of marinas obtain publications on this subject from the National Fire Protection Association and adhere to the regulations set forth.

As previously stated, very little if anything can be done to give additional protection to boats against the ravages of wind and flood, except locating the harbor in a cove or such other sheltered spot as nature may have provided. Some degree of protection can be secured against moving ice by the installation of a system of icebreakers, proper shaping of the exposed edges of the marina or placing the basin in a location not exposed to the moving ice. It is only in the matter of providing protective structures against the action of waves and steamer wash that effective artificial steps can be taken. Even then the effectiveness decreases as the intensity of the water agitation increases. On narrow streams and small bodies of water, waves are small and the bulkheads necessary to break them up may consist of simple sheet piling attached to the main structures. As the wave height increases on larger open expanses of water the strength of the barrier must increase. It can readily be understood that in some locations the severity of waves is such that the strongest breakwater consistent with the importance of the proposed improvement will not be good enough and the site should accordingly be abandoned.

It is generally recognized that untreated timber and piles exposed to the atmosphere are subject to decay primarily due to the alternate wetting and drying of the wood. Some localities, having few rains and damp fogs, report less decay and longer life for exposed timber than some of the other communities with more changeable weather. Under the best of circumstances exposed untreated timbers and piles extending above mid-tide will decay in a few years. It is recommended that pressure treatment of creosote be given these timbers and piles in accordance with the recommendations of the American Wood Preservers Association. In communities located on salt water infested by marine borers, creosote injected under pressure to the maximum capacity of the wood is mandatory for piles and timbers within tidal range, if a reasonable life is expected for the structures.

CODES AND MATERIALS

Metropolitan districts, counties, states, and some civic associations have made studies of materials and construction procedures and have

published codes controlling construction within their jurisdiction. Numerous manufacturers' associations have established regulations to standardize the use of their materials. Particular reference is made to the timber, concrete and steel industries whose products make up the major part of all marina structures. These codes and regulations have been developed by groups of experts using all available data concerning the physical and chemical qualities and serviceability under actual working conditions. It is urged that these requirements be adhered to whenever they apply and in communities where no code is applicable, some code of recognized standing be adopted for the project. The service of an engineer familiar with the requirements for the project will generally prove advantageous for properly interpreting these codes thereby assuring the safety of the structures with economical use of material and labor. The following paragraphs contain brief discussions regarding the nature and use of some of the more usual materials for this class of work.

Choice of Construction Materials •

Wood, concrete and steel each play a major role in marina construction and for some items they are interchangeable with very little effect upon appearance, strength, durability or usefulness of the structure. However, wood is recommended for the open type docks, walks and catwalks primarily for the reason that higher strengths of steel and concrete are not needed to support the light loads superimposed thereon.

Wood, under adverse conditions of exposure has a very short life but when properly protected has a life comparable to concrete and steel. Marine borers which abound in practically all salt water harbors make short work of untreated wood and heavy, deep pressure treatments of creosote are essential. In fresh waters, piles and timbers which are continuously wet seldom need treatment but those which are alternately wetted and exposed to the atmosphere quickly decay if untreated. Wood in climates exposed to atmospheric changes is subject to decay in varying degrees and should be pressure creosoted in accordance with standard practice for the severity of exposure. In recent years several other wood preservatives have been developed which are

reported as having good service records under some exposure conditions. When used, care should be exercised in selecting the one which is best suited for the local conditions and it should be used as recommended by the manufacturer. Some species of wood take creosote treatments better than others and often the heartwood and sapwood of the same piece react differently. Fortunately most of the woods which resist pressure treatment have a better-than-average resistance to decay.

Concrete is one of the best materials for resisting exposure conditions such as are found in marinas. Much of the disintegration which does occur is caused by freezing and thawing or by erosion. Concrete structures should accordingly be built as required under a recognized specification using modern material and methods. Concrete is particularly useful in bulkhead walls, breakwater structures, foundations and similar parts subject to heavy stresses.

Structural steel is invaluable in improvements of this type but when alloyed with some other metal, such as copper, its durability is considerably increased at little additional cost. Even then it is subject to corrosion especially

in salt water unless protected by a surface treatment. In some positions such as for sheet piling the best obtainable paint for the purpose should be applied before erection since repainting in future years is impracticable. The method of manufacturing wrought-iron renders this material somewhat more resistant to corrosion than steel even though the two are made from the same basic material. Steel is sometimes used for bolts and other hardware but its use cannot be recommended for exposed positions. Wrought-iron has a better service record under these conditions and should be used wherever the life and strength of a major part is contingent upon its connections. Wrought-iron has proven its resistive qualities when used for utility lines suspended from the docks.

When long life is desired from secondary or accessory items the planners have a wide range from which to choose. Some of the more common are copper, aluminum, bronze, zinc, asbestos, glass, rubber and prefabricated masonry units. These should each be used when and where their particular qualities indicate best results would be obtained for the cost involved.

Surface treatments are essential to the life of many materials. They prevent attacks by the elements and even such sturdy members as concrete sheet-piling and bulkhead walls are improved by applying a heavy coat of asphaltic paint to the surface within the tidal range. Zinc coatings applied to ferrous metals give superior protection to the base metal unless the galvanizing has been broken by careless handling during erection or abrasive action later. Paint is necessary for the protection of wood surfaces and the operator will find that the few dollars spent for annual painting will return large dividends because of the added attractiveness.

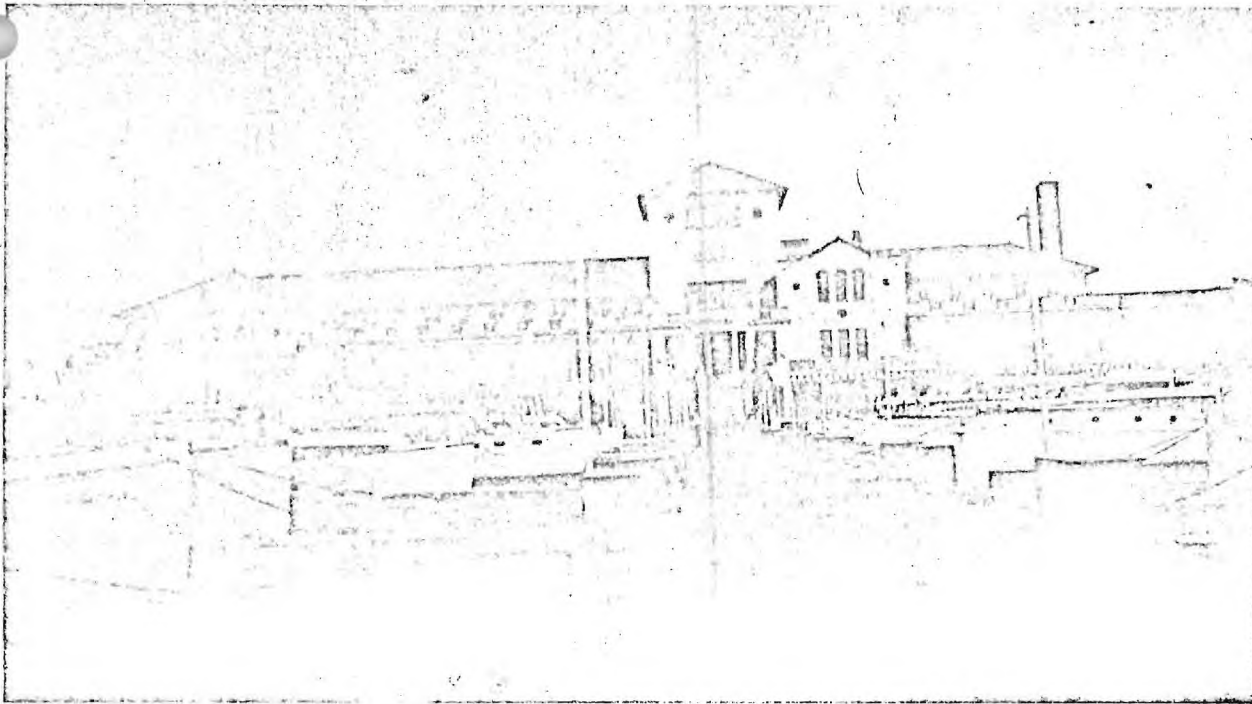
SHORE PROTECTION

As previously indicated a neat bulkhead constructed to predetermined lines is unquestionably the most desirable form of shore protection. Many types have been developed and it is reasonable to assume that at least one of these will prove satisfactory in meeting all of the requirements locally encountered. Bulkhead walls vary considerably in cost as between the various types, and the physical requirements at the site will also influence costs.



EXAMPLE OF RUST AND DECAY

This view shows the destruction after only seven years caused by failure to seal the tops of the piles and exposing steel sheet piling to alternate wetting and drying.



DETROIT YACHT CLUB, DETROIT, MICHIGAN

This imposing structure is an excellent example of the size and quality of club house needed in large marinas. Structures of this type are also suitable as administration and general purpose buildings in municipal marinas.

Riprap stones as slope protection or the simple grading and planting of slopes is sometimes resorted to with satisfactory results and at large reductions in initial costs. These latter methods of treating the shore line can be adopted only when a surplus of land and water area exists which can be utilized for the purpose.

No particular interference should be expected in plans for beautification and landscaping due to the selection of any one of these methods of preserving the shore line. In congested areas the bulkhead wall used to conserve area would be in keeping with the surroundings while in outlying districts either type would fit in well with the natural surroundings.

DOCK AND WALK STRUCTURES

When planning for the marina it will be found financially advantageous to give consideration to the physical conditions at the site before determining the style, location and design of the docks and walks to be installed. Occasionally, natural formations and the forces of nature dictate such matters, but whenever a choice is permitted, that shown most beneficial

after reviewing all factors should be selected. Docks provided for repair and service purposes and for the support of heavy deck loads are generally of the relieving platform type, sheet-piles retaining solid fill, or a beam and slab type resting on caissons or clusters of piles. On the other hand mainwalks and catwalks, supporting only pedestrians and supplies moving between the shore and boats in slips, are usually of an open type consisting of a system of timber beams and decking supported on wood piles when the tidal range or other water level fluctuation is not excessive. Connections are bolted.

Free-standing piles at the outer ends of slips serve to protect the berthed boats from damage and provide a means for securely anchoring the boats. The installation of traveler bars permitting the lines to ride with the tide fluctuations permit much shorter lines from the boats and conserve large portions of the water area for the construction of additional slips. Support piles which are allowed to extend a few feet above walk level add materially to the feeling of security while traversing the walks, and laths, painted white, tacked to these piles

make the walks more attractive and assist in outlining the walks at night.

When, for reasons outlined in earlier sections of this bulletin, the construction of fixed type walks supported on piles is not practicable, floating type mainwalks and catwalks are used. The advisability or necessity for using floating walks should be determined in the early stages of planning since these walks must be somewhat wider to obtain stability and therefore space the boats farther apart. Floats may be divided into drum, log and barge types. Each of these has its peculiar advantages and disadvantages with a large range in costs per square foot. They are frequently used adjacent to walks and docks to facilitate boarding.

BOAT HANDLING EQUIPMENT

Unless there are already sufficient means of transferring boats between land and water at some nearby site, it would be wise to plan for suitable equipment in the proposed marina. Accidents can happen in any harbor and often the presence of a railway or hoist will prove the means of salvaging a boat in sinking condition. In some communities, boat owners find it advisable to remove boats from the water during floods and severe storms and between boating seasons. Periodic scraping and painting of the bottoms is necessary for the safeguarding of the craft whether kept in salt or fresh water.

The old style marine railway has been the favorite means of handling boats for many years but lately the vertical-lift hoist or elevator has experienced increasing popularity. Either one of these two pieces of equipment can be constructed to handle any of the craft considered in this article and both of them are alike in requiring a system of yard tracks for safe and economical handling of the boats. Marine railways cost approximately half as much as hoists for equal capacity. On the other hand, the hoist presents a neater appearance and occupies much less space than the marine railway, and the space thus saved may be converted into rentable slips. Hoists as usually constructed are capable of handling more boats per day than are the railways.

Derricks and cranes are very handy equipment and are frequently used for handling boats in the 20 to 27 foot class using either

slings or hooks attached to rings built into the decks for the purpose. Trailer and car-top boats are the favorite types among the younger group and to some of the older boatmen in most communities when conditions are favorable for their operation. To assist these enthusiasts it is suggested that a rig be purchased or specially built for the launching of these boats. These small rigs are inexpensive and their availability will do much to encourage the owners of these small craft even at the cost of twenty-five cents for each time the equipment is used. It should be remembered that many of the boys operating these small outboard boats today become the men who pay large slip rental fees in the not-too-distant future.

OFF-SHORE PROTECTION

The reader is referred to a previous section of this bulletin concerning the necessity for and extent of the protective structures beyond the outer edge of the marina to give ample protection to the boats tied up in the slips. The community is indeed fortunate when inexpensive sheet piling attached to the outer edge of the docks and walks is sufficient to ward off the effect of the waves and steamer wash.

When a separate breakwater of heavy design is required the primary requirement is that of its strength and permanence. However, when one considers the large expenditures necessary for its construction it might be well to proceed further into the study with a view to gaining other uses to compensate for the costs. Among the possibilities would be a widening of the structure to provide roadways and walks for sight seeing, a berm for use of fishermen, and trees, grass and shrubbery for the beautification of the outer reaches of the harbor. The location and arrangement must be such as to effectively break the force of the waves and the entrance should be located as indicated by studies of intensity and direction of the prevailing disturbances. It is advised that careful cost estimates be made prior to physical work since the costs can easily exceed an amount justified by the project.

Special consideration of the entrance to the harbor is another item to be taken up during the preliminary planning. When no dredging is required near the entrance and no break-

water is built the chances are good that the existing currents will remain unchanged and areas which have been free of earth and sand deposits will accordingly remain so. On the other hand, when necessary to dredge an entrance channel or to perform other work which materially changes the shore line or the action of water currents some future troubles may be anticipated regarding the navigation entrance. When this condition is created, protection in the form of groins or jetties must be anticipated and as their construction is inevitable they should be included as part of the initial unit. Similarly to the breakwater these jetties may also be developed for other uses and to improve the appearance of the marina. Entrance lights as approved by the state and Federal authorities are requisites and signs bearing the name of the marina are good publicity and invite additional patronage.

UTILITIES

The provision of the usual utilities and services is necessary for establishing the reputation of the installation as a first-class modern marina, although some curtailment may be made temporarily to meet the financial program. Utilities and services provided are water, electric energy, telephone, sanitary system and fire fighting equipment. A brief description of the facilities furnished for each of these is given herewith.

Water System

The water system should extend throughout the marina to provide water for boats in all locations and for fire hydrants where required. It is considered good practice to provide a garden hose connection for each of the large boats, a connection for each two smaller boats with living accommodations and scattered connections for the small boats intended for daytime use only. The water main should have a minimum size of one and one half inches to supply the fire hydrant, increasing the line to meet larger demands. Additional outlets are required at the service dock and other central locations.

In localities where freezing temperatures are expected during the winter season it is desirable to place the water lines on a grade and provide drain cocks at critical locations. One or more antifreeze type hydrants are desirable

for the convenience of those who wish to use their boats during cold weather.

When the marina is located near a municipal water main it is economical to obtain the supply from that source. Should the selected site be at a distance from an established source of supply the drilling of one or more wells may then be necessary. The drilling of wells and use of water therefrom must comply with all local and state regulations and if used for human consumption must equal the standard of quality established by the health authorities.

Sanitary Sewage System

The objectionable features of discharging raw sewage and rubbish into the waters of the harbor, and the legal regulations of such matters were discussed previously. A brief description of some of the means for relieving this condition is given herewith. The ideal solution to this problem would be the installation of tanks or chemical toilets on the boats for the scientific handling of this refuse; however, as far as can be immediately determined, such equipment suitable for pleasure craft is not now on the market, but it is understood that its development has on several occasions been considered by manufacturers.

At present the construction of suitable sanitary facilities on shore and their use through voluntary action by boat owners and guests or by police regulation appears the only hope for abatement of this nuisance. It must be admitted that the use of sanitary facilities on shore is a great inconvenience especially if the boat is tied up in one of the outer slips. Indirect advice is at hand that in at least one community, toilets are locked when the craft is assigned a slip but the reaction is not of record at this time. This strict requirement may become advisable or even necessary in numerous marinas and the planners should install the shore facilities at once or take the necessary steps to permit their installation when needed.

The shore installation will be one or more comfort stations with showers, rest room and toilet facilities for men and women adequate for the population of the marina. These facilities may be either in an administration building or clubhouse or may be in a separate unit or possibly both for large marinas. When a

branch of the local sewer system is nearby, it is economical and generally advisable to make use of this means of disposal. For marinas so located that no public sewer is available, recourse must be had to cesspools, septic tanks or underground dispersal fields as permitted by local and state laws.

Electrical Service

The electric supply system serves three purposes, namely: lighting of buildings, floodlighting of grounds and walks, and electrical energy furnished to the boats. It is advisable to consult the local power company and design these systems to meet their stipulations. The systems should also comply with local requirements and the regulations of a recognized code such as the National Electric Safety Code.

There are two available arrangements which may be followed for the walkways. The first of these is the overhead system in which the wires are strung on poles approximately ten feet high with span connections dropping down to the boat service outlets. This system being above high water level need be damp proofed only and is the more economical in first cost. The second arrangement involves placing the wires below the mainwalk decks and extending the service branches upward to the outlet boxes. In this event it is necessary to provide a waterproof system, otherwise high waters will put the lines out of service. When the wires are hidden from view the general appearance of the marina is greatly improved but the cost of installation is much higher than for the overhead system. However, the added attractiveness is sufficient to recommend its adoption whenever funds are sufficient for the purpose.

An excellent arrangement for the floodlights consists in the use of "canopy" type reflectors placed about ten feet above the deck surface and lights of only sufficient wattage to permit safe walking at night. Electrical energy is customarily furnished at all large slips and to approximately one half of the smaller slips. Some arrangement is usually made whereby the boat owner can be billed for the amount of current used.

It is not usual practice to furnish telephone service at the slips but facilities are provided whereby those wishing this service can have same installed by direct application to the telephone company.

Fire Fighting Equipment

The providing of adequate fire fighting equipment for the protection of boats and marina structures against fire loss is one of the greatest moral obligations of planners and operators of waterfront installations. This subject has been thoroughly covered by recognized authorities in a number of publications such as those of the National Fire Protection Association and will be only briefly touched upon in this bulletin. Chemical equipment for fighting all classes of fires should be installed at critical locations and one and one half inch hose lines should be so located that two streams of water may be played upon any fire.

