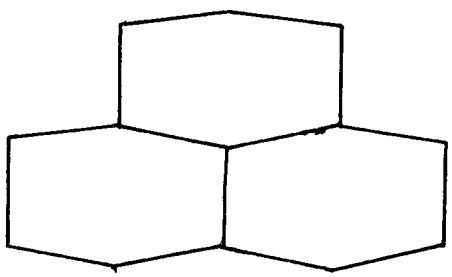
A MOTOR HOTEL

FOR
LUBBOCK, TEXAS



INTERCONTINENTAL — INNS

L O D G I N G F A C I L I T I E S

A Thesis

by

Larry Marley

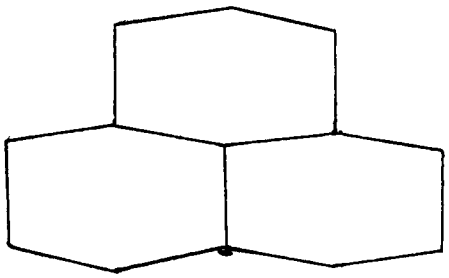
Part II

An Architectural Solution

August 18, 1971

Architecture 425 Texas Tech University

CONTENTS



GENERAL CONCEPT

The solution for this lodging facility involves the general concept of designing for factors which are presently unfavorable in the Hotel/Motel industry in order to provide the best possible qualities for both the guest and owner. In order to approach the problem with such a broad concept over-and-above the ordinary requirements of a lodging facility, the following information was compiled to better understand the needs of both guest and owner.

Guest desires: (In order of preference) [24]

(a) Privacy: especially visual freedom from passers-by, still maintaining an exterior view.

(b) Noise freedom: from highway traffic, from passers-by and from adjacent guests (especially plumbing noises)

(c) Variety in choice of rates, size, views and appearance.

(d) Variety in choice of social activities, recreational facilities, and dining facilities.

(e) Covered parking and direct access from auto to interior space

(f) No porters to tip.

(g) Entry away from a main lobby.

(h) More spacious rooms for a variety of activities. (Today's traveler desires the capability of entertaining, working, relaxing and sleeping in the privacy of his own room).

Owner desires: (In order of preference) [24]

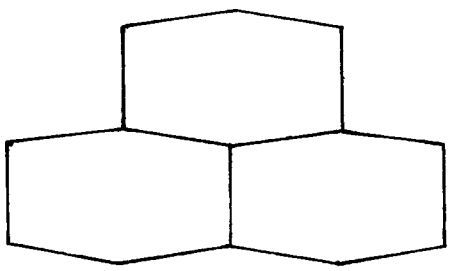
(a) lower maintenance costs.

(b) lower personnel costs.

(c) Short term construction- no costly delays due to weather vulnerability and long term tie up of construction money.

(d) Fewer guest complaints.

In summary, to provide more for less, both initally and long range - the informality and economy of a motel with the facilities and services of a hotel.

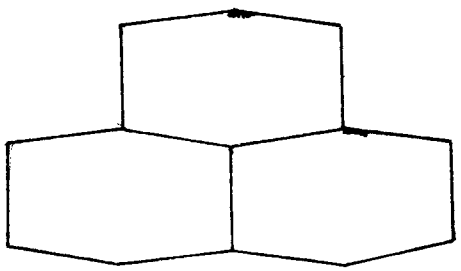


GENERAL CONCLUSIONS

The need for a modular form of construction was indicated as a possible means of cost control and short-term tie-up of of the owner's money for this facility. Therefore, research was done on the various existing forms of prefab modular unit construction, both in the hotel field and in the general housing fields. One factor however became apparent - problems existed in correlations between light weight modules and low maintenance modules. There appeared to be only a choice of one or the other with added costs of interior finish work at the site. Since both lightness for ease and economy of construction and low maintenance for long term use were necessary, research was then begun for a new possible means of module construction.

The decision was made to design a reinforced plastic sandwich construction for the modules. With this material we could not only attain the necessary lightness and long-term durability but also an integral finish for both interior and exterior and an integral structural capacity to allow stacking without the need of a separate frame work.

With this decision in mind, the design of the modules and the overall complex was begun.

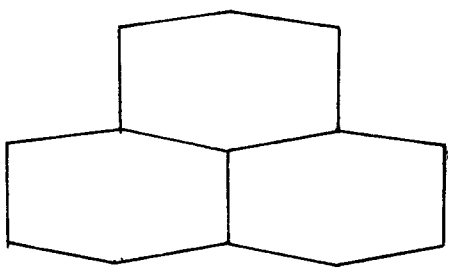


SPECIFIC CONCEPT

In my opinion a hotel should be designed to provide an unusual concept for living which would not be found in the everyday routine of a "home away from home" approach to fulfilling guest needs. It should be one which can provide a zestful feeling for life with an atmosphere of gaiety and enjoyable living that might otherwise be too dominant for year-round living environments.

Since the average length of visits to hotels and motels today is only one and one-half days,[24] this short-term stay could and should be taken advantage of to provide the utmost in visual stimulation to make more enjoyable spaces in which to sleep, work, or play.

The use of colors, textures, spaces, and geometric forms which are normally considered to be too stimulating for long-term use can be used effectively to attract guests for these short stays, stimulate their activities during their stay, and to allow them to leave with the memory of their enjoyable experience so that they will once again want to return to recapture these happy moments.



DESIGN DECISIONS

The planning for this hotel evolved from step-by-step development of various solutions to the most commonly voiced dislikes of both guests and owners of hotels and motels in conjunction with my own ideas of what I feel hotel life should be as stated in the specific concept.

The following list is a statement of each general planning and design decision with reasons for that decision.

A. Site Selection:

Unquestionably, the most important single factor in the success of a hotel is its location. The site selection for this facility was made on the premise of providing a strategic location which can cater to several markets, and therefore provide the most potential for sources of regular business and consequently a better return for the investor.

The following points show the strategy of this site selection: [24]

1. Adjacent to the second heaviest traveled highway into the city which also has the highest percentage of traffic increase over a ten year period.
2. Location at division of highway where traffic will normally slow down.
3. Will be adjacent to Interstate 27 whether its final route through the city will be on Avenue A or Avenue Q, which is still undecided.
4. At a point where traffic will normally be slowed coming uphill.
5. Located on top of a hill which will permit travelers to see it well in advance of reaching the site.

6. Above main road level on an access road which will limit road noises.

7. Location overlooks the canyon terrain of Blackwater Draw which provides a break in the monotony of the flat South Plains of Texas.

8. The site is located at a point approximately midway between the Municipal Airport and the Central Business District.

9. Access to any area of the Central Business District is easily facilitated by either Avenue Q or the Amarillo Road which leads into Avenue A and the warehouse districts.

10. Access to any of the sub-centers within the city is easily made by any of several major arteries which connect with Avenues Q or A, or by means of Loop 289 which is also near the site.

11. Direct access by Avenue Q to the proposed recreation centers within the city.
    a) Mackenzie State Park
    b) Municipal Golf Course
    c) Canyon Lakes Project

13. Access to Texas Tech University
    a) Jones Stadium
    b) Municipal Auditorium
    c) Municipal Coliseum

B. Building Orientation:

The plan design consists of three guest wings which emerge from a central core housing the guest support services in order to provide minimum distances in a sprawl design. The wings are oriented to provide 120° between each in order to get the best out of site and climate. This allows a wide view of the exterior recreational areas and landscaped grounds from any of the rooms and also eliminates any direct east or west room orientations. The building is almost centrally located on the site in order to get maximum use of the site for outdoor recreation and guest views from each room. Every room will be provided with a private balcony to provide shading for the large glass areas and to provide direct guest contact with the outside.