Small cabinets to contain the hose reels, chemical extinguishers and sand pails protect this equipment and keep it available for instant use. Twenty-four hour watchman service and alarm boxes connecting to a central system are excellent safeguards and a trained group of volunteer fire fighters is invaluable in isolated locations.

FUELING STATIONS

The fueling station is a very important adjunct of the marina, not only to the owner of the boat but to the operator of the facility also. These stations are necessary but unfortunately are sources of danger to all boats tied up near by, mainly through ignorance of safety rules or carelessness by some person in abiding by these rules. Experience has shown that the delinquency is apt to be by either the boat owner or the attendant. On this account it is desirable that fueling be done elsewhere than in the vicinity of the slips, preferably on the outside of the breakwater or at some other point where floating gasoline is not likely to come into contact with the boats. Of course, the fueling station location should be convenient for the boats and accessible for restocking from either tank trucks or barges. Publications prepared and distributed at small cost by the National Fire Protection Association contain much information which will be invaluable to the operators of the stations.

The equipment of these units normally is one or more fuel tanks preferably underground, pumps, meters, remote control systems and a small building to serve as combined office and sales room. Patrons expect to be able to pur-

se marine gasoline, diesel oil, greases, lubricating oil and a few of the more common accessories and repair parts. The presence of an attendant with some knowledge of engines meets the need for minor adjustments and repairs. The sales made and services rendered at fueling stations produce scarcely sufficient income to cover the operating costs, but their convenience and the air of friendliness add much to the reputation of the marina and are indirectly responsible for increasing the overall net profit.

DEVELOPMENT OF GROUNDS

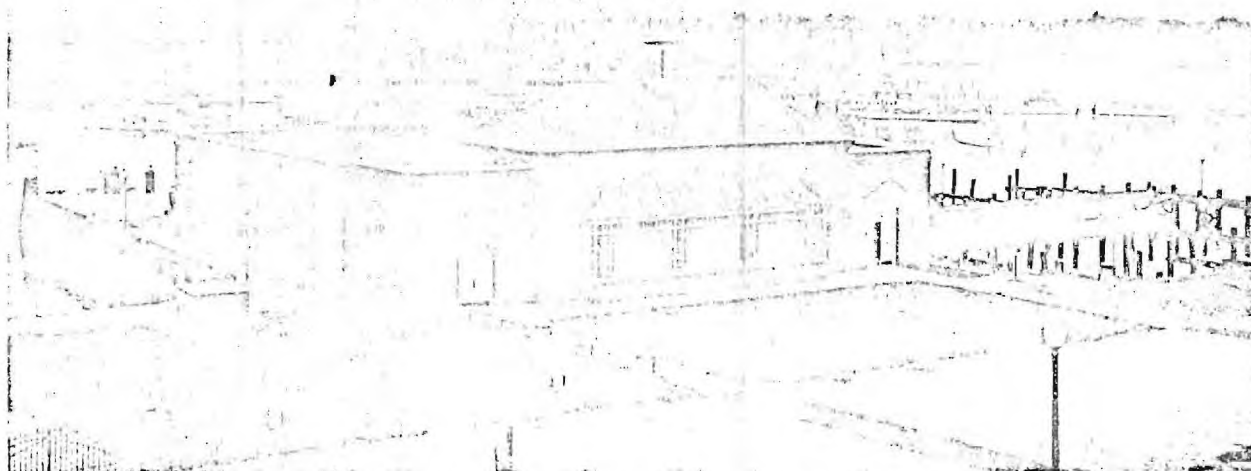
It would serve no useful purpose to attempt a description of hypothetical arrangements of grounds for either municipal, club or commercial type marinas since the shape and amount of land available and numerous other controlling factors dictate that each improvement be different. This section accordingly will be devoted to individual discussions of the features which might be combined for the betterment of the project. As the various items are taken up it will be noted that the planners may make the combination which best meets the requirements. Furthermore, circumstances may indicate the advisability of combining normally commercial features with those usually seen in

municipal type marinas. This applies especially when construction is limited to one multipurpose marina by reason of limited space or small available funds.

Treatment of Commercial Marinas

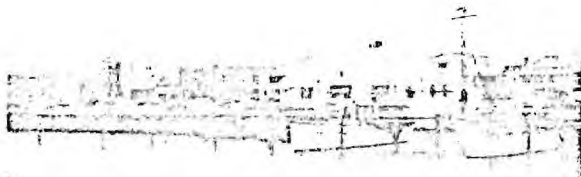
In the commercial marina, the three major uses for space on land are repairs, dry storage and automobile parking while additional small spaces are occupied by fueling facilities, marine railway or vertical lift boat-hoist, yard tracks, possibly some landscaped area and other miscellaneous purposes. No rule can be formulated for determining the amount of land which should be set aside and any estimate would be misleading, as will be readily seen from the following description of some of the usages. Dry storage of boats during winter months in cold climates is a general practice so that much space is occupied in this manner, whereas in southern waters boats are seldom stored on land.

For obvious reasons one commercial unit may develop a very large and prosperous boat building yard or hull repair business while a similar installation elsewhere is unable to build up such a business or for reasons of its own does not wish to conduct a business of this nature.



MARINA NO. 1 ON WASHINGTON CHANNEL, WASHINGTON, D. C.
SALES AND SERVICE BUILDING

This view shows part of vertical lift boat hoist at far end of building. Boats can be transferred from trucks, through the building and launched by means of the hoist. Small shed at left front houses fuel pumps. Dispensers are at outer end of pier. Fuel tanks are underground.



MUNICIPAL MARINA, CAROLINA BEACH, N. C.

This marina demonstrates what can be accomplished with limited funds. With an expenditure of only \$20,000 the town dredged the basin and one mile of entrance channel and constructed bulkhead wall and slips for 36 boats. Income the first year is more than sufficient to meet charges for maintenance, interest and annual payment on the bonded indebtedness. The marina will be expanded to accommodate 76 boats.

An activity of this kind requires large operational spaces for boats on the ways, dry space for others waiting, extensive marine railway and yard track systems in addition to lumber storage and shop space. Still another marina may develop a reputation for quality engine work and do an equally profitable business with a short railway, a ginpole and a well arranged but small and condensed shop. Operators at other sites, for sufficient reasons, may have no storage and repair facilities but may specialize in sales of boats, accessories, supplies, foods and personal services, requiring little more than show spaces and a means for launching the boats.

A well arranged yard includes railways with sufficient cross tracks to serve all storage spaces directly, thereby permitting the handling of boats without regard to a cumbersome schedule of dates. The determination of the correct amount of space for automobile parking is equally as difficult. It is contingent upon the number and activity of the boats in the slips, the amount of repair and sales business conducted, the number of regular employees and the number of calls by delivery trucks, salesmen, visitors and others for sundry purposes. Marinas have been known to operate successfully with about one parking space per ten slips while others seemingly have no surplus space when the ratio is one parking space for each two slips. An approximate rule for use in preliminary studies allowing one space for each four slips plus ten additional spaces has worked very well in several cases.

Due primarily to the nature of work conducted in commercial marinas, but sometimes

due to neglect and carelessness, the grounds are unsightly at their best and sometimes are detrimental to the appearance of an otherwise neat, orderly waterfront. When these conditions become aggravated they constitute a fire hazard, lower the efficiency of the yard and discourage patronage. Corrective steps should be taken in the interest of all parties concerned.

Treatment of Club Marinas

The arrangement of the grounds at a club type marina is rather simple when compared to the foregoing. Occasionally a fueling station or a small railway for emergency purposes are installed but usually the entire site is used, for parking and landscaping. The parking space desired is an amount necessary to provide for the members and friends on holidays, weekends and at social functions in the club house or on the lawn. Occasionally the assembled groups are quite large and three parking spaces per four slips are not unusual and are advisable if sufficient area is available. The development of the remaining area into lawns with flower beds, shrubbery and shade trees might easily transform a club type marina into a feature attraction for the community.

Treatment of Municipal Marinas

Problems relating to the amount of space and the most desirable development for municipal type marinas are of intense interest, not only to boating enthusiasts, but to the vast majority of the citizens. Since projects of this type are usually located in park or residential areas or areas reserved for these, many items found in commercial marinas need receive little consideration. Occasionally, for local reasons, an artistically designed fueling station or a short marine railway for emergency use are installed and serve their purposes well. In northern climates, where boats must be placed in dry storage for winter, it can be recommended that limited sections of parks can be diverted seasonally to this use when no commercial yard exists.

Planners have found that boat owners with their graceful craft, and nature lovers who spend their idle moments in the park, will have a mutual interest in a combined public park and marina. Base ball, tennis and other sports events are interesting to boatmen and a round

of golf or the quiet shuffle-board make welcome diversions. On the other hand the view of the marina with its craft of many styles might be the inducement from which another boat owner emerges.

The development of the park area, whether large or small, is worthy of careful planning and belongs under the guidance of someone experienced in utilizing the space to greatest advantage of the boat operators, businessmen, taxpayers and the community in general. Each community will have its particular problem and very little can be written into this text to aid in determining the amount of space required nor the exact usage of the space for best results in all localities. Some observations will be recorded regarding some of the more important features, to serve as a guide in evaluating the various elements. Their arrangement must be controlled by the plot of ground available.

Automobile parking, driveways, walks, sports areas, picnic grounds, trees, shrubbery, flowers, lawns, and public comfort stations are a few of the possible installations. In addition to automobile parking for general purposes, it is good practice to provide one space for each slip in the marina plus additional spaces facing the waterfront for use of those who enjoy the view. The roadways and walks should be planned to reach all major attractions with numerous benches provided in popular spots for the comfort and enjoyment of all. Attractive landscaping is pleasing not only to the citizens but adds much to the popularity of the marina by transients on extended cruises. Club houses, auditoriums and band pavilions are valuable assets in parks adjacent to marinas.

One item not previously mentioned but of primary importance to the boat owner is a fence. He deserves the privacy required for satisfactory living aboard the boat but the reputation of the marina and community are at stake in protecting the boats during the absence of the owner and crew. Fences of adequate design and height are strongly recommended for all types of marinas but particularly for areas where boats are under repair or in dry storage.

BUILDINGS

In most of the previous sections of this bulletin the reader will recall that planning to meet the needs of the boatman and increase the

income of the marina were stressed as of primary importance. On the other hand, when planning the buildings, more consideration can be given local desires without seriously influencing the usefulness of the main structures, provided that satisfactory space is allocated for conducting the business and associated activities.

The uses to which floor space is put vary greatly with the nature of the activities conducted, and conditions in different communities necessitate arrangements specially made as a result of studies at the site. In municipal and club type marinas; offices; chart rooms; sail lofts; heater and utility rooms; steward's quarters; toilet, shower and locker rooms; restaurant, bar and kitchen space; club rooms and ballrooms are quite usual. Buildings in commercial units often have offices; boat, accessory and food sales spaces; storage rooms; repair shops; toilet, shower and locker rooms; heater and utility rooms; and a lobby or club room. Combinations of the foregoing space allotments are made as indicated by local studies. The amount of floor space to be provided for each of the several usages will also be determined by studies of anticipated requirements.

The question as to whether all activities of this nature in the marina should be housed in one large building or divided into several smaller structures is one that might be best decided after consulting the local art commission. At times, particularly for small marinas, the use of a large building adds to the dignity of the unit while in some of the larger projects the use of one large central structure with scattered small buildings for service stations and additional sanitary facilities often presents a pleasing appearance.

The type of construction used is contingent upon the climate, amount of funds available and the use to be made of the building. In cold climates, buildings which are in service over the winter months are of different construction type from similar structures elsewhere and other variations between localities will cause corresponding changes in construction types. Buildings in commercial marinas used for storage and repair purposes generally meet all needs when of low cost types and conserve construction funds for other more urgent uses.

Most communities have one particular style of architecture which predominates and is favored by local architects. Generally the continued use of this style will meet the physical needs, produce a pleasing appearance and receive wide-spread approval. Other architectural styles are available and equally suitable. Contemporary designs are in good taste in many settings, and buildings showing some nautical touches are appreciated by boat owners and citizens alike.

MAINTENANCE

The writer does not wish to appear unduly critical of the maintenance program, but occasionally, marinas have been visited which definitely show signs of badly needed repairs and repainting. Satisfactory reason may exist for this seeming neglect but the result is the same regardless of the cause.

In the extreme exposure conditions encountered in most waterfront areas, careful maintenance repairs and repainting must be carried out on an annual basis commencing the season after operations are started. A few dollars spent for the correction of defects as soon as they appear may save several hundred dollars in repairs a few years later or may be the means of preventing costly and untimely replacements. Decay starts in the ends of timbers where moisture can enter the wood and resulting decay fungi can attack the ends of the fibers. Sealing such openings will often stop the action. Some other simple remedies are the cleansing and painting of steel, sealing surfaces of concrete at the water line with tar and asphalt coatings to check disintegration, painting exposed woodwork, pointing-up masonry joints, replacing broken parts and patching breakwater structures are only a few of the first-aid measures which can be undertaken at little cost.

In order to assure a fund to cover the inevitable maintenance operations, it is strongly recommended that the planners provide for its creation at the time plans are made for setting up construction funds. Under normal conditions it is natural to expect maintenance expenditures to increase somewhat each year regardless of the degree or efficiency of maintenance.

FINANCIAL

In one of the earlier sections of this bulletin it was recognized that the principal aims in construction of the municipal marina were the creation of a safe refuge for boats and the improvement of the municipal waterfront. The builder of the commercial marina also expects to earn a profit on the investment. In both of these cases it is immediately evident that financial studies are necessary to determine construction costs, operating costs and the gross and net income to be derived whether the purpose is choosing between several sites or a justification for use of one particular site. Such studies are generally required when construction loans are sought and they are also advisable when sufficient funds are at hand.

Construction cost estimates are made at current prices in the locality; for the entire project including utilities, approach roads and similar items, whether constructed immediately or built in installments as required or as funds become available. Extreme care should be taken in preparing the list of quantities of material and labor and prices for these should be fixed only after consultation with those thoroughly familiar with construction of the types involved.

Operating costs are equally important. In order to establish the true value of the installation they should include all costs and charges which may develop annually including salaries and wages, maintenance of the unit and access roads, insurance and interest and amortization of the expended funds. When the Federal Government participates in the expenditures it is also necessary to include the cost of maintenance of navigation channel and navigational aids.

Benefits derived from the marina may be divided into three groups for ease in determining the true benefit for the basis upon which the study is made. The first group includes all income at the site of the improvement such as slip rentals, locker rent, club-room rent, shower services, dry storage charges and profit from repairs, repainting, boat accessory and food sales and similar items. The amount of the foregoing benefits may be included and are acceptable by all interested parties as proper income for justifying a profit. The second group of benefits is of interest only to municipal gov-

ments and local business men. They include such items as increases in off-the-site sales, hotel service, amusements, etc., higher property values, larger tax collections and increases in employment. Such items are acceptable when justifying municipal expenditures and are generally known as indirect benefits since they are not income received at the immediate site of the improvement. The third group might best be termed intangible benefits but they are acceptable, at this time, by the Federal Government for consideration as justification for Federal participation. They include such items as the amount of loss or damage to boats eliminated by the improvement, a small annual percent of the value of boats berthed and time saving to commercial boats effected by the construction of the harbor.

All of the items of cost and benefit applicable to the site and to type of justification under consideration are given monetary values. The true value of the project to its owners and to those investing in the project is represented by the ratio of annual benefits to annual costs or carrying charges. When this ratio is relatively low the project should be undertaken only

when the provision of a harbor is necessary for the protection of boats without due regard to cost or when a municipality considers the improvement will furnish in beautification and satisfaction, what it may lose financially.

CONCLUSION

This bulletin cannot be considered a complete technical treatise covering all of the engineering, architectural and financial details involved in the planning of a marina. Its purpose is only the presentation of the major aspects in brief form to serve as a guide to those considering an improvement of this type and should be supplemented by the detailed studies and planning of someone experienced in the development of marinas. Additional information may be obtained from the book "Marinas, Recommendations for Design, Construction and Maintenance," published in 1939, and the Supplement thereto published in 1947. These books were written and compiled by the writer of this bulletin and published by the National Association of Engine and Boat Manufacturers of 420 Lexington Avenue, New York City.

PLANNING THE SUCCESSFUL RESORT HOTEL

By Alan H. Lapidus, architect
Morris Lapidus Associates, Architects

The resort hotel, like Janus, wears two faces. The paying customer sees only the "front of the house", and this must be all that he desires—a wish fulfillment, an ego builder, a status symbol, and the promise (and perhaps fulfillment) of great delight. The "front of the house" comprises every area that he will see: lobbies, dining spaces, rest rooms, bathers' passages, passenger elevators, hotel rooms, etc. These spaces must be handled and laid out with one thought in mind, the convenience and continued approbation of the guest.

But the "back of the house" is where all that makes this happen takes place. These are the areas of burnishing, butchering, baking; of boilers and many other functions. The guest never sees this but these unseen spaces will precisely determine his degree of contentment. These are the areas that will ultimately dictate whether the hotel will run at a profit or a loss.

Let us presuppose a hotel located in a thriving but not overdeveloped resort area, an architecture suitably superb—or suitably ghastly—to attract the clientele (either extreme will generally succeed; it is mediocrity that founders) and a competent top echelon management.

The "back of the house" must be laid out with two paramount objectives: control and efficiency. Control is crucial because pilfering is a real problem and improper design resulting in incomplete control can cripple or kill the operation. Take the case of a large chain that opened the first sizable hotel on a little Caribbean island several years ago. The building was finished, the employees had had several weeks of pre-opening training, but the hotel could not open on schedule: there simply was not enough of the new silverware left. Several changes in service area layout were made, the local constabulary called on employees at their homes and requested return of the "borrowed" flatware—and the situation was corrected. Liquor, meats, dry goods, linens and housekeeping supplies are all items that most people have need of in their homes; and maids, dishwashers, busboys, laundresses etc. are not the best compensated people in the labor market. The pilferage problem in hotel operation should never be underestimated.

The second objective is efficiency. Inefficiency results in two people doing a job that could be done by one person, thereby increasing the operating overhead of the hotel by the yearly salary of that person. It also results in the delay of or detriment to service to a guest. An employee that has to travel a maze of passages to accomplish his job is being paid for spending a lot of time walking. A poor layout results in lost time, effort, and money for the hotel and its guests and customers.

What is the flow diagram for a typical "back of the house"? First, the service entrance is located out of the view of the main entrance to the hotel but with direct access onto a road capable of handling truck traffic. It should have a loading dock—covered, to protect it from the weather. (Food, laundry and sup-

plies will be off-loaded and stored on this dock and should not get rain-soaked while waiting to be checked in.)