C. Large Grounds:

Neat and attractive grounds are like setting out the Welcome mat. They are the wrapping of the package of service and goodwill which the hotel has to sell, and they provide the first impression upon the guest, whether it be conscious or unconscious. Therefore, the planning for this hotel included a site large enough to be surrounded by well landscaped grounds and to provide for exterior recreation facilities not common with hotels in this area.

D. Sprawl Design:

1. To provide a more intimate and informal scale.
2. To locate rooms as close to parking as possible.
3. To provide direct interior access from automobiles.
4. No central lobby entrance.
5. No necessity for porters to tip.
6. To provide covered parking and access for guests.
7. To locate guests as close as possible to outdoor recreation areas.
8. To provide minimum height for stacking of modules in order to eliminate structural framework.

E. Prefab modular rooms:

1. Rapid and economical construction.
2. Replaceable where maximum wear occurs.
3. Rapid updating at end of design period.

F. Use of Plastic:

1. Ease of erection @ 1/5th the weight of contemporary methods.[5]
2. Low thermal transmission.[16]
3. Low sound transmission.[20]
4. Integral color.[16]

5. Weather resistant [21]

6. Corrosion and decay resistant. [17]

7. Unit made complete with no interior finish works at the site - economy. [18]

8. Little maintenance required. [21]

9. Lightness and gloss provides gaiety of atmosphere.

G. Central Core Approach:

1. To provide interior access.

2. Centralization of mechanical needs.

3. To provide a plumbing wall other than between units.

4. To provide air conditioned ease of access to all areas within the complex.

5. To provide a view from every room undisturbed by passers-by.

6. To provide for a centralized maid service on each level.

7. To provide for a centralization of guest support services-restaurants, cocktail lounge, dinner club, meeting areas, vending lounges, etc.

H. Width of Wing Core:

1. To omit seemingly endless narrow corridors.

2. To provide interior social and recreation areas and a flow of interior space with an interplay of open and enclosed space.

3. To provide natural lighting through light wells over landscaped interior gardens.

4. To provide rentable specialty shops on the first level.

I. Use of Black Mexican Onyx:

1. Color and texture used for background contrast of modules and to tone down the variety of colorful rooms as a whole.

2. Gloss and light qualities similar to plastic to provide continuity as well as an elegance and richness complimentary to the plastic.

J. Color

1. Flexibility of interior design schemes.

2. Individuality for guest rooms.

3. Gaiety of atmosphere.

4. Visual stimulation.

K. Below Grade First Level:

1. Separation of vehicular traffic and pedestrian traffic.

2. Parking and traffic hidden from view.

3. Grade level access to recreation areas.

4. Hidden service parking and access.

L. Separation of Office:

The office and registration areas have no direct function with guest service other than check-in and check-out. Therefore, the decision was made to completely separate the business functions from the guest oriented service. This separation further allows a rapid-service solution to its primary guest service, and a separation of business from pleasure.

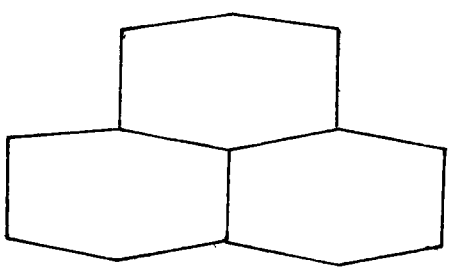
The central core of the hotel will be constructed of poured-in-place concrete wall, slab and beam and serve as the service center. All electrical, plumbing, and mechanical service will be handled through this core and connected to the modules with quick-change-connectors.

The room modules are designed to provide a rapid construction method in which no framework is necessary . Each of the modules will be supported by continuous post tensioned cables through the core floor joists. For this purpose, the material chosen for the modules was a sandwich construction of structural plastics.

New materials have long been needed in the construction industry along with new techniques to assist the transition from on-site building to site assembly of factory made components. This method not only allows a more precise economic analysis for the owner prior to construction but also prevents a long term tie-up of money in the construction phase.

Some new materials have been introduced to the building industry during this century, but the concepts of load-bearing trabeated construction has been retained with what is becoming an irrational labor economy.

For the room modules we will use polymer resins reinforced with glass and asbestos fibers to be constructed in a sandwich method consisting of inner and outer ribbed shells fused together with a polyurethane core for sound and weather insulation. The resin imparts form and structural continuity to the fibers



STRUCTURAL

and the fibers in turn provide strength and dimensional stability to the resin.[16] The asbestos fibers improve the bonding conditions between the resin and glass components, reduce the thermal coefficient of expansion, augment the glass in increasing mechanical properties of the composite structure, improve fire retardance capabilities, and provide a substantial decrease in the end product cost by acting as a filler in the resin.[21] In addition, the use of HET acid as a substitution for part of the polyester compound to provide a self-extinguishing plastic, the asbestos and glass fiber, and the inclusion of nitrogen and non-flamable expanding agents in the urethane core, the composite structure can achieve a 4-hour fire rating.[10]

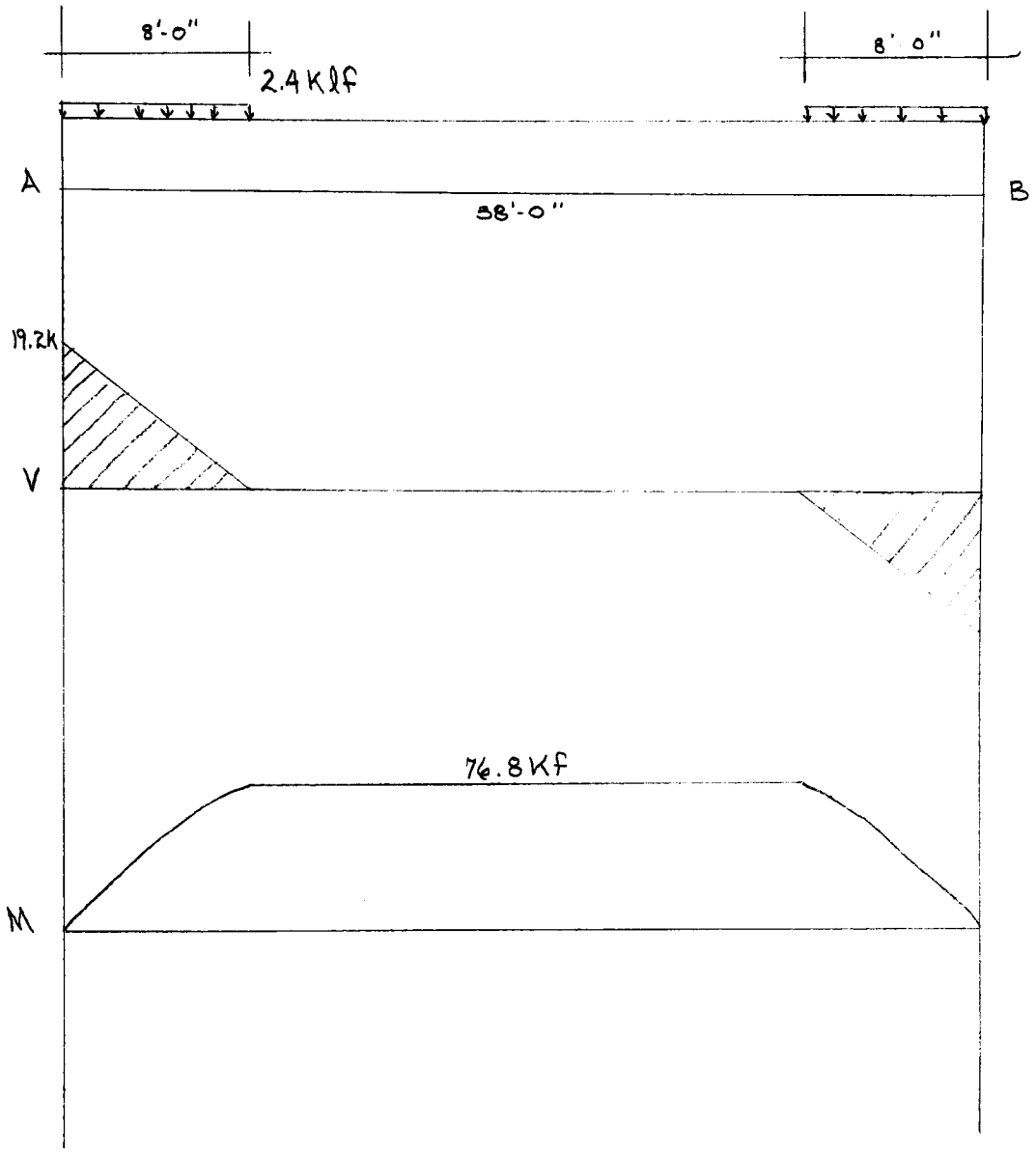
A definite structural life of ten years will be established as a part of the design brief to enable "creep" design methods to be used for a more economical use of materials. At the end of this period, new modules will be installed to provide all new living units to keep the hotel updated and basicly maintenance-free.