All personnel will enter the hotel at this point. At least two small offices should be located here, for the steward (or receiving) and the timekeeper. Outside the steward's office is a floor scale to check the weights of the produce as it enters. If the food storage and preparation kitchens are located on a different level, a sidewalk lift or conveyor belts should be provided here. The timekeeper checks the employees in and out and makes certain that everyone stays honest. Immediately past the timekeeper, the employees should be separated into two different traffic flows: one for food service personnel, the other for everyone else. (It is advisable to provide separate locker facilities for these two types of personnel.) Once food service personnel enter their traffic flow they have no contact (with the obvious exception of waiters) with either guests or other house personnel. The reason is simply security. If there is any deep dark secret of successful hotel service design, it is a built-in security system. Uniform issue is related to the housekeeper, the housekeeper to the laundry room (and the laundry room to the soiled linen room; the soiled linen room, connected by vertical linen chute, to a service room on every typical floor; and every typical floor connected by service elevator(s) that open to the aforementioned service rooms and also to the service entrance, convenient to the scrutinizing gaze of the steward and the timekeeper).

For convenience, the trash chute from the typical floor service area is located next to the linen chute. The trash room must therefore be located next to the soiled linen room and, for ease of pick-up, near the service entrance. Depending on the size of the hotel and the frequency of trash pick-up, this room may be equipped with a trash compactor or some other such implement of destruction. The garbage room should be located somewhere near the trash room (ideally, opening directly onto the loading dock). It should be refrigerated and either have space for, or be in immediate proximity to, a can wash area with floor drain and hose bib.

The boiler room usually has a direct escape to the outside and, for ease of maintenance and repair, should be located near the service entrance. The boiler flue, extending to the top of the hotel tower, is usually located in the main vertical circulation core and its location, therefore, is important at the earliest stages of design. If there is enough height in the service floor to breach the flue horizontally, the problem is somewhat mitigated, but usually not without objections from the structural and mechanical engineers.

Telephone equipment, electrical and air-conditioning equipment rooms can be handled more flexibly than the other service areas, but their size and locations vary according to the size and location of the hotel.

The employees' cafeteria, generally a steam table-grill operation, should be located near the kitchen and as close to the employees' locker room as possible. Access should preclude passing through the food service area.

Before delving into the intricacies of the workings of the food service and laundry, let me comment on the services of the specialists who will actually lay out and design the equipment in these areas. They don't really need that much space. They will swear a mighty oath that they do, and will conjure up visions of irate chefs stalking off the premises and laundresses working overtime shifts, but they can really do with less. Believe me. However, before one can hope to cope with

After comestibles have been weighed in, checked, and signed for, they are sent to either dry storage or liquor storage (a room with a big lock on it) or to one of the various cold holding rooms or boxes. If the hotel does its own butchering it is necessary to know what size cuts it buys (halves, quarters, etc.) and it may be necessary to provide ceiling rails to transport them. Meats, fish, dairy, bakery products, frozen foods etc. all require different cold facilities. Since these boxes require heavy insulation, slab sinkages will be required in these areas. If these are not provided, the floor of the box will have to be ramped—but the person who has to push a heavy cart up this ramp will curse the architect for all the days of his life. An alternate method, if the exact sizes will not be known until later, is to depress the entire slab and build up the rest of the floor with lightweight fill.

Any resort worthy of its credit cards will have one main restaurant, at least one specialty restaurant, a night club with a dinner show, and a bar where sandwiches and/or snacks will be available. It will also have that service—beloved of guest and hated by manager—room service. Most resort hotels these days also have convention facilities which entail feeding large numbers of people the same meal at the same time. If that meal turns out to be semi-congealed chicken-a-la-king the hotel has lost that convention group forever.

From kitchen storage, food goes to the prep kitchen to be prepared for final cooking in the main kitchen. The main kitchen actually consists of several kitchens (and must have a flue extending to the top of the building lest the guest get an odoriferous foretaste of his next meal). The specialty restaurant(s) and the main restaurant will have their own kitchens and their own chefs but these should all be located within the same general area. ("Kitchen" refers to a cooking line with its back storage tables, reach-in boxes, work areas etc.) The "common" areas that all of the kitchens can use are the dishwash, pot wash, salad set-ups and dessert set-up (waiters usually set up desserts such as ice cream, cakes, etc.). The dishwashing area should be located near the door of the kitchen so that the waiter or busboy can enter, drop off the dirty dishes, and get out again without walking through the cooking area. This is, however, a noisy area and it should be sound-baffled.

Cooking for banquets is usually done in the main kitchen and then brought to a banquet or "holding kitchen", equipped with banks of ovens where food is kept hot until served. Depending on the size of the operation, this kitchen may also have its own dishwashing equipment. Other facilities include reach-in boxes, set-up areas, and storage areas. Hot and cold carts are another means of servicing a smaller banquet facility. Both methods require direct access between main kitchen and banquet area.

There is usually a service bar for alcoholic beverages in the general area of the kitchen. As the waiter leaves the kitchen he must pass a checker who verifies that what has been billed is being served and that only food that has been billed is walking out of the kitchen. The checker's station is always located immediately inside the door between kitchen and dining area. The head chef should have his office in the main kitchen area, in an office with enough glass to permit visual control over the kitchen operation. In addition, silver storage and burnishing room must be under his visual control.

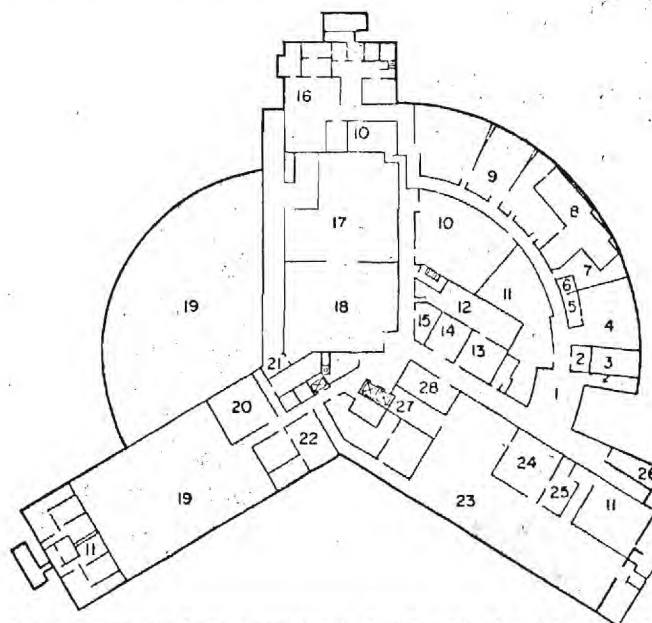
it may have its own "kitchen" usually consisting of a generous amount of grill. (Breakfast is the most popular room service meal.) Storage and setting up room service carts—these take up considerable space—must be provided.

It is evident from this cursory survey that all the food facilities of the hotel, from the coffee shop to Old Watashi's Polynesian Luau Room, must feed directly from the main kitchen without going through tortuous service corridors or across public areas. With this flow line, food can be requisitioned from storage to the kitchen and go through just one control:

The laundry size will depend upon such diverse factors as the number of people who will use the pool or water facilities (beach towels); whether tablecloths are used for lunch and breakfast; whether there is a health club (towels again); and how many employees there are (uniforms). The main concern in allocating space for this facility are the enormous amount of ventilation required, the large headroom required over items such as a ten roll ironer, and the fact that circulation within the laundry is by means of large heavy carts. (No ramps here; avoid columns in the aisles.)

The principal items in a laundry are the washers, extractor dryers, ironers, sorting rooms and the folding areas. There must also be linen and uniform storage, a sewing area, a dry cleaning area and a spot cleaning area. The housekeeper's office is always located in this area and, like the head chef, she should be situated so as to maintain visual control.

There are other areas in the back of the house, repair shops, locksmith, administration, miscellaneous storage and so forth but the items set forth above are the prime space determinants. They must be set up in a certain pattern and that pattern will set the plan for the front of the house.



Service area for a large resort hotel—Paradise Island Hotel on Paradise Island, Bahamas (Morris Lapidus Associates, architects). 1. Loading dock. 2. Receiving steward. 3. Garbage, refrigerator and can wash. 4. Trash. 5. Purchasing agent. 6. Steward. 7. Liquor storage. 8. Cold boxes. 9. Prep kitchens. 10. Employees' cafeteria. 11. Toilets. 12. Lockers. 13. Locksmith (upper echelon). 14. Transformer room. 15. Switch gear. 16. Bakery. 17. Mechanical equipment. 18. Boiler. 19. Storage. 20. Maintenance shop. 21. Locksmith. 22. Switch gear. 23. Laundry. 24. Housekeeper. 25. Uniform issue. 26. Timekeeper. 27. Soiled linen. 28. Trash collection.

When a guest enters the hotel lobby (and there should never be confusion as to where the entrance is) he should be overwhelmed by a feeling of serenity—or enchantment, or revulsion—but never confusion. The registration desk and the elevators should be immediately apparent. The registration area should consist of the front desk, behind which is a clerk, behind whom is the key and mail rack, behind which are various administrative spaces. At one end of the desk (and partitioned off from the rest of it) is the cashier and next to this is the valuables room, a separate room where the guest is given a safe deposit box. After filling his box with jewelry, cash or other valuables, the guest hands the box to the cashier who locks it away.

The main administrative area usually backs up to the desk but the type and amount of space for this depends solely on the management. The telephone board is located here. The restaurants, bars and other *divertissements* should be either visible from or well indicated in the lobby area.

If the hotel has a casino, local regulations will determine how visible or accessible it may be. In Las Vegas the idea is to force all circulation through the casino whereas in Puerto Rico the casino is only open during certain hours and there are strict regulations as to how obvious the gaming may be. Nonetheless, the ironclad relationship here is that the casino entrance should be immediately opposite the night club entrance. The psychology is simple. After being entertained by the stars of stage and screen, the patron walks out of the night club and practically falls into the casino. He thereupon sees the glitter of the wheel, hears the click of the dice, remembers how Bond did it in Casino Royale and immediately blows the egg money. Casino operation is highly variable and the actual planning depends upon the individual operator.

A bathers' passage should be provided from the elevators to the pool or beach. This is so that clothed dry guests do not have to associate with half-naked, wet and oily guests. In designing the pool deck do not forget the little nicety of making sure that a large shadow does not fall across it. Most pool decks containing the shadow of the hotel at 2:00 P.M. have pools with the architects at the bottom. Since the main occupation at any pool deck is sunning rather than swimming, a generous area must be allocated for chaises. These are large and it is a good idea to overestimate space for them. If at all possible the pool should be oriented so that the diving board does not face the afternoon sun. A bar and snack bar for the pool deck should be provided and access to the coffee shop should be from the pool deck as well as from the public spaces of the hotel.

The actual floors of a hotel are strictly a matter of budget and space. The module for the floor set up (and thus for the building) is based on the fact that a maid can make up 12 to 14 rooms per day. (It is inadvisable operationally to have a maid make up six rooms on one floor and five on another.) A normal hotel tower is at least 60 feet wide (minimums 30 feet clear living space from outside window to bathroom wall, 10 feet for bathroom and closets, 6 feet for a hall). A hotel floor should have a number of interconnecting rooms (soundproof connecting doors) and some rooms that by size, configuration and furniture can be combined into suites of various sizes. However, for the most efficient hotel design every room should have a fully equipped bathroom so it may be rented as a separate room. A room furnished as a living room should have convertible beds instead of couches. Thus every

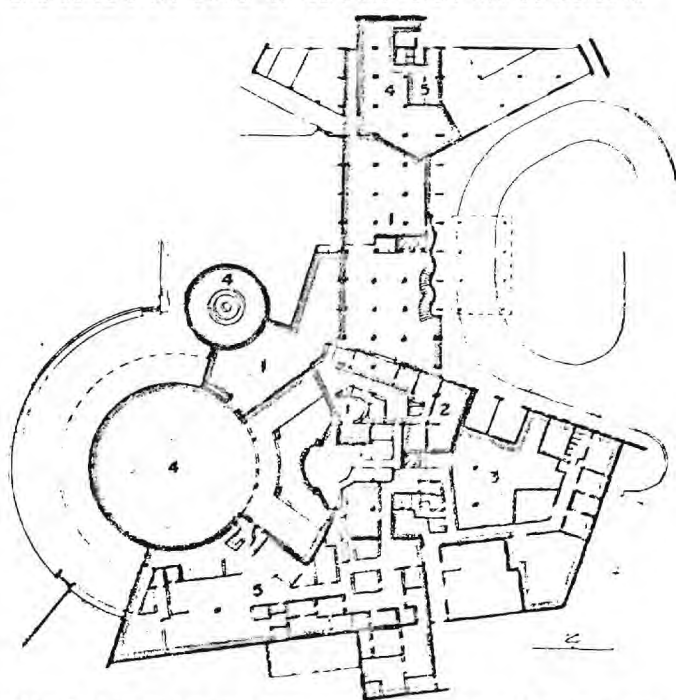
room is a "key." (In hotel parlance rentable rooms are called "keys" and a two-room suite where the rooms cannot be rented separately is only one "key".)

The service area on the typical floor is located near the vertical circulation core (service elevator, dirty linen and trash chutes). The service area also contains space for storage of the service carts (one per maid), a slop sink and storage for clean linens, towels and supplies. Walls of rooms that adjoin the elevator core should be sound proofed.

Now that I have lovingly laid out the principles of practical hotel layout let me stress that all generalizations, including this one, are false. Depending upon the terrain, the view, the solar orientation and the size of the property many of these guidelines may have to be stretched.

At the Conquistador Hotel on the eastern tip of Puerto Rico, the program was to enlarge an existing 94-room hotel with minimal facilities by adding 300 more rooms and full public facilities, including convention ball rooms and a casino. The site was a steep mountain with no available flat areas but an incredible view. A high rise building was deemed inappropriate and the operation of the existing hotel could not be interrupted during construction. The solution was to break most of the rules. A large portion of the hotel, including the pool and pool deck, 70 hotel rooms, a bar, kitchen and outdoor dining, was located in a fold of the terrain halfway down the mountain. The only way to reach this complex is by an aerial tram and a cable railway. This means that all foods, linens and supplies have to be brought down this way and garbage, trash, etc. have to be removed this way. The total number of employees per guest is high and operational problems are legion. However, these considerations are secondary because of the unique layout which attracts guests at premium rates, thus insuring a successful operation. Which is, after all, what it is all about.

Rules are for the ideal. If you can take advantage of a special situation or create spatial excitement by bending or breaking these rules, do so, just be aware of the consequences, and be sure the owner concurs the result will be worth it.



Main floor of the Jamaica Hilton Hotel. Architects: Laidlaw Associates and Architects Jamaica. 1. Pool area, 2. Administration, 3. Support personnel, 4. Restaurant and cocktail bar, 5. Kitchen.

HOTEL ARCHITECTURE: A MANAGEMENT VIEW

By Roger P. Sonnabend,
President, Hotel and Motor Hotel Divisions, Hotel Corporation of America

As a top executive of H.C.A., Roger P. Sonnabend speaks for an organization which is responsible for the operation of twelve leading hotels and fifteen motor hotels. It has four major facilities under construction, and building has just begun on a fifth project, a 1,000 room hotel for Boston's Prudential Center. H.C.A. management hires good architects and uses them well because it considers a high level of design essential to successful hotel or motel operation. Here Sonnabend tells why. —EDITORS

is a trend, these days, to look for trends in every phase of business and industry. After all, finding and riding a trend is sometimes the easiest way to achieve success.

In the hotel and motel business, we hear a great deal about trends. There has been and continues to be a trend to motor hotels because it is pointed out that the public is motel conscious and desires the informality, convenience and easy parking provided by motels. This motel trend is led by Holiday Inns, Howard Johnsons and Travelodges, and is reportedly followed by virtually every major hotel company.

There is another trend towards large downtown hotels because it is said that new hotel facilities are required downtown to replace older properties that are becoming outdated and unable to cater well to ever larger and more important convention groups. This is typified by the new hotels built or being built by Hilton in Pittsburgh, Denver, Montreal, San Francisco, New York and Washington; by Sheraton in Philadelphia, Dallas, Houston, Portland, (Oregon) and Minneapolis; and by H.C.A. in New Orleans, Hartford, Houston and Boston.

We hear of the trend toward downtown motor hotels. Induced, it is said, because downtown is where most people want to be, including motorists who hereafter have stayed in the suburbs. This trend is embodied in New York City, for example, by Loew's under the Tisches, by Sheraton, and by Howard Johnsons and Holiday Inns.

There is a trend to rehabilitate older downtown hotels because it is argued that they have economic advantages with their depreciated costs over newer

properties. The Plaza and Waldorf Astoria Hotels in New York, the Sheraton Cleveland, the Fairmont in San Francisco are just a few of the grand downtown hotels that are undergoing extensive rehabilitation.

There are also reported trends toward resort hotels and motels and toward properties overseas.

What is the meaning of all these trends, and are they actually trends or merely manifestations of an industry that is expanding helter-skelter and in every way? And if there is not a trend to follow, where does success lie in the hotel-motel industry?

First, we must recognize that there are profits to be made in many phases of the hotel industry, or at least many people believe this to be so. Perhaps this is true for those select hotels or motels that are well located, well designed and truly meet the lodging and food and beverage needs of our citizens. But it is not true for properties badly or unwisely planned, or under-financed or unable to rise above competition. Alas, overexpansion and excessive competition potentially threaten all hotels; but most certainly the typical hotel or motel we find today in America that is not outstanding, not truly unique, not eminent, is most threatened of all.

This overexpansion threatening the hotel-motel industry has important meaning for hotel and motel developers, owners and architects. It means, first, that caution must be exercised in considering new projects. Perhaps more importantly, it means that there is a greater premium today than ever before—both in designing new hotels and in rehabilitating old hotels—on good architecture and design. To be

successful in the future, a hotel must not only be well located but must be superb in the way it functions and in its operation, and outstanding in its esthetics.

Each hotel operator, of course, has his own point of view as to how best to create or improve a hotel. We in H.C.A. feel that success rests first on the basic soundness of the project in terms of location and financing, but then equally on the program that is developed for the hotel and on the architect selected to execute the program.

The program for a hotel and the selection of the architect are in their way as closely interrelated as the chicken and the egg. The type of hotel we desire, its location, and other aspects of the program dictate in many ways our choice of an architect. The architect in turn greatly influences the program.