The hexagonal shape of the modules was developed in order to provide a system of transferring vertical forces downward through the walls and structural ribs. This truss-like system will permit a more efficient use of materials and a greater structural capacity for the stacking method of construction. The indentations in the outer shells caused by the ribs will serve as receptacles for rigid wethane "key strips" which will provide an alignment and interlock system.

Other than the usual advantages of a modular prefabricated

system, the use of plastics will yield these additional advantages:

1. Approximately 1/5th the weight of currently manufactured concrete modules at the same structural capacity.
2. Ease of erection on the site.
3. Very low thermal transmission.
4. Very low noise transmission
5. Integral color
6. Weather resistant
7. Corrosion and decay resistant
8. Ease of maintenance



$V_{MAX.}$ = 19.2 KIPS @ WALL

$M_{MAX.}$ = 76.8 KIP ft. @ 8' RIGHT of A To 8' LEFT of B.

Live Load = 100 psf Code = 2400 plf w/16' eff.width

Dead Loan = 50 psf @ 100 pcf

Required: fs = 20,000 d = 16" M max. = 76.8 kf

fc' = 3,000 b = 12"

fc = 1,350 n = 9

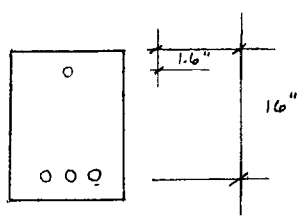
$$R = \frac{76.8 \times 12{,}000}{12 \times 16^2} = \frac{920{,}000}{3072} = 300$$

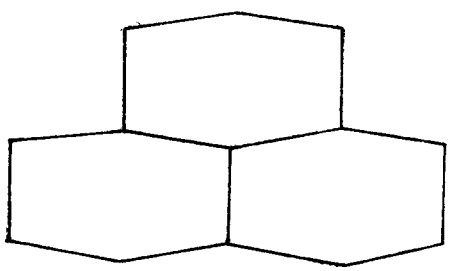
Use doubly reinforced balanced ACI Code 318-63 C-4

P% = 1.71 P' % = .49

Ast = .0171 x 12 x 16 = 3.38 # USE 3 # 9

Asc = .0049 x 12 x 16 = .94 # USE 1 # 8





MECHANICAL

Since the rental units are occupied only intermittently, there is a need for an airconditioning system that is flexible and quickly responsive to individual room control. Therefore, in order to satisfy both comfort and economy, this facility will utilize a four-pipe hot and chilled water system to individual fan coil units. This will provide the best possible maintenance-free system in comparison to individual heat pumps and will eliminate the duct work of a forced air system which usually becomes a path for noise travel between units.