For H.C.A. hotels we prefer to use an experienced architect, one who can bring to our projects a basic knowledge of the hotel business and who knows how best to incorporate operational and service factors into a structure. A hotel is a complex building because it is a many-purpose building. The fact that it includes guest rooms, restaurants, shops, meeting space, ballrooms, parking facilities, office space and often recreational facilities such as a swimming pool, makes for an architectural challenge equal to, or perhaps greater than, the challenge made by any other type of building.

Then, too, we want to select an architect who, in contributing his knowledge and experience, has the ability to create a building that is not only practical and easy to operate, but which is outstanding in appearance and esthetics.

From the very earliest stages we want to share with the architect, and we want the architect to share with us, the development of the project. We want to work together on the character and nature of the guest rooms and baths, for these represent most what we have to sell. This is where our most profitable dollars lie.

We want to work together on the restaurants of our hotels, for the day of the nondescript hotel restaurant is past. We need restaurant facilities that are truly distinctive, equal to or better than the other restaurants in the cities in which we are located. We want to lead the way with new restaurant concepts—specialty restaurants, for example, such as a roast beef specialty room in the Vieux Carre in New Orleans or in London.

We want to work together on the banqueting and meeting spaces of our hotel because these can perhaps enable us to become the social center of the community, the meeting place for important civic and business groups, and can help us supplement our regular transient business with conventions and groups.

We must work together on the public spaces of the hotel, for they display our personality and our character, while they also must breathe the charm and

comfort that will make a guest feel welcome.

We are concerned with the exterior architecture of our hotels for this is in a sense our trademark, an important advertising and promotional tool.

These are just a few of the concerns we share with the architect in the development of our hotel projects. They apply equally to large downtown hotels, to downtown, suburban and highway motor hotels and to resort hotels.

In developing a program for the hotel with the architect, we ask a lot of questions of ourselves and others. Of what should the hotel consist? What kind of guests do we want to attract? What kind of business do we want to serve? Should we cater to businessmen or tourists? If businessmen, are we most interested in top executives, middle management or traveling salesmen? If tourists, are we looking for families, tour groups, honeymooners? Do we want conventions and if so what sort?

We must study the nature of business generators around our hotel. We will be concerned with cultural and entertainment facilities of the city, with transportation terminals—airports, stations, bus-stops—with shopping facilities, hospitals, tourist attractions, with civic affairs and festivals, with highway.

We will analyze the customs of visitors to the city and of the city's residents in terms of entertainment and dining out, of social events such as wedding and celebrations, of conventions and group meetings and of weekend, summertime and holiday activities.

We will determine price levels in the city and carefully study and shop our competition.

Sometimes much of this has been done in advance of the selection of an architect. If this is the case we carefully go over with him all the information developed, for it is important that we have a mutual understanding of all these factors.

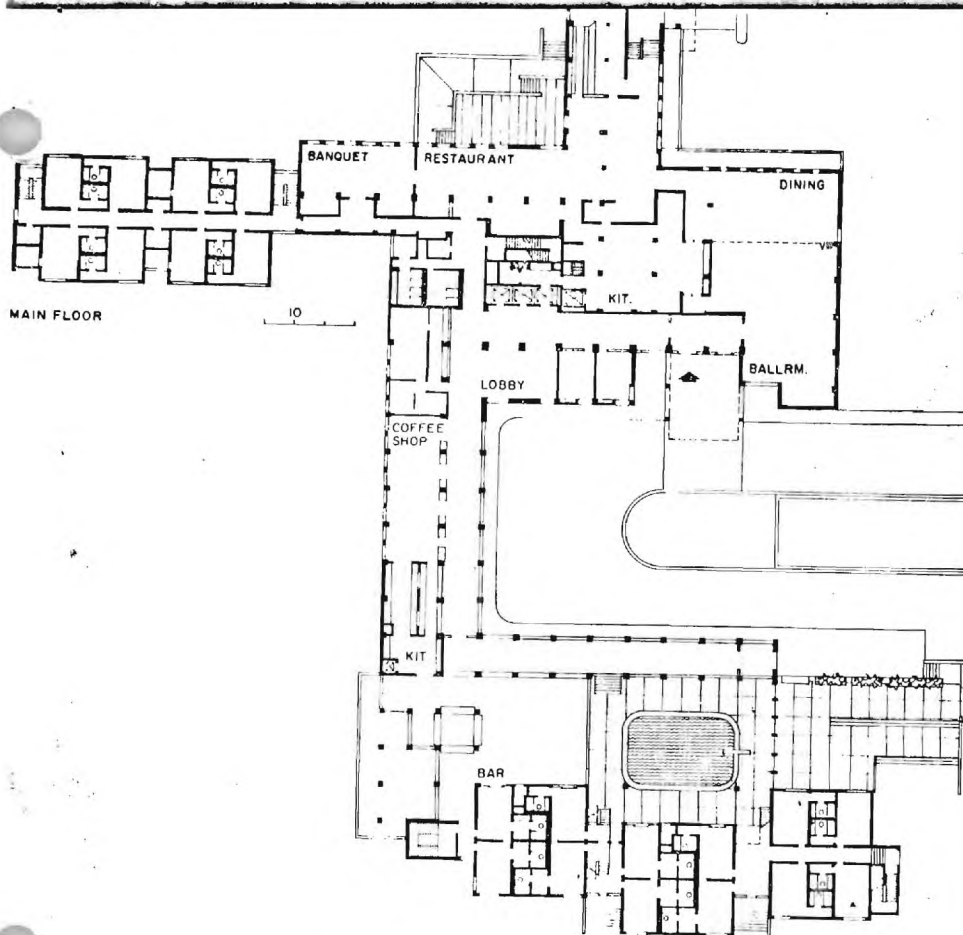
With the architect we can thus develop a final program for the hotel. It will represent a shared effort between the architect and ourselves. But then it is the architect upon whom we rely to create for us a truly eminent hotel from the program; a hotel or motor hotel that will be successful in tomorrow's excessively competitive hotel world. We seek a hotel or motor hotel with the distinctive character and personality of a Royal Orleans (New Orleans), a Beverly Hilton, a Marriott Motor Hotel, a Motel on the Mountain, a Rickey's, a Fairmont (San Francisco), an Atlanta Cabana, a Holiday Inn, the Plaza in New York.

True eminence in a hotel requires a service-minded and hospitable hotel staff. It requires a superb as well as efficient operation, but it also requires warmth, charm and a fine architectural character in the building itself. It is the architect who can provide this for us, if he is a planner capable of designing a hotel that will work well, and if he is, at the same time, a creative artist who can design a building which is architecturally distinguished.

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RESORT HOTELS AND CONDOMINIUMS DESIGNED FOR ROMANTICS IN SEARCH OF JUST THE RIGHT AMBIANCE

The four projects included in this study have a single common thread. Each has been designed to celebrate its environment and the sports of that environment in a direct, expressive way, and each succeeds in doing so. All have been created by architects who may or may not like to watch yacht races or sail in Narragansett Bay, or swim and snorkel in the Caribbean, or ski in the French Alps. What is important is that they possess the sensitivity and imagination to perform the fascinating task of creating the right ambiance for those who do.—Mildred F. Schmertz

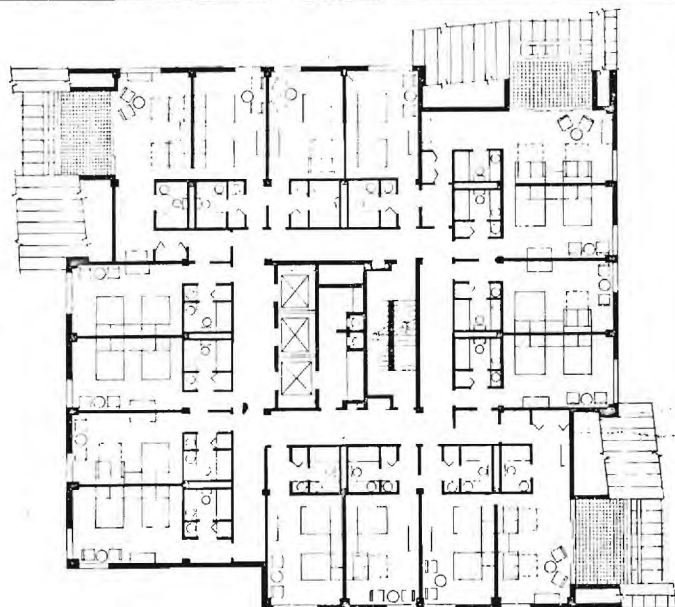
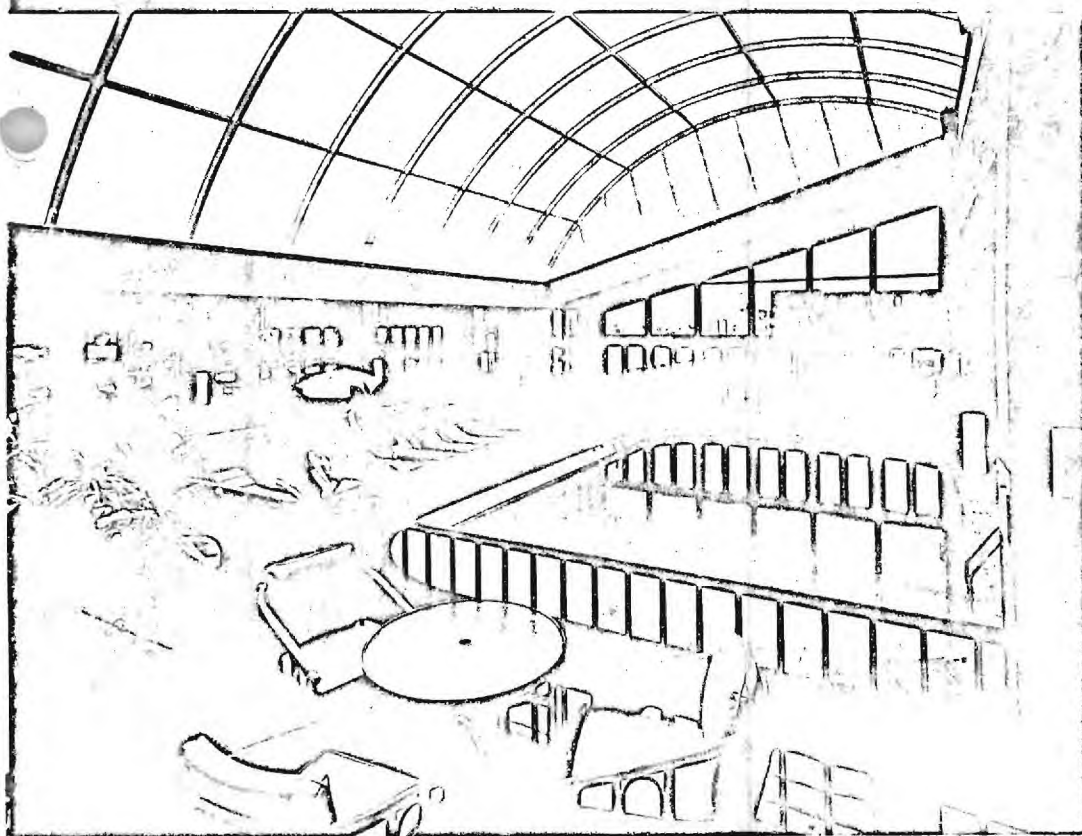


ACROSS THE WATER THIS SHARPLY ANGLED SILHOUETTE LOOKS BETTER THAN A BOX

This year-round inn on Goat Island in Narragansett Bay is visible from Newport R.I., the great harbor, and the route over the Bay by way of a recently constructed bridge. The clients began by wanting a typical squared-off functional box in the tradition of chain hotels everywhere. The architects persuaded them that the visual prominence of the site was one of its greatest assets and that the hotel should have a form and shape to make the passing traveler wonder what it is. The result is a work of sculpture to be viewed from all angles. Its steeply pitched roofs are inspired by local shingle-style houses.

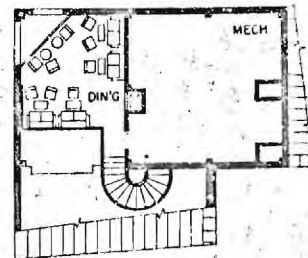
SHERATON-ISLANDER INN, Goat Island, Newport, R.I. Owner: *Island Development Corporation*. Architects: *Warner Burns Toan Lund*; mechanical and electrical engineers: *Francis Associates*; general contractor: *F. L. Collins & Son, Inc.*



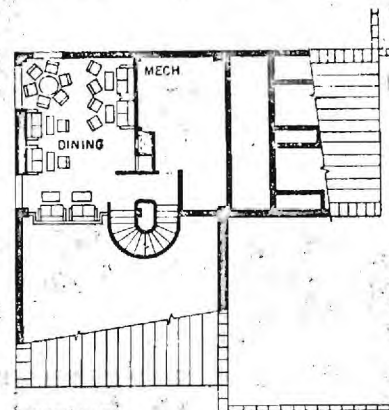


FOURTH FLOOR

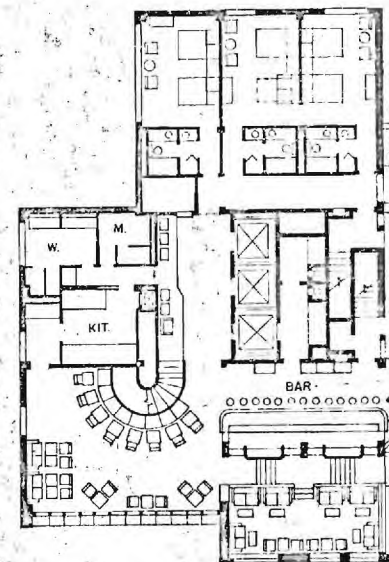
Shown above is the 10-story inn's glass-enclosed swimming pool and at left the typical arrangement of rooms around the central elevator and stairway core. The most interesting feature of the hotel is its five-level cocktail lounge at the top of the building surrounding the elevator penthouse. Because this lounge is high, multi-level, and shallow, it offers a lighthouse-like viewing perimeter for those who like to look out over Narragansett Bay. The owners say that the lounge does an excellent business, especially during sailing race weeks. Four of the five levels and how they interconnect are shown at the right.



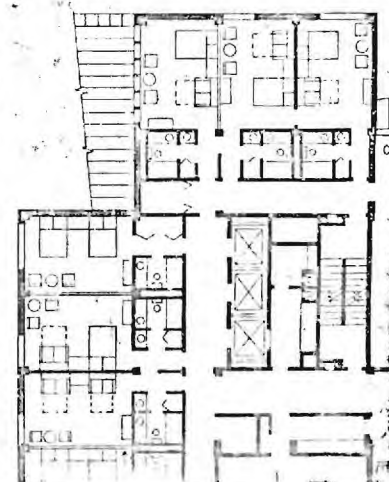
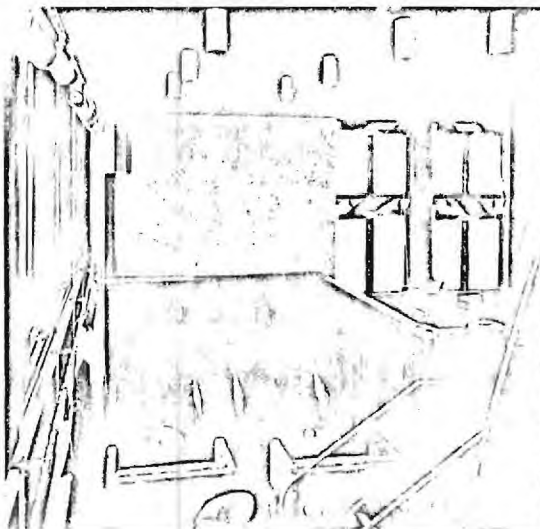
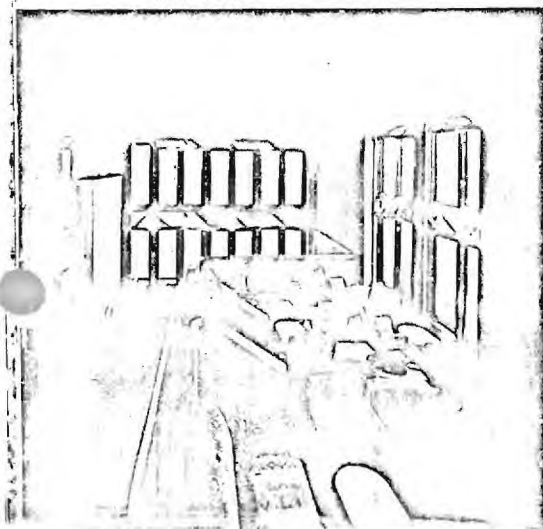
NINTH FLOOR

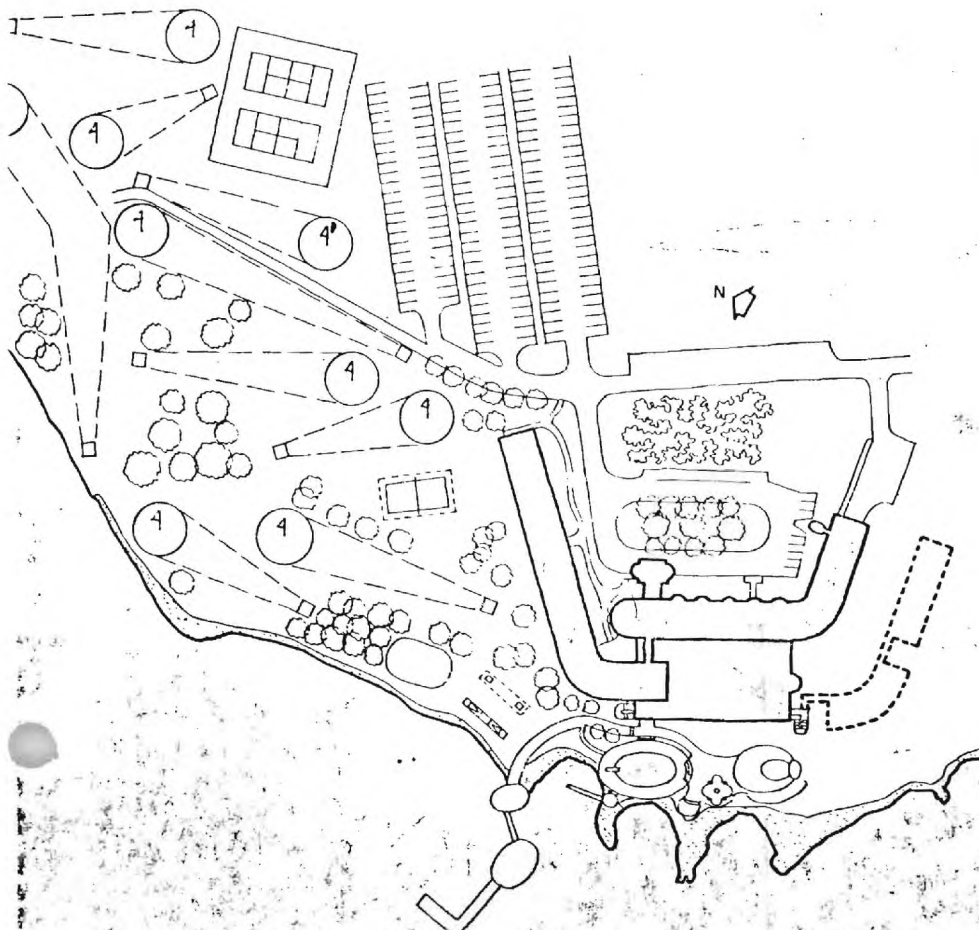
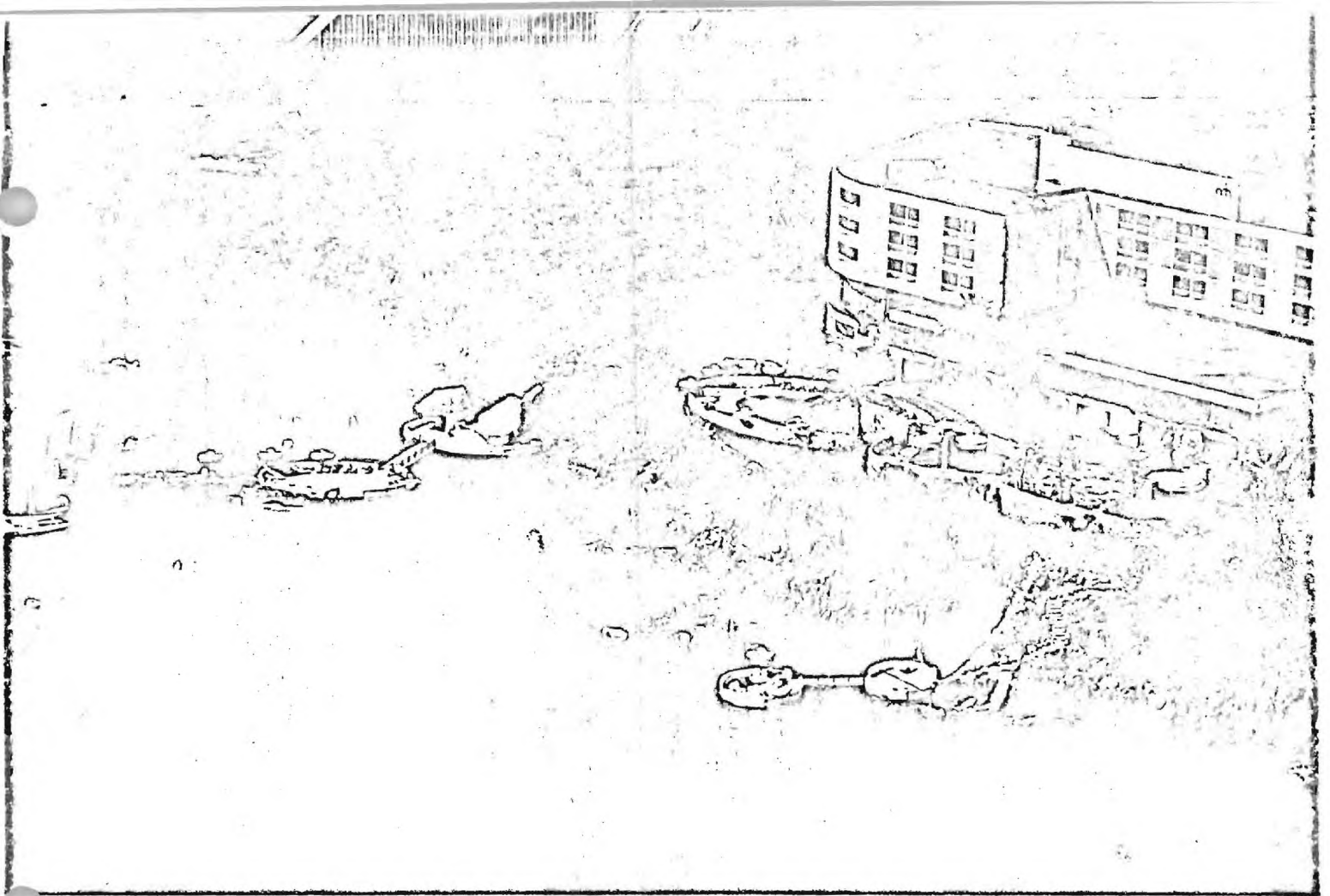


EIGHTH FLOOR



SEVENTH FLOOR



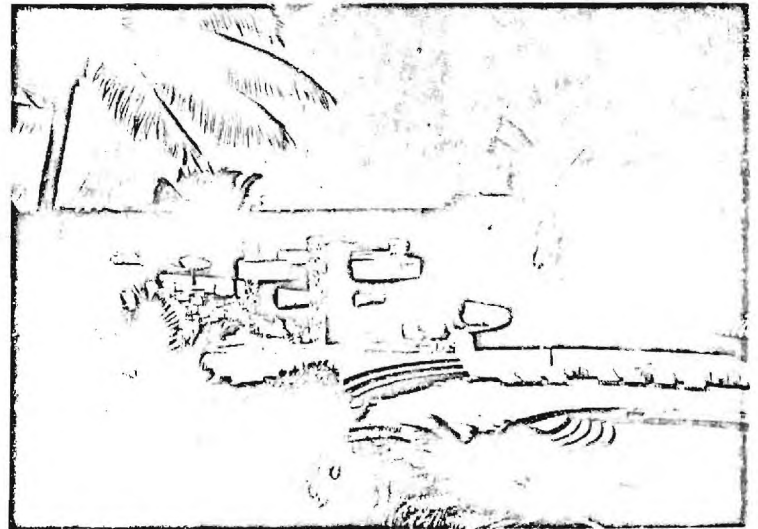
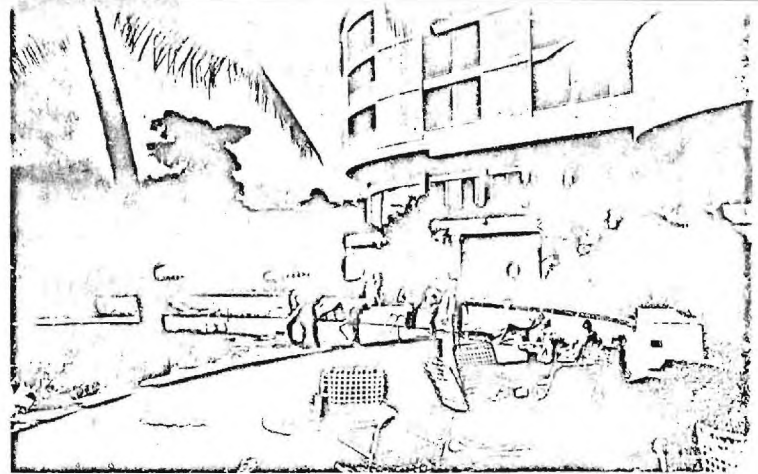


A GOOD SITE PLAN MAKES A ROCKY COAST JUST RIGHT FOR SWIMMERS

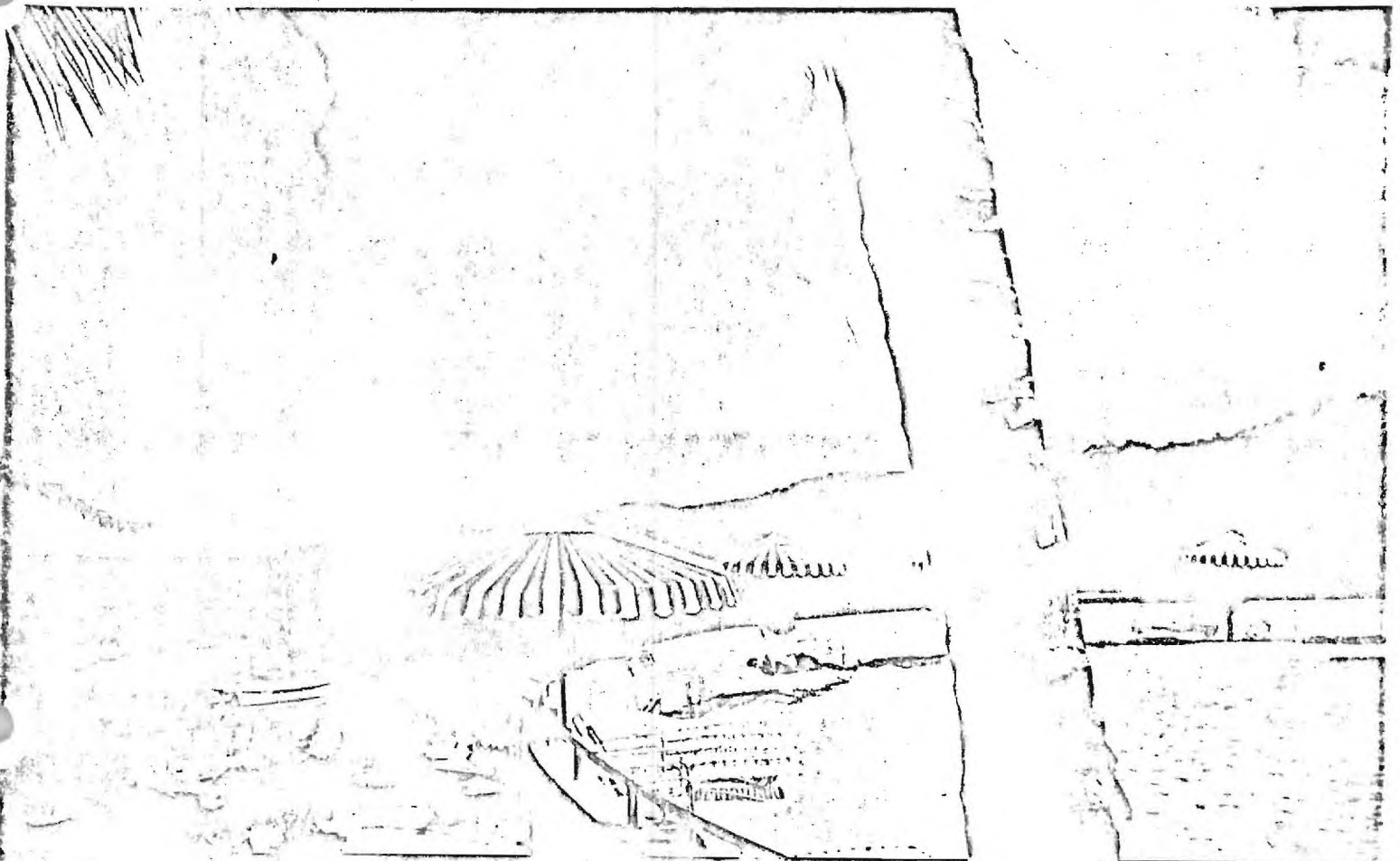
Most hotel developers about to construct a large international facility on a cliff site such as this Hilton for Martinique, would first blast the rocks to create a sandy beach. After thus violating the site, they would build what they considered a spectacular and luxurious edifice—possibly staggered down what remained of the rocks—in the hope that the tourists would share their tastes. Happily this hotel, which is quite modest in its architectural expression, maintains the continuity of the land form.

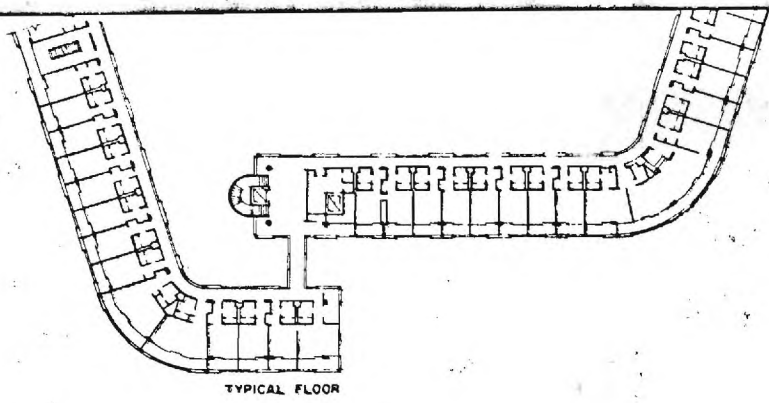
MARTINIQUE HILTON, "Le Bateliere," Schoelcher, Martinique, F.W.I. Owner: *Societe-Hoteliere et Touristique Martiniquaise*. Architect: Charles Rameau; consulting architects: Warner Burns Toan Lunde; structural engineers: Severud-Perrone-Fischer-Sturm-Conlin-Bandel; mechanical engineers: Jaros Baum & Bolles; lighting consultants: Wheel-Garon, Inc.; interiors: WBTL-Jacques Dunham; general contractor: Labin Co.

As the air view and site plan indicate, the ocean side of the hotel is a beautifully planned series of spaces which include a pool jutting out over the rocks, terraces, a gazebo and steps leading down to the water. At the water level are a series of bridges and oval platforms which the architects call pods, which connect with a marina. The pods are for swimming, snorkeling and sun bathing. The two wings of the building surround a group of royal palms, the center of the courtyard of the original estate. A small golf course has been planned within the estate's botanical garden. Wherever possible plant materials, rocks and water remain as the developers found them.

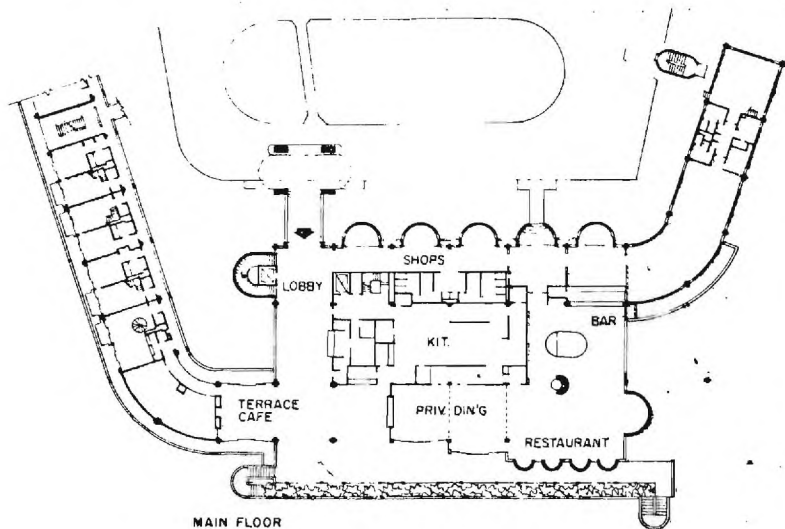


Louis Reens photos





TYPICAL FLOOR



MAIN FLOOR

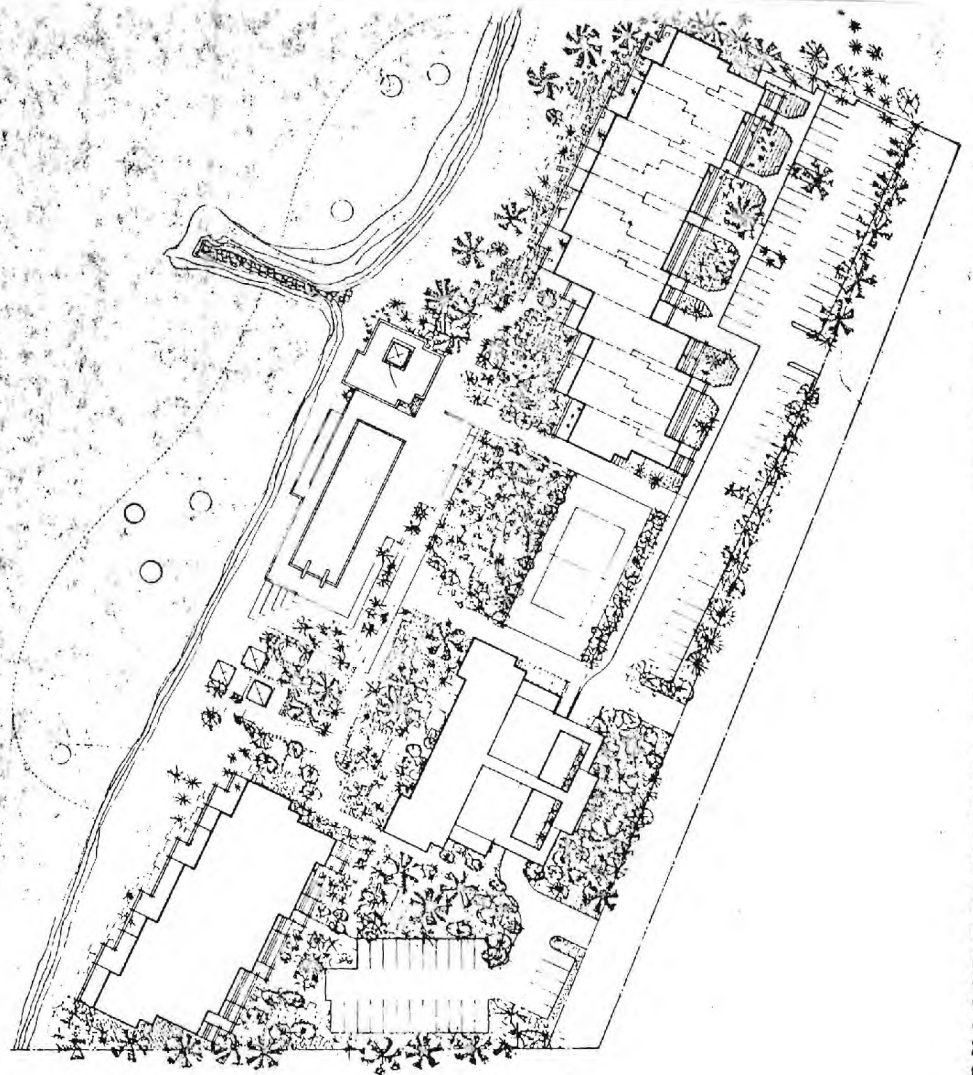
The royal palms and driveway from the original estate are shown at the right. Adjacent to the entrance as the ground floor plan indicates are a series of shops enclosed within half circles. The dining terrace below overlooks the swimming pool and the ocean. As can be seen in the plan of a typical hotel room floor, all rooms are reached by a single-loaded corridor and have seaside terraces.