Each wing of guest units will be served from a centrally located mechanical room at roof level. The system will consist of two zones, each serving a single side of the wing for all three floors. This division of zoning will provide the shortest and smallest feasible piping runs at 34 g.p.m. and 3.5 f.p.s, which will yield the lowest possible noise factor and the best possible heat exchange system.

A separate forced air system will be used to condition the air of the core central and wing cores. This fresh air will also be mixed into the return air grilles of room fan coil units from the wing cores and thus furnish the necessary ventilation for all areas of the entire complex.

Room Heat Loss

Upper Northeast Unit

r Values

f_o = .17
f_i = .68

Urethane = 40.0 @ 4" = 80.0 @ 8 avg. thickness of honeycomb floor.[17]
Resin w/glass and asbestos fibers 3.63 @ 1/2" = ea. shell x 2.[16]
Neoprene and hypalon @ 1/2" = 2.17.[22]

Roof & Ceiling:

f_o = .17
f_i = .68
Ceiling = 43.63
Roofing = 2.17
r = 46.65

$U = \frac{1}{46.65} = .0215$ $H = UA\ (t.-t_2)$
$= .0216 \times 247 \times 70$
$= 370$ BTUH

Floor:

f_o = .17
f_i = .68
Floor = 83.63
Carpet & Pad = 2.08
86.56

$U = \frac{1}{86.56} = .0116$ $H = .0116 \times 247 \times 70$
$= 200$ BTUH

Wall:

f_o = .17
f_i = .68
Wall = 43.63
44.48

$U = \frac{1}{44.48} = .022$ $H = .022 \times 240 \times 70$
$= 370$ BTUH

Glass Wall

U = 1.13 H = 1.13 x 106 x 70 = 8,390 BTUH

Total Loss = 370
+ 200
+ 370
+ 8390
9,330 BTUH For Extreme Unit

=> 9,330 x 70 = 653,100 BTUH per wing.

2 zones each wing @ 9,330 BTUH x 35 ea. = 322,550 BTUH

$$GPM = \frac{322,550}{(8)\ (60)\ (20)} = \frac{BTUH}{\text{wt. of water per gal/hr x temp diff. of water}}$$