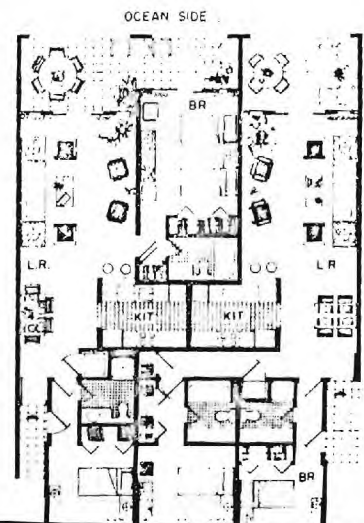
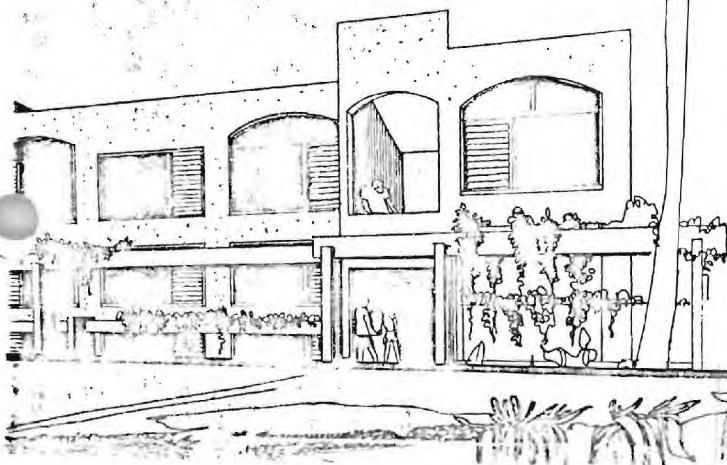
FUTURE HOTEL-MOTEL CONDOMINIUM CAN START SMALL WITH A GOOD DESIGN

In many resort areas developers with only a small amount of capital begin by constructing condominiums first and selling them to raise more capital to construct the basic hotel-motel facilities. The plot plan (right) shows a projected development in St. Croix which will include 36 condominium units now under construction in the first-phase building. Next to be constructed will be a multi-story hotel with the usual tourist facilities as well as pool and terrace. The addition of another 24 condominium units will complete the development.

GRANADA DEL MAR, St. Croix, U.S.V.I. Owner: American Antilles Development Corp. Architects: Robert L. Rotner, project architect Dennis P. McGrath; structural engineers: Alvin Fisher-Robert Klein; mechanical engineer: Robert C. Dukes; construction consultants: Concrete Detailing Services, Inc.



The building, a simple poured concrete and concrete-block structure, has been given variety and interest and brought into scale with the local village architecture by means of open stairways and broad trellises on the entrance side. The well-thought-out layout of the condominiums, shown in the plan below, permits the owner to conveniently and comfortably occupy all of his unit, or just the living and master bedroom, or only the second bedroom, if he chooses to rent out the remaining space.



RESORT HOTELS:

SYMBOL AND ASSOCIATION IN THEIR DESIGN

There is a problem in the design of modern hotels which everyone acknowledges but no one seems to know what to do about, or even express very well. The problem can become obvious when an architect who has never done a hotel is commissioned to do one; he suddenly finds himself differing strongly with his client, the client's interior designer and other "experts" in the hotel field regarding that part of architecture in which the architect feels most secure, and about which he is least accustomed to challenge—that is, esthetics and the visual repercussions of design.

Herbert Weisskamp, who has written a recent and excellently illustrated book on hotel architecture,¹ states it this way: "Hotel people see the architect as a puritan who sticks rigidly to his austere modern style, and refuses to give them the ornate or glamorous interior, the trappings of delight, elegance or romance which they hanker for; and the famous architect, better able to get his own way, may seem even more of a peril. From the other side of the fence, architects find that hotel managers place too much emphasis on decor and stage-management, demand over-designed exteriors which disrupt the essential outline and texture of buildings, and leave only elevations and lobbies to architects, handing over the interior facades to unspeakable decorators who horse around with chandeliers, fake antiques and folksy bric-a-brac. Architects feel that they are allowed too little control of the design process, with the consequence that most hotels end up as trivial or flashy stage sets, draped heedlessly over a structural frame."

Disagreements between the architect and hotel developers concerning visual matters tend to diminish, of course, when the architect has designed several hotels, or when his practice is based upon this building type. And historically the architect, not

the developer, has made the compromises; he has re-thought the problem of esthetics in hotels or has decided that he must provide what the owner says he needs in the belief that the owner often really knows what he needs. Whatever has happened, said established hotel architect tends to feel guilty about this deference to his client's demands in regard to esthetics, may stay off the subject of architecture as art at the local A.I.A. meetings, preferring architecture as business, and thinks the students at the local architectural school may be laughing.

We need, then, to ask some questions: Why do developers and architects tend to disagree about how a hotel should look more often than they disagree about how a house, industrial plant, church or office building should look? What is the basis for the architect's point of view, and what is the basis for the developer-interior designer-hotel expert's point of view? Who is right? Answering any of these questions is not easy, of course, because it requires talking about some principles in modern architecture, how they might need changing, and how they are changing already.

The developer knows what he likes

When asking non-architects what they think a hotel, particularly a resort hotel, should look like, or at least what they think it should try to do, visually, one gets back a wild variety of answers—unclassified, instinctive, not particularly articulate. But they know what they like and it is worthwhile trying to understand why they like it. The answers can be placed in one of two categories, which may be used to broadly organize and evaluate them; there is the scenographic approach and the psychological approach to explaining what a hotel should look like, and they are closely related to each other.

Stephen W. Brener, who is a hotel consultant and senior vice president of Helms-

ley-Spear Inc., a real estate firm, says that "atmosphere" is the most important requirement for a hotel if it is to be successful. Atmosphere, to Brener, connotes a sense of specialness, excitement and mood a particular place may cause in the person who sees it or walks through it; what kind of atmosphere one tries to achieve in a hotel depends first upon what clientele one wishes to appeal to and secondly upon where the hotel is located. As examples of what he means by atmosphere, Brener says that good atmospheres are achieved by nature, first of all, and that if the site is well chosen, atmosphere takes care of itself. A pine-covered mountainous site with sweeping views, or an ocean-front site with a white sand beach and semi-tropical vegetation, has atmosphere without the help of, or perhaps in spite of, whatever building is put upon it. Conversely, it is possible for an architect to provide the atmosphere where none existed before; the Regency-Hyatt Hotel in Atlanta by John Portman with its 21-story interior court, the five "theme" hotels planned by Walt Disney for Orlando, Florida (Brener refers to these as "the five atmospheres planned by Disney") or even "The Tree Hotel" in Kenya which is built as a treehouse, off the ground.

A crucial issue in all this is the protection of the hotel's atmosphere from destruction. This is relatively easy in hotels like the Regency-Hyatt where atmosphere is man-made, but not so easy in those establishments that depend on views or the quality of the land around the hotel which is not owned by that hotel. Over-development of an area, and the desecration of the landscape by others is the major threat to many resort hotels, in Brener's view.

Brener's examples tell us little about the real visual and tactile basis for the atmospheres he thinks are important, nor how to create them, but the concept of atmosphere may be classified as a psychological approach to defining a successful hotel, as

ARCH Record
Dec. 1969

¹ Herbert Weisskamp, *Hotels; an International Survey*, Frederick A. Praeger, New York, 1968.

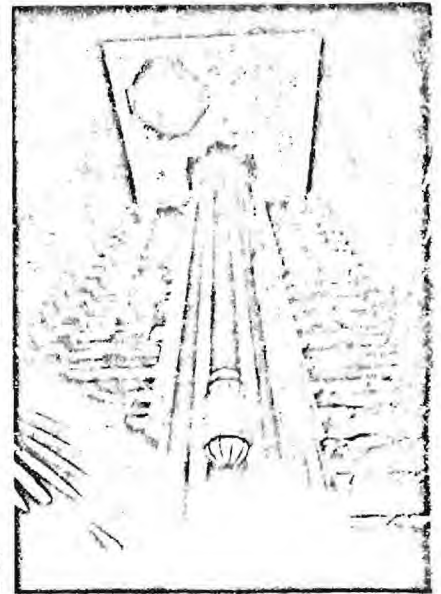
Erwin Christian



SIGNIFIER FORMS, SPATIAL PROGRESSIONS
Eden Roc Hotel, Miami Beach; Morris Lapidus Associates

ATMOSPHERE DEPENDENT ON THE SITE
Hotel Tahara'a, Tahiti; Wimberly, Whisenand, Allison & Tong

ATMOSPHERE DEPENDENT ON THE ARCHITECTURE
Regency-Hyatt Hotel, Atlanta; Edwards and Portman



we said before; we can return later to what its primary foundations are.

Another psychological approach to architecture by a layman was presented by Dr. Bruno Bettelheim, speaking at the NEOCON convention in Chicago last June. Dr. Bettelheim, who is professor of psychology and director of the Orthogenic School at the University of Chicago, did not direct his remarks at hotels and their proper design, but at interior environments in general; nevertheless, his ideas are directly related to what Brener has called atmosphere and represent an articulate version of ideas reported by several interior designers, managers and hotel developers. The following remarks—with which you may not agree, but which represent a common viewpoint—are taken from Dr. Bettelheim's paper, *How Interior Environment Affects People*:

"Our modern buildings offer excellent protection against rain or physical cold; but none against emotional coldness, the sense of loneliness, isolation, lack of purpose.

"The dominant attitude I have encountered among architects is: you tell us what you want, and we'll see that you get it, as if it were as simple as that. What I wanted from them was creative ideas for living. What I got was a series of cubicles based on identical modules, and long discussions on dollar costs of the cubic foot. I got answers to problems of living in terms of machine efficiency and traffic flow, but when it came to why traffic should flow in the first place, we seemed to part ways.

"They seemed shocked when I told them I knew good design is expensive, that unless it expresses the particular spirit it should serve, a building cannot serve the purpose it is planned for. This they should have told me in the first place.

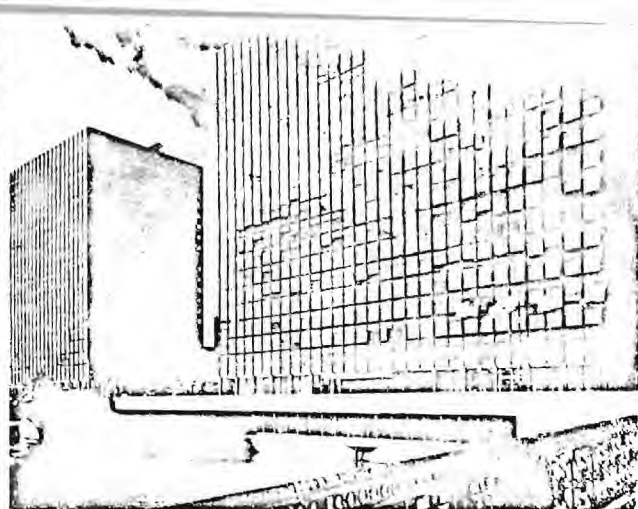
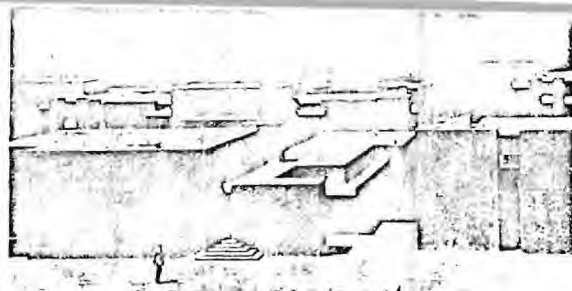
"I do not believe, as I'm told, that

into identical rows of windows give, at best, a feeling of cold intellectualism, a stark, economical function and avoidance of frills. But puritanism is not an esthetic virtue; it never warmed the soul."²

In contrast to Brener and to Bettelheim, Alan Lapidus is an architect, one who is committed to the design of hotels as the primary basis of his practice. The firm of Morris Lapidus and Associates, in which Alan is a partner with his father, is responsible for such hotels as the Eden Roc in Miami Beach, The Americana in New York, the Jamaica Hilton in Ocho Rios, and the Aruba Caribbean Hotel in the Netherlands West Indies. In Mr. Lapidus' view, most guests come to hotels, particularly resort hotels, for release from the everyday problems of their lives, for two weeks or two days of regeneration, escape and refreshment. In this context, the public areas of the hotel, those parts which the guests see, must act as stage sets—they become backdrops and vehicles for role-playing by the guests. Even salesmen, executives traveling on business, or conventions of whole companies are subconsciously attracted to settings which provide fresh, novel or exciting environments in comfort, where they may be allowed to forget the normal routine and roles of their life. Role-playing varies in intensity for different people, of course, and might be subconscious in most. Yet the phenomenon of role-playing in our society has been tellingly described by Tom Wolfe, in *The Pump House Gang*, a collection of essays about people who seem to be playing roles during much of their day-to-day existence, in an effort to think of themselves as more than just average (Wolfe calls it "starting your own league"), and simply find it more comfortable in Las Vegas and places built for that purpose. Lapidus agrees

with the opinion that for many of the older vacationers in Miami Beach and Puerto Rico their role is the 1930's movie, the Bugsy Berkley musical conceived within the lavish and streamlined forms they valued and that became associated illustrations of "the good life." Las Vegas makes its public "King for a Day," broadcasting the aura of fantasy, a mile-a-minute kind of excitement and architecture. It is not just for the people who might live that way normally, but for the blue-collar worker from Pittsburgh and his family on a week's vacation in the West who can afford Las Vegas because income from gambling makes lavish entertainment free and hotel rooms inexpensive. Las Vegas is for the farmer and the grocery clerk away from his small-town daily routine, or for the just plain bored escaping from any routine. To cope with these issues within the context of hotel or motel architecture Lapidus talks about "signifier forms", the illusionary use of lighting, the importance of changes in level, and the need for "spatial experiences." It is with these architectural techniques that Lapidus creates his hotels and it is from the above issues that the need for such techniques grow. They are not the "normal" issues upon which architects found their design philosophies, and may be called a combination of scenographic and psychological criteria, in the context of our original classifications. Lapidus is an articulate architectural specialist who has learned to deal with the issues raised by the hotel professionals and developers; people who know what they want, again, but do not necessarily know how to express it.

But . . . the architect knows what he knows: The basis of the architect's point of view concerning good hotel design, or good design in general, is the need for a



SIMPLE GEOMETRIC FORMS, EXPRESSION OF STRUCTURE
EXPRESSION OF MATERIAL

left: Smith House; Richard Meier
above: Trent University; Ron Thom
right: Gateway Center; Skidmore, Owings and Merrill

developing, changing personal style.

In visual terms, architects' training has been founded on the use of simple geometric solids as the formal elements of building; the cube, the sphere, the cylinder, the pyramid. These simple shapes are combined in three dimensions and in complex ways to form the esthetic of modern architecture, with wide variations of color, texture and systems of combination. This is no revolutionary statement, of course; it has been pointed out by historians of modern architecture since the early 1920's, and was clearly stated by Le Corbusier as early as 1923: "Our eyes are made to see forms in light; light and shade reveal these forms; cubes, cones, spheres, cylinders, or pyramids are the great primary forms which light reveals to advantage; the image of these is distinct and tangible within us and without ambiguity. It is for that reason that these are beautiful forms, the most beautiful forms."³

The simple geometric solids of that period—untextured, combined so each form is read separately, so that each change in plane or shape is "articulated"—are still with us as a primary generator of the architectural forms of our day.

A second tenet upon which our education was founded, and which the practice of architecture seems to reinforce, is the belief that structure in architecture should be as efficient as possible, should have its outlines or locations acknowledged in plan, elevation or room shape, and should in some cases be entirely exposed to view. Related to this tenet is the insistence that materials be used "honestly," to reflect qualities inherent in that material which do not exist in other materials. Thus, wood should look like wood if possible, and its uses must somehow be different from, say, concrete; a proper analysis of the particular design problem in question should even demand separate usages, separate expressions.

³ Le Corbusier, *Towards a New Architecture*, translated by Frederick Etchells, London, 1927, p. 31.

Brick cannot necessarily be substituted for wood in a design, or vice versa, without the designer also needing to change the architectural system, or the expression of structure—at least he must feel guilty if he does not consider these issues.

Other preoccupations, both conscious and subconscious, dominate design philosophies in modern architecture; most designers are "functionalists" in one or another sense of that complex word; an architectural solution may be conceived within the framework of as many immutable economic, social and programmatic conditions as possible; an architect learns to estimate costs, cut costs, save the owner money, think of himself as a watchdog for the owner's financial interests.

Now, it should be clear that the basis upon which most architects must found their opinions concerning excellence in modern architecture, and the basis upon which many hotel developers, their interiors people, and some experienced hotel architects found their opinions concerning how a hotel should look, have very little in common with each other. The architect's opinions are founded in academic, carefully learned principles concerning modern architecture in general, which are transferred to hotels in particular. Hotel people, without any very complex academic background in hotels, at least in relation to esthetics, are inarticulate about that subject as related to hotels, deriving their opinions from their own intuitions, guest's opinions, and hearsay—and these opinions tend to come out in terms of mood, feeling, "atmosphere".

Symbol and associations in design

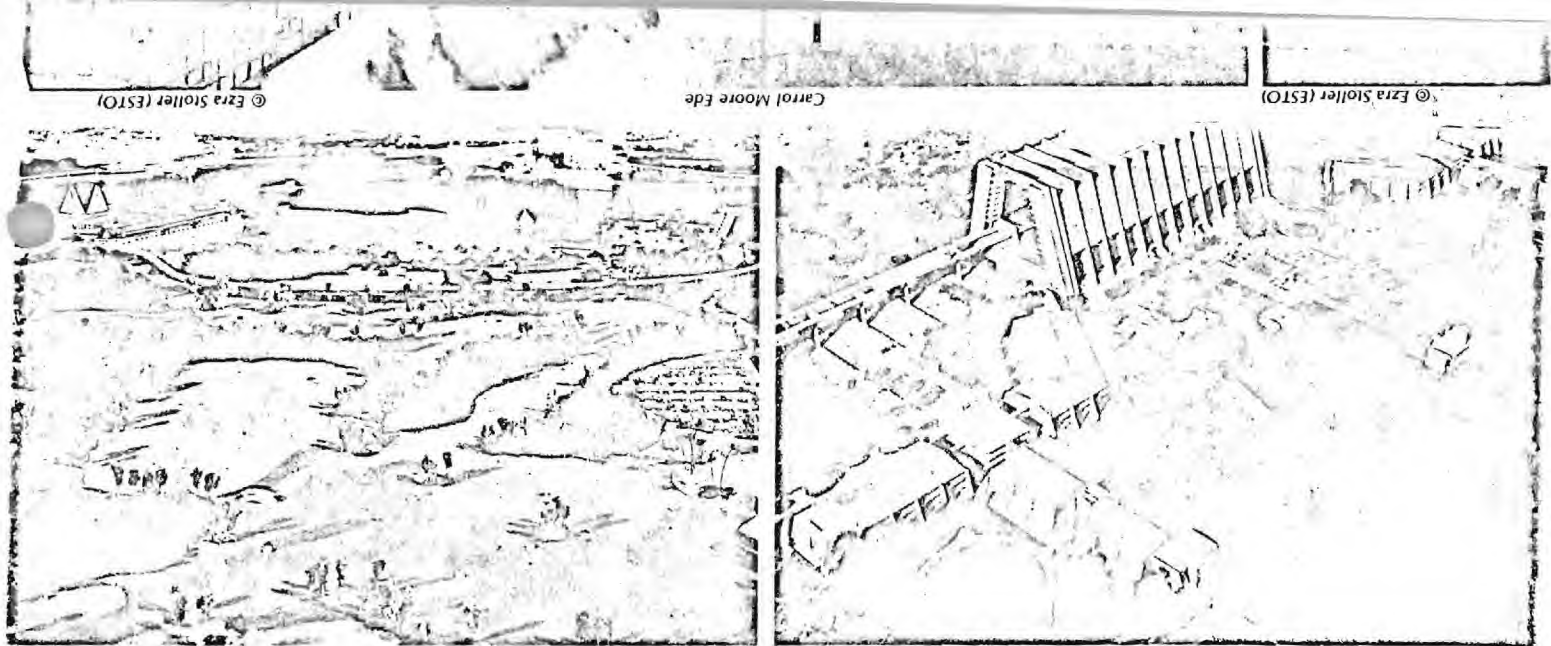
At the heart of the problem are the roles of symbol, association and allusion in art and how these qualities, which all objects possess, are used and understood today. In architectural terms, these issues relate to the ways in which whole forms, small details, or techniques such as lighting can be

manipulated to cause associations in the mind of the viewer, can remind him of something, can allude to and call up in the viewer whole categories of subconscious ideas or emotions.

There are banal applications of symbol in architecture, as when a roadside fried chicken stand has been shaped to look like a chicken; and there are highly complex and subconscious applications, as in the feelings of subservience, awe or reverence one might get from a Gothic cathedral, St. Peters in Rome, a New England country church, a stable, three lit candles or a cross. One can use religion and its architecture as an example because this building type has the widest and most commonly agreed upon set of associations and symbols connected with it. Also, implied by the character of the preceding list is another important point: though most forms communicate symbolically with a viewer, the intensity of that communication is not necessarily dependent on the "quality" of that form, on its high or low ranking in terms like the subtlety of its proportions, the rhythm of its solids and voids, or in its correct use of material, texture or color. Nor do the associations we have with a building necessarily depend upon the size of that building, the magnificence of its spaces, or its current use.

What we want to be, not what we are

It is not that modern architecture lacks a symbolic sense, or attempts to symbolize as little as possible. Rather, the issue is what modern architecture (and modern hotel architecture) is symbolic of—what people associate it with, and how effective such associations are in creating a successful hotel; one that people want to stay at, or come back to, or tell their friends about, so that the management makes money. It has been stated to the point of triteness that modern architecture is a symbol of the machine age, of a technological industrial society, of ef-



efficiency and clarity rather than multiplicity and ambiguity, but it is still true. The polemicists of modern architecture intended it to be this way, and it probably expresses the way we are most of the time today, though not, perhaps, what we are coming to want to be. "... Invincible, triumphant, the machine goes on, gathering force and knitting the material necessities of mankind ever closer into a universal automatic fabric; the engine, the motor, and the battleship, the work of art of the century."⁴ This is not Le Corbusier speaking, or the current president of General Motors, but Frank Lloyd Wright, Chicago, 1901. Colin St. John Wilson, in a paper he called "Architecture as Symbol" talks about the "twentieth century myth" and its expression: "If there was a sign of the zodiac underneath which this myth was born, it would be something to do with structure. The psychologist talks of the structure of consciousness, the philosopher of the structure of language, the atomic physicist of the structure of the atomic nucleus, and everybody talks about the structure of society. It has a sort of obsessive power over us, and in that sense, architecture is very much more than the mother of the arts. It is out of such concerns as these that we get our feeling for the purpose of architecture, the action of architecture as being to give the unique and perfect form to a specific combination of functions."⁵

The forms developed by modern architecture to express symbolically the purposes Wilson speaks of, we have mentioned here at the outset: geometric solids, pure forms free from images of past experience, determined by logical process, program and structure. But these issues are

not what people vacationing for two weeks in a resort, or staying one night in a strange town necessarily want to be reminded of, even subconsciously.

Venturi, the Romans, and the hotel as Israel

Robert Venturi has been an evocative commentator on current uses of associational elements in hotel and motel architecture. In his "... Learning From Las Vegas" article, Venturi writes:

"The Miami Beach modern motel on a bleak stretch of highway in southern Delaware reminds the jaded driver of the welcome luxury of a tropical resort, persuading him, perhaps, to forego the gracious plantation across the Virginia border called Motel Monticello. The real hotel in Miami alludes to the international stylishness of a Brazilian resort, which, in turn, derives from the International Style of middle Corbu. This evolution from the high source through the middle source to the low source took only 30 years."⁶

Venturi points out, too, that associational values in architecture are complex and contradictory, that they add to meanings rather than clarify them, and often alarm architects who are consciously or by habit committed to categorization, further definition and articulation.

The manipulation of associational forms is little understood, but is practiced constantly in hotels, especially in successful ones. A deep red carpet leading through a hotel entrance lobby lined with mass-molded, life-sized statuary of toga-clad Romans may cost less than a fine-grained oak flooring, furnished with hand-welded steel shaped on marble bases—but the entering guest may associate the first with gaiety, wealth and personal attention, the

second with efficiency, business, or similar spaces in which he always had to remain quiet. He may prefer that first association and he has little concern that the second motif is "better design."

The Tel Aviv Hilton, designed by architects Rechter, Zarchi & Peri, has been a very successful hotel, and its architectural form and functions are thoroughly modern. Designers Dora Gad and Arye L. Noy were responsible for its interior design, however and Olga Gueft, writing in *Interiors*, tells us why this hotel may be so effective: "The Hilton assignment confronted Mrs. Gad and her partner with a new problem: to dramatize the region so that the guest, who entered the public rooms or opened his eye in the morning, would sense immediately that he was in Israel and nowhere else. The devices they used were those one would expect—colors of earth, sand and sky; Bedouin stripes in guest room fabrics, desert plants such as cacti, a ceiling of silken striped folds for the Chalim night club ("chalim" means tent), earthenware sugesting pots of honey and jugs to draw water from a well, copper ceilings recalling King Solomon's mines in the Negeb, sculptural niches in white plaster repeating the deep sun and shadows of desert village fabric textures evoking homespun wool or goatshair, also soft leather and tough rawhide."⁷

Walt Disney Modern

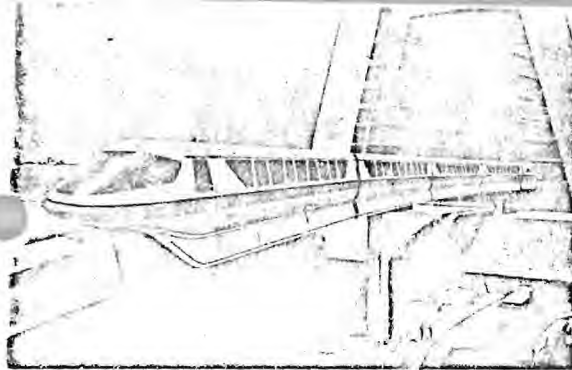
One of the most obviously associational allusionary hotel projects is the series of five resorts planned by Walt Disney Enterprises for a 2500-acre lakefront property near Orlando, Florida. There will be a "Contemporary" hotel, the Polynesian hotel, the Persian hotel, the Asian hotel, and the Venetian hotel, all within sight of each other and grouped around a lake. A "Magical Kingdom" resort similar to Disneyland

4 Edgar Kaufmann and Ben Raeburn, *Frank Lloyd Wright: Writings and Buildings*, Meridian, New York, 1960, p. 59.

5 Colin St. John Wilson, *Symbolism and Architecture*, "Architectural Association Journal," November, 1953, p. 105.

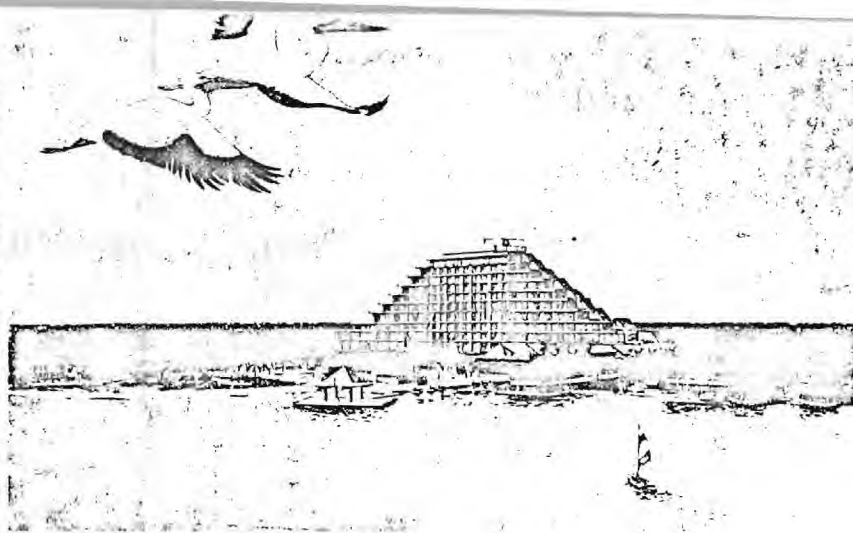
6 Robert Venturi and Denise Scott Brown, *A Significance for A & P Parking Lots or Learning from Las Vegas*, "Architectural Forum," March, 1960, p. 38.

7 Olga Gueft, *The Tel Aviv Hilton—The Work of Dora Gad*, "Interiors," October, 1966, p. 152.



EXTRAVAGANT ASSOCIATIONAL AND ALLUSIVE DESIGN

ar left: site plan, Walt Disney World, Orlando, Florida
 left: The Contemporary Hotel; Welton Becket and Associates
 above: monorail through the Contemporary Hotel
 right: The Polynesian Hotel



California, but much larger, will be the focus of the area and a key attraction. The Contemporary hotel will consist of two 14-story-high slabs placed back to back and sloped into each other, with the structural frame of the two slabs joining at the top to form a very high and long (several football fields placed end to end) interior mall between them. An overhead monorail, the on-site transportation system for the complex, will run down the center of the mall—stopping, going, loading and unloading guests. The architectural expression is not just contemporary—it is super-modern futuristic; the architecture and every detail that creates the hotel's "atmosphere" is straining toward that end, alluding to technological-utopian worlds to come. The train zooms through the center of life on feather-quiet rails, speed without sound; full-size palms grow within the hotel as well as without; nature, the whole site, is controlled. The shape of the building must be "nothing-we-have-ever-seen," the space within must be the largest, the way it is built must be the newest, the never-been-done-before. The U.S. Steel Corporation is in the final stages of developing a pre-fabricated steel framing system for the hotel with stacked, pre-finished steel rooms to fit in it. The Disney people say it is being developed to save costs; but it is also part of the show; you can suppose that when the hotel is complete (late 1971, and currently moving quickly ahead) there will be a large model continually displaying to the lucky families-with-a-future who have elected to stay there, just how their room was hauled into place and their hotel constructed; all moving by some mysterious, invisible, unknown force, the same invisible technological forces that could create this fantastic place in the beginning.

The other four hotels planned by Disney allude to other things. The Polynesian hotel evokes the far Pacific, Tahiti, jungle drums, Gaughin painting native girls. It

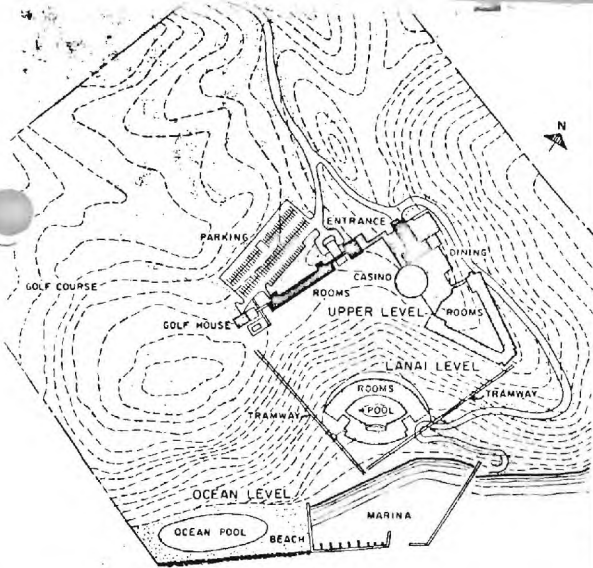
doesn't matter that one's images are mixtures of different times or places than what really is Polynesia—no Polynesian long house ever looked like that, no pelicans ever flew over them, the water has waves there, the beach is not that clean. It is the image of what people *think* Polynesia should be and is, that they are after; derived from Rogers and Hammerstein musicals, thousands of Hawaiian travel posters, those articles in Holiday, Maugham's Gaughin, James Michener, or television's "Adventures in Paradise." The allusions may be vulgar and the associations laughable to those who have really been there. Or the allusions are vulgar to those who have been carefully taught that forms should be refined and abstracted, so as to make the reading and understanding of them clear, "honest," focused, alluding to nothing but the desire to express them unambiguously. And the allusions are dishonest to those who are habitually accustomed to forms related to the technological age, the image of the machine or the definition and categorization of parts, whether it be the economic system, political or building techniques that is being defined; in other words, to those who have an artistic commitment to such forms as the medium they believe is proper for the age, or the only medium they *understand*—by habit, training and choice.

Is there a more appropriate way?

We may be able to say, then, from what men like Stephen Brener and Alan Lapidus tell us, and from what can be seen in some hotels, that hotels often demand associational connections with fantasy, wealth, cultures and geographies other than our own, the personal rather than the bureaucratic, times past or times future rather than the present; with aspirations, perhaps, rather than with what has been realized. Such categorizations are vague and superficial, however, and the ultimate foundations of hotel design have only been sug-

gested; roughly outlined by contrasting their surface characteristics with those of other architectural types, by weighing the evidence of why hotels are used and how they tend to look. The user—the guest—communicates his values by remaining at and returning to certain hotels, his preferences are devious, subconscious, inconsistent, not the same for all, but there is a basis of common needs which a hotel can fulfill, as successful ones prove. To the extent that the fulfillment of these needs rests on the visual qualities of the surroundings, as well as with the functional or economic criteria which we have not considered here, architects must try to understand how the necessary visual qualities are achieved, and how they may be manipulated. We must avoid condemning what has been achieved in this building type on grounds of "taste" or learned esthetic principles; indeed, one of the characteristics of symbolism in forms makes it possible that architects could perhaps improve the "taste" of hotel environments. The original assertion was that the symbolic or associational content of an object (or a building) is essentially separate from that object's quality in other artistic terms—texture, proportion, the subtlety of rhythms, or the play of solids and voids. From this, it is possible for architects to focus their visual perceptions within the framework of the symbolic and associational criteria upon which hotel architecture is based; not contradicting the need for associational qualities in that environment, but making them more subtle, more unified, more complex, more artistic. No other current architectural problem might offer the architect such broad outlets for the foundations of his training; to break issues into their first principles, to combine them and build a solution to a particular hotel design without dependence on criteria used for other building types.

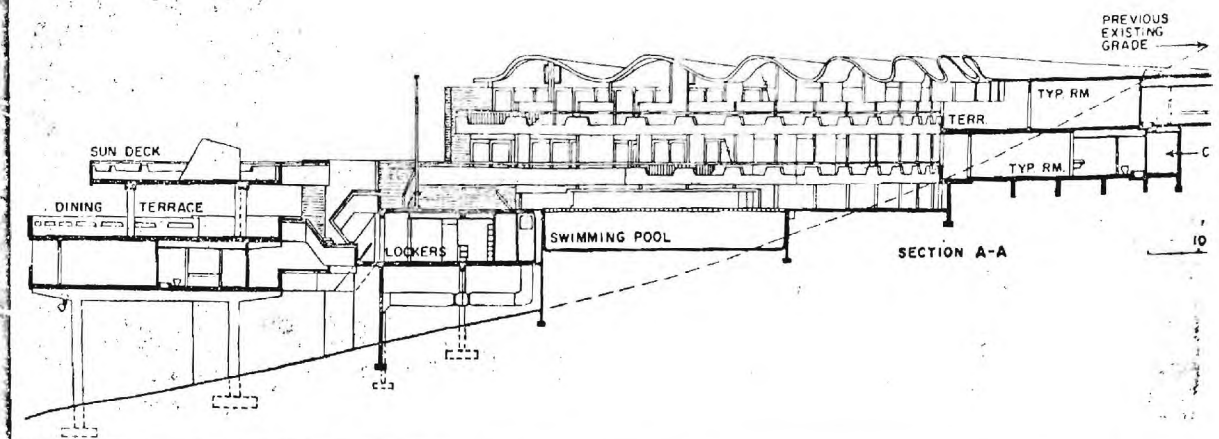
—Robert Jensen



The site plan (above) shows the total El Conquistador complex, including a portion of the golf course, with the most recent portion of the hotel (completed in 1967) shaded in gray. It is located on a point of land about 36 miles from San Juan, with a sweeping view of the Caribbean. The lanai level (photos, left and right) of the hotel sits about halfway down a steeply sloping ridge of land from the major portion of the hotel, which houses the shops and lounges, dining rooms, casino and convention hall, and suites of rooms. The lanai level is reached via a rail car from the upper portion of the hotel, and this same rail car continues down to the sea-level facilities; a beach, an ocean pool, and a marina. The hotel will eventually have three separate rail lines linking its three levels of facilities. The section through the lanai level (below) shows the two floors of ocean front rooms curving around the central swimming pool, plus the dining and deck facilities nearest the ocean. The curving roof of the rooms, plus the white stucco finish on the exterior walls echo earlier and indigenous Puerto Rican architecture.