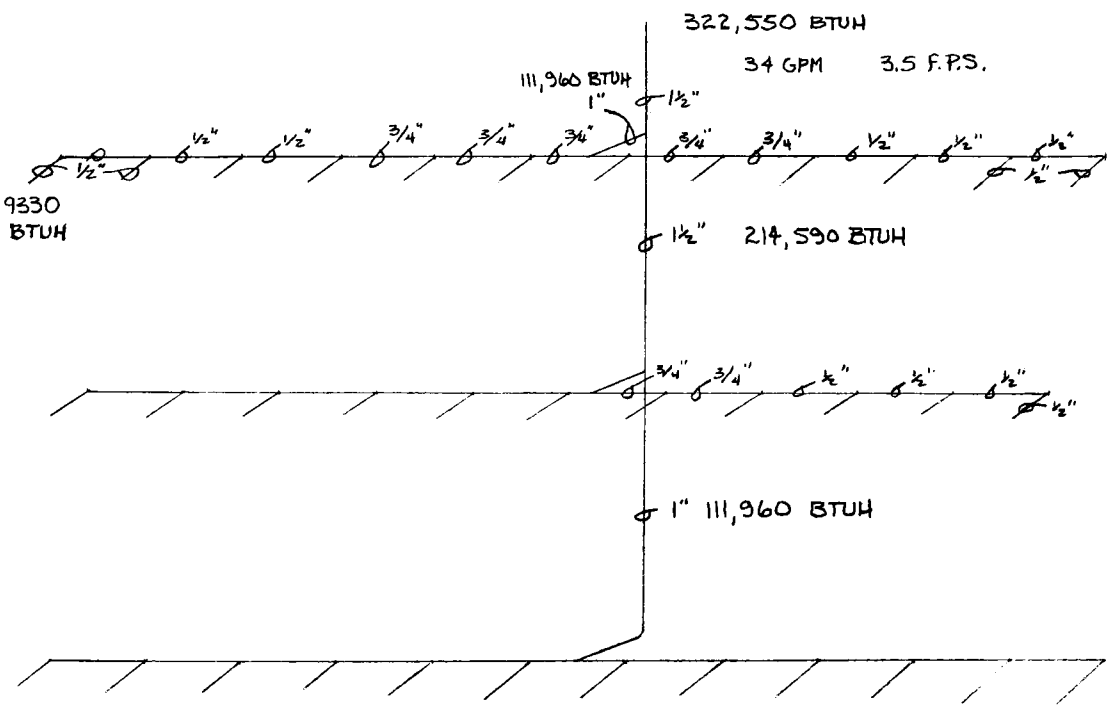
= 34 gpm

Pump size @ 2" = 9.8 head ft.

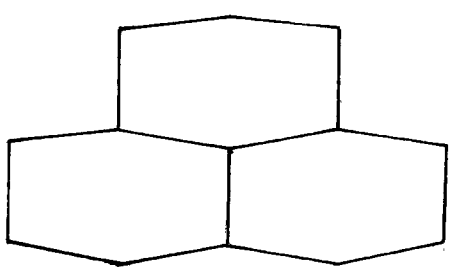
Longest Run Eq. Length = 215' + 110 (fittings) = 325'

$$\text{Friction Loss/ft} = \frac{9.8 \times 12,000}{325} = 365 \text{ milinches/ft}$$

NOISE LEVEL - OK
PRESSURE - OK
FLOW RATE - OK

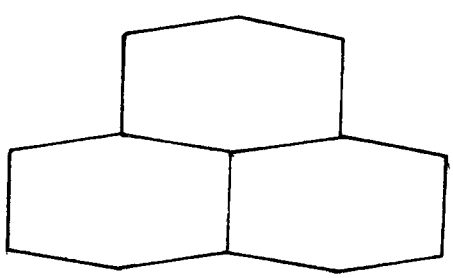


SUPPLY - RETURN SIZES
BALANCED SYSTEM



PLUMBING

Plumbing of fixtures for each guest unit will be facilitated through mechanical columns located at every 32'-0" along the core wall. Each of these columns will provide a plumbing spine which will serve two adjoining units on each level. Plumbing will be roughed-in with cast iron pipe before pouring of concrete on each level. Quick-change connections will then be left protruding through the exterior wall for rapid module connection. By use of this plumbing and vent spine in the core wall, plumbing noises will virtually be eliminated between guest units.



LIGHTING

Rooms: Since guest rooms are used mainly at night, lighting is of great importance - both specialized and generalized. General lighting will be provided by suspended decor lamps in conjunction with an indirect panel lighting of fluorescent lamps located above the bed head. These lamps will be operated by two-way switches located in the entry and at bed-side control panels with silent mercury switches. Specialized lighting will include two retractable hi-intensity lamps located above the bed head and within the fluorescent panels to provide flexible night lighting for two individuals of differing tastes. The dressing area will have a ceiling fixture with two 60 watt lamps for general use and specialized lighting located above the mirror to provide facial lighting both direct and indirect from the light colored countertop.

Core area: Since flexibility of lighting in the core area is not necessary and a more general diffusion of light is desired, fluorescent lamps in recessed fixtures will be used in conjunction with natural daylight provided from the two skylighted areas in each wing.

[18]

Dinner Club: A more specialized lighting is necessary in the dinner club and therefore calculations and layouts are provided for this area. The lighting will include a dual system of both direct and indirect light provided by a combination of 75 watt and 150 watt Par 38 filament lamps. This choice was made because the incandescent lamp

is the best light source where food and facial complexions are concerned.[8] The lighting system will consist of direct lighting fixtures evenly spaced throughout on a triangular grid of 15 circuits and indirect lighting by incandescent lamps diffused through plastic rod fixtures also spaced on the triangular grid and consisting of 9 circuits. This combination of lighting will include the use of dimmer switches on separate controls to provide for a variety of footcandle levels from 0 to 30 and to provide for separate lighting of areas for different uses - dance area, walk areas, dining areas and stage.