Alexandre Georges photos



PLAYBOY: ALLUSIONS TO CITY TASTES IN A COUNTRY SETTING

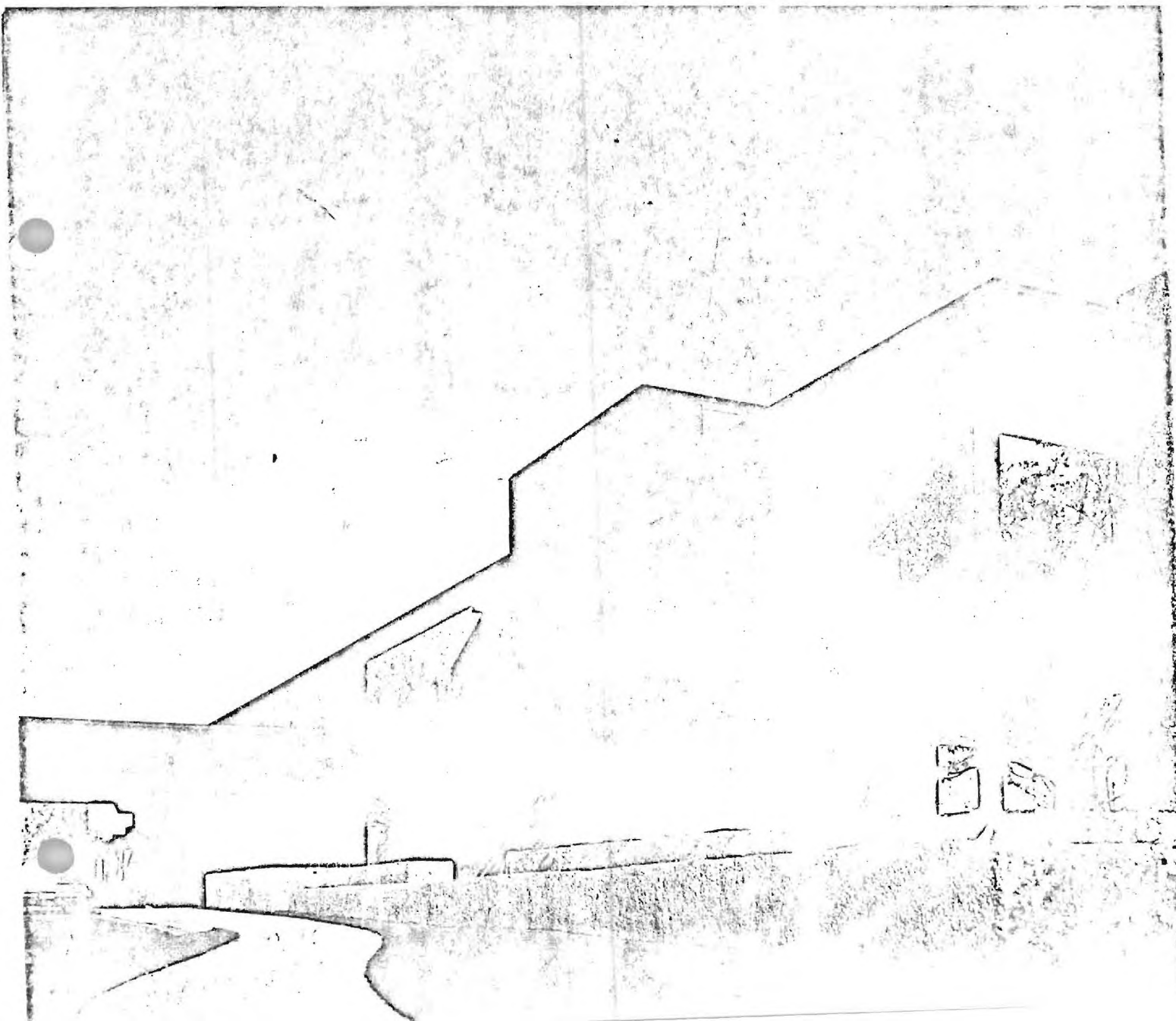
The Playboy Club Resort is insistently rectilinear and hardedged in its individual forms, with bronze glass areas running from floor to ceiling, "office" style, and with its austere, undecorated right angles rigidly limited to two materials. In this sense the club is intellectualized, urbane, sophisticated; related to the city and sub-urban associations from which it springs. But in its siting, its landscaping, and particularly in its horizontality and jutting overhangs which hug the ground, the Playboy Club relates to the land, to the rural, attempting to speak of carefree pleasures in the country air. This is a valid combination of associations for this city-born club in this setting, but the combination is difficult to achieve, and is one of the chief successes of the architecture.

PLAYBOY RESORT HOTEL, Lake Geneva, Wisconsin. Architects: Robert L. Taeye & Associates—Robert L. Taeye, executive architect; Paul Magierek, design architect; structural engineers: Donald McElfresh (main building); Peter Fung & Associates (lodge units); electrical engineers: Melvin Cohn & Associates; mechanical engineers: Mechanical Design Incorporated.

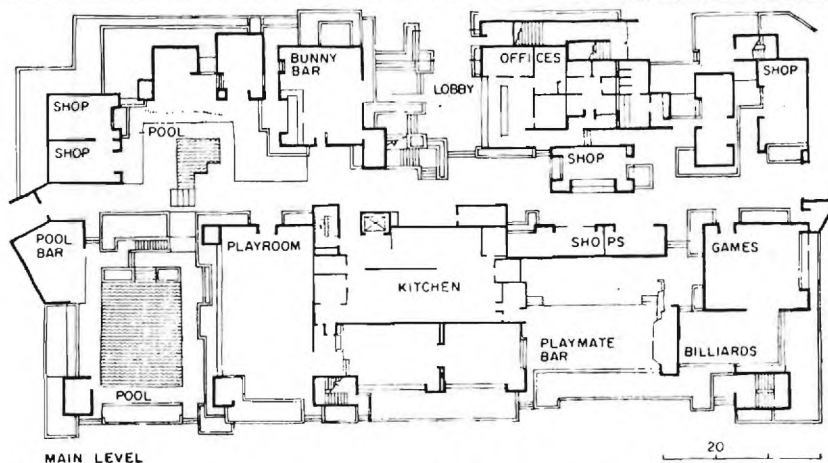
Playboy



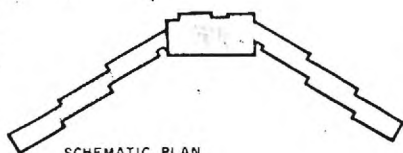
Hair, Hedrich-Blessing photos



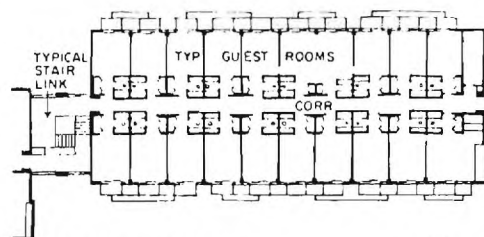
The resort is located in southern Wisconsin, on a large tract of land including a golf course, small lake, riding and tennis facilities, and a private airfield. The main lodge has 300 guest rooms in two symmetrical wings spreading out from the central public facilities, and each of these wings has three rectangular three-floor nodes with stair towers between them (floor plans and schematic, right). Exposed surfaces have been limited to two materials; redwood boarding along the roof edges and most balconies, and exposed aggregate concrete, usually poured-in-place. There is much use of retaining walls and planting terraces in the resort, so that the facade is everywhere jutting out or receding, with trees and shrubbery planted throughout the various levels. This, plus the large panes of glass, often butt-joined with mastic rather than set in mullions, breaks the massiveness of the architecture, making it transparent and open in places.



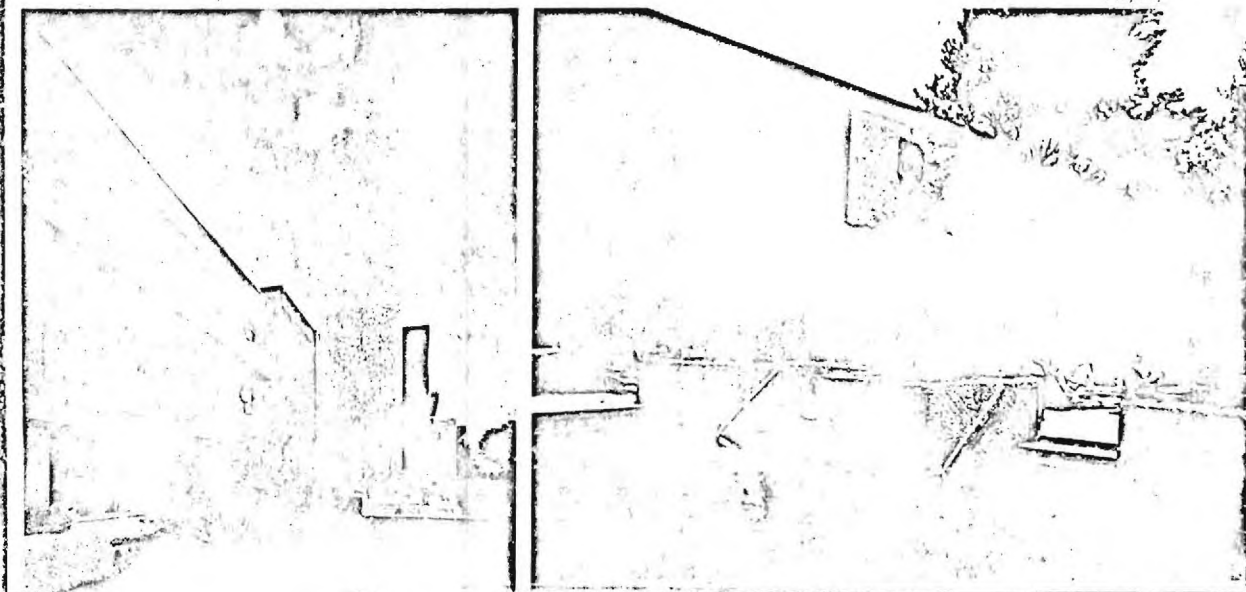
MAIN LEVEL



SCHEMATIC PLAN



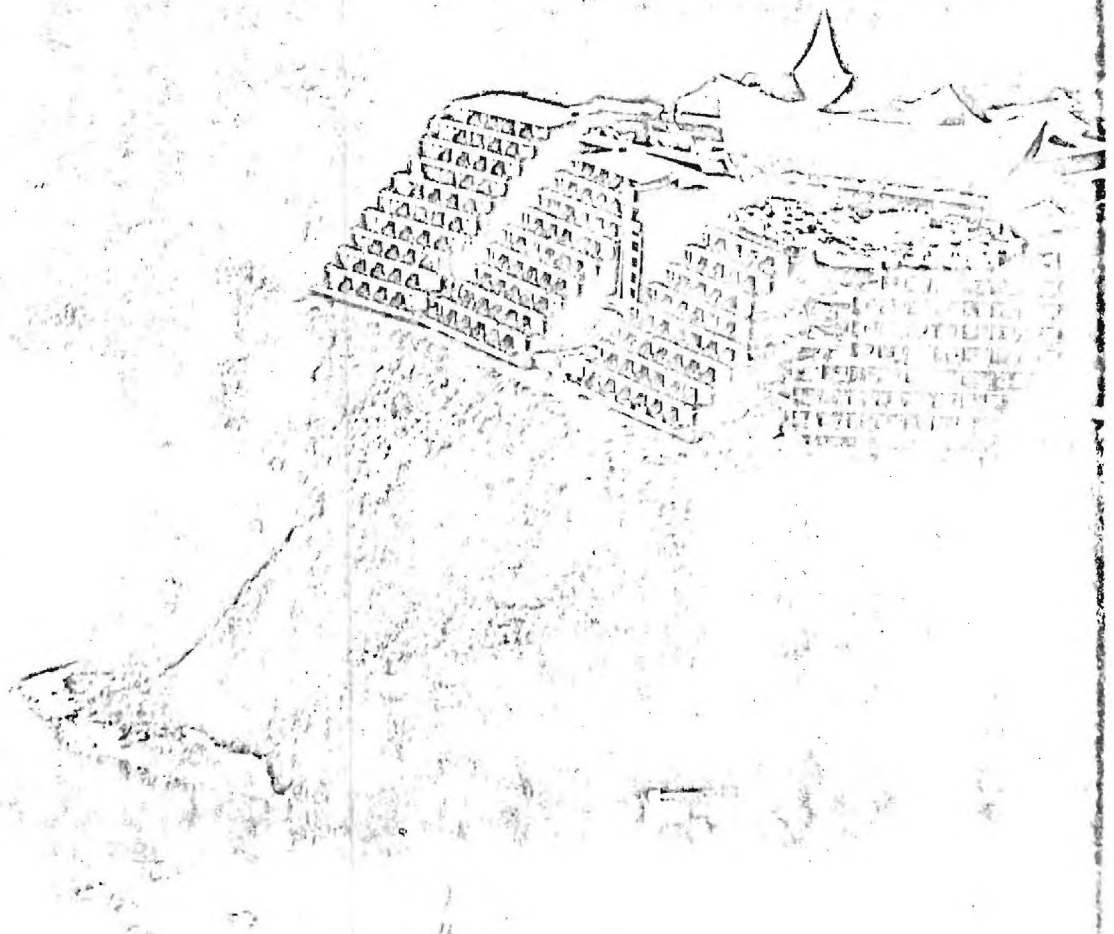
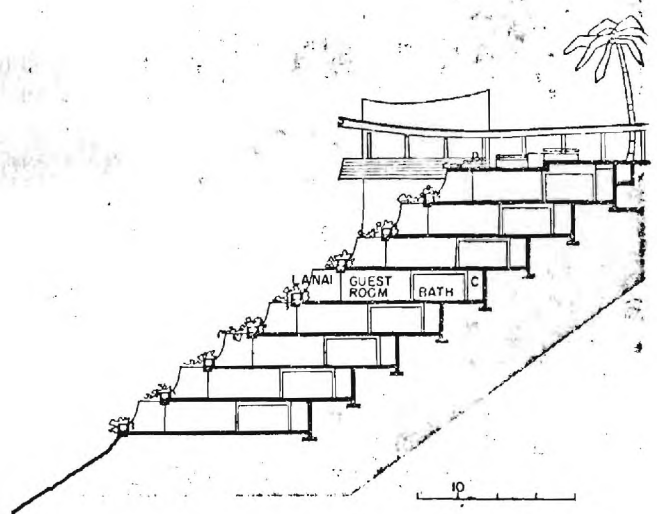
TYPICAL 2ND & 3RD FLOOR

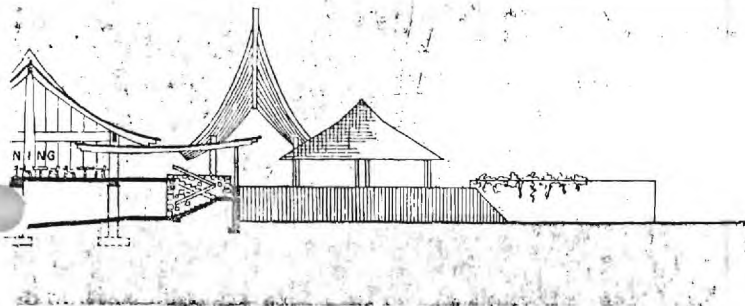


TAHARA'A: THE WARM AND MAGNIFICENT VIEW FROM TAHITI

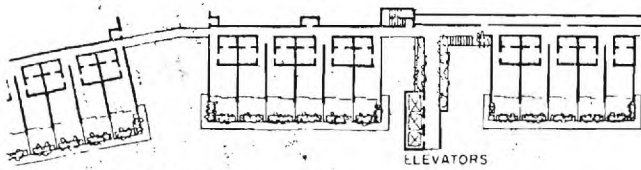
The Hotel Tahara'a Intercontinental is located about seven miles from Papeete, in Tahiti, and like the Conquistador has been designed to emphasize its site. Approaching by automobile, all that one sees of the hotel is the grouping of several long halls with their sloping, textured wooden roofs, grouped together forming the public facilities. These are attempts to blend by association into the indigenous architectural character of Tahiti. The 200 guest rooms are spread out below the ridge of the hill, to be as unobtrusive as possible within the landscape. Each tier of rooms has its plants and trellises on which the vegetation can grow, eventually making the terraces look very much like the hillside itself.

HOTEL TAHARA'A INTERCONTINENTAL, Papeete, Tahiti. Architects: Wimberly, Whisenand, Allison & Tong, Ltd.; structural engineer: Richard Bradshaw, Inc.; electrical engineer: Douglas V. MacMahon, Ltd.; interior design: Neal A. Prince; contractor: Swinerton & Walberg Company.

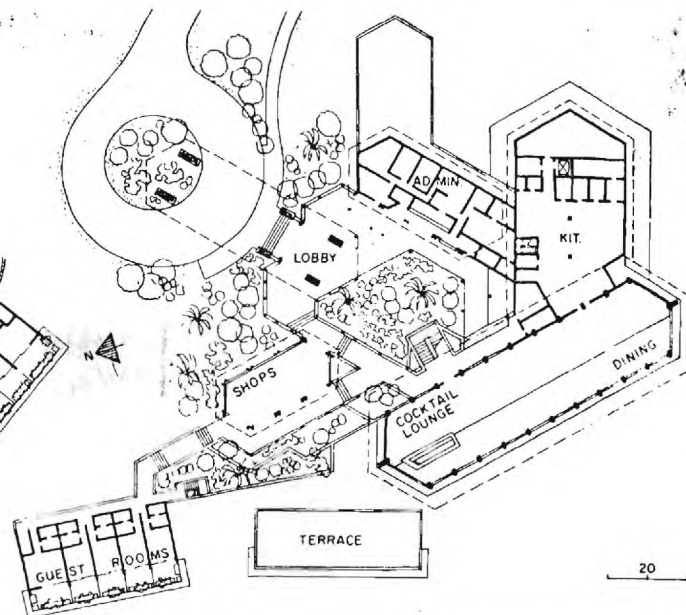




TYPICAL GUEST ROOM FLOOR



ELEVATORS



There are two levels of public area above the guest rooms; the major interior space of the dining room and bar occupies most of one level with the pool, recreation area and night club below. A long covered ramp sweeps out from between the tiers of rooms to connect with the elevator tower serving the seven levels of terraces; as can be seen in the plan above, the lines of rooms are broken to conform to the direction of the hill as well as its slope. The Hotel Tahara'a was built almost entirely by native construction workers over a period of 18 months. A plant nursery was established on the site before construction began, so that immediate landscaping was available on completion. The hotel sits on seven acres of land at about 200 feet above sea level, sloping down to a black sand beach (above, right). The view from the site is directly across Matavaia Bay to the island of Moorea.