Dinner Club Lighting 8,9,11, & 18

Room Ratio = $\frac{WXL}{H(W+L)}$ = 3.7

Coefficient of Utilization:
70% Ceiling
30% Walls C.U. = .66
10% Floors

Fg = $\frac{EXA}{CU \times DF}$

Fg = initial lumens
E = desired footcandles
A = floor area
CU = coefficient of utilization
D.F. depreciation factor

Fixture A @ 10 fc. max. ⬡

$$Fg = \frac{EXA}{CU \times DF} = \frac{10 \times 5493}{.66 \times .85} = \frac{54930}{.561} = 97{,}200 \text{ lm.}$$

75 Watt Par 38 with plastic diffusers

$\frac{97{,}200}{600}$ = 162 lamps in 36 fixtures => $\frac{162}{36}$ = 4.5= 5/fix

Fixture B @ 20 fc max ⬡

$$Fg = \frac{EXA}{CU \times DF} = \frac{20 \times 5493}{.66 \times .85} = \frac{115{,}200}{.561} = 194{,}400 \text{ lm.}$$

150 Watt Par 38

$\frac{194{,}400}{1350}$ = 144 lamps

Fixtures A & B => 30 fc

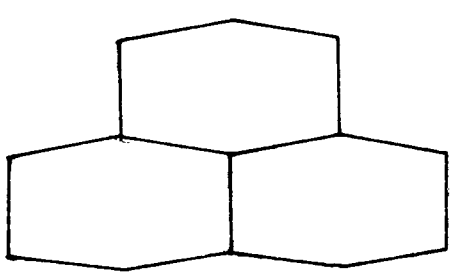
4 fixture A per circuit => 75 x 5 x 4 = 1500 watts/circuit

36 fixtures/4 => 9 circuits

10 fixture B per circuit => 150 x 10 = 1500 watts /circuit

=>15 circuits

Direct / indirect



CONVEYANCE

Vertical transportation selected for guest use will be hydraulic units. Hydraulic elevators were selected over electric traction units because of the short travel distances involved with the four floors to be served. The maximum speed advantage which could be achieved by an electric traction elevator at 600 f.p.m, over a 200 f.p.m. hydraulic traveling the four floors would be only 1.1 seconds. This is due to the 25 f.p.m. leveling and starting speeds necessary for both units to prevent passenger jolting.

Therefore, due to the more economical and maintence free system offered by the hydraulic units, Dover Oildraulic units with 200 f.p.m. and 2500 pound capacities will be used.

SPECIFICATIONS

7 MOISTURE PROTECTION

0740 - Preformed roofing and siding

0743 - Preformed asbestos - cement panels of exposed aggregate as manufactured by Intermezzio Mexico Quarry. Panels shall be of the sizes and thicknesses as indicated on drawings and of resins, silica, and aggregate fillers with woven fiberglass reinforcing. Exposed aggregate to be Black Mexican Onyx and shall be from one lot and binding matrix.

0750 - Membrane Roofing

0751 - Built-up bituminous roofing for core areas to consist of 2 inches of rigid insulation, 5 layers of 45# felt alternating with bitumen layers and with gravel surface. All cants to be of 2 inch rigid insulation.

0754 - Elastic liquid roofing for upper rows of modules to be of neoprene base coat with two coats white hypalon.

0770 - Wall Flashing

0771 - All flashing to consist of glass tape applied with neoprene sealant and hypalon coating.

0780 - Roof accessories

0781 - Plastic skylights shall be Rohm and Haas model IAC or approved equal.

0790 - Caulking & sealants shall be DEP neoprene or approved equal.

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24. See program Vol. I under appropriate topic for source notes.