

A BURN CENTER

by

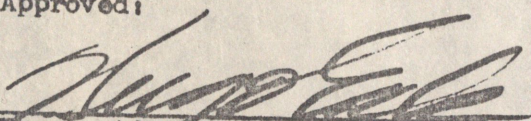
JOHN D McKITTRICK

A thesis submitted in partial fulfillment
of the requirements for an undergraduate degree

of

BACHELOR OF ARCHITECTURE

Approved:


Thesis Advisor

MONTANA STATE UNIVERSITY
Bozeman, Montana

June, 1976

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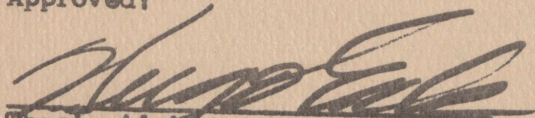
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THESIS STATEMENT

Thought is ignited by research. Thought produces energy. Energy produces results. The gathering of pertinent information with no preconceived architectural concept will, through thought and work produce an acceptable design solution.

THESIS SUBJECT

A Burn Center

A burn center is a specialized facility used for the treatment of burn victims with special emphasis on research and teaching as well as patient care.

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CHAPTER I

THE BURN CARE PROBLEM IN THE UNITED STATES

It is of primary importance to first look at the burn problem in this country in relation to other statistics in order to get the proper perspective of the situation. Table 1 presents a few statistics that relate this problem to other highly recognized problems.

Table 1¹

<u>Subject</u>	<u>Occurrence Per Year</u>
Burn Related Deaths	9,000
Heart Related Deaths	1,529,722
Cancer Related Deaths	708,586
Homocides	41,820

Table 2 (page 3) presents some measure of the magnitude of the present burn problem in the United States.

A slow rate of progress cannot be blamed entirely upon the hospitals or the administration. Special hospital facilities are of little value to the burn patient if they are not adequately staffed with a well trained and equipped burn team. Bringing together the personnel that are capable of treating severely burned patients is perhaps the greatest contribution a burn center makes to the community. It provides the following:

1. United States Census Bureau, 1975.

1. a single location for optimal care of burn patients;
2. to permit isolation of the burn patients from probable sources of infection;
3. to provide a suitable environment for both progressive burn patient care and long term care;
4. to provide a suitable environment for teaching and research of burn patient care; and
5. to abide by legal and otherwise binding restrictions beyond the control of the hospital planning committee.

Table 2²

The Burn Problem in the United States

	<u>DATA OF BURN INJURIES PER YEAR</u>
A. INCIDENCE	2,200,000
B. MORTALITY	9,000
C. HOSPITAL ADMISSIONS	74,000
D. DISABILITY DAYS	8,900,000
1. In Hospital	1,300,000
2. In Bed (Not Hospital)	2,000,000
3. In Restricted Activity	5,600,000
E. HOSPITAL AND/OR MEDICAL COSTS	\$300,000,000

-
2. Compiled using data from the U.S. Public Health Service, The Commission of Professional and Hospital Activities, Ann Arbor, and The National Burn Information Exchange, Ann Arbor.

I. Feller, K. Crane, "Classification of Burn-Care Facilities in the United States," *Journal of the American Medical Association* 215 (Jan. 18, 1971), 463-6.

CHAPTER II

THE PROPOSED SOLUTION

Current specialized burn care facilities are classified as follows:³

1. Burn Centers
2. Burn Units
3. Burn Programs

A Burn Program

At this level, the hospital has no specialized facilities or areas for burn care. However, a consistent plan for management of burn patients is implemented by an interested and experienced physician (or jointly by several). As a measure of experience, it is assumed that the physician is treating at least twenty-five burns per year.

A Burn Unit

This specific type of burn program is conducted in a specialized facility that is only used for the treatment of burns. The burn unit treats at least thirty-five patients per year and is equipped with at least four beds. There may be a small amount of research and teaching however, it is present on a very irregular basis.

3. Planning and Designing A Burn Care Facility, I. Feller and K. Crane, Institute of Burn Medicine, 1971, p.3.

A Burn Center

The burn center is a much larger burn unit which places special emphasis on the areas of research and teaching as well as patient care. This particular facility provides very intensive burn care which involves the support of both the research and teaching staffs. The intensive-care environment provides the "classroom" for teaching the various complexities of burn care and also serves as a "laboratory" for research. This facility treats at least fifty patients per year and has at least six beds.

The major factors in determining the severity of the burn injury and thusly the level of care required, are as follows:⁴

1. the age of the patient
2. the total size (area) of the burn measured as a percentage of the total body surface
3. the depth of the burn; i.e. the area of the full-thickness skin loss (third degree burn) measured as a percent of the total body surface
4. the location(s) of the burn on the body
5. past medical history of the patient
6. the presence of other injuries in addition to the burn.

The first three of the above factors are of the greatest importance.

The long range solution to the burn problem is for each community to provide those specialized levels of care which are

⁴. National Center for Health Statistics, Vital and Health Statistics, Hospital Discharges and Length of Stay, Public Health Service Publication No. 1000, Series 10, No. 30.

practical, considering its need and resources.

It is not practical to provide care for every burn victim within his community. The community as a whole must consider two factors.

1. Is there a sufficient need?
2. Is there sufficient resources to meet that need?

The following method can be used by any community to determine their need for a burn care facility.

1. Define the geographical boundaries of your community. The term community in this context means a defined geographic area which tends to be independent of adjacent areas in serving its health care needs. For computational purposes this boundary should be established using existing jurisdictional boundaries (city, township, county, or multiples or combinations thereof).
2. Determine the population inside the defined community from census or other records.
3. Calculate expected annual burn-patient admissions (excluding admissions for rehabilitation only) as follows:

Community Population divided by 2800 = Number of Annual Burn Admissions

(Approximately one person out of every 2800 will, each year, have a burn accident requiring hospitalization. This estimate is based upon 70,000 admissions for burns of the skin from a total population of 200 million.)

4. Calculate the expected average daily burn-patient census as follows:

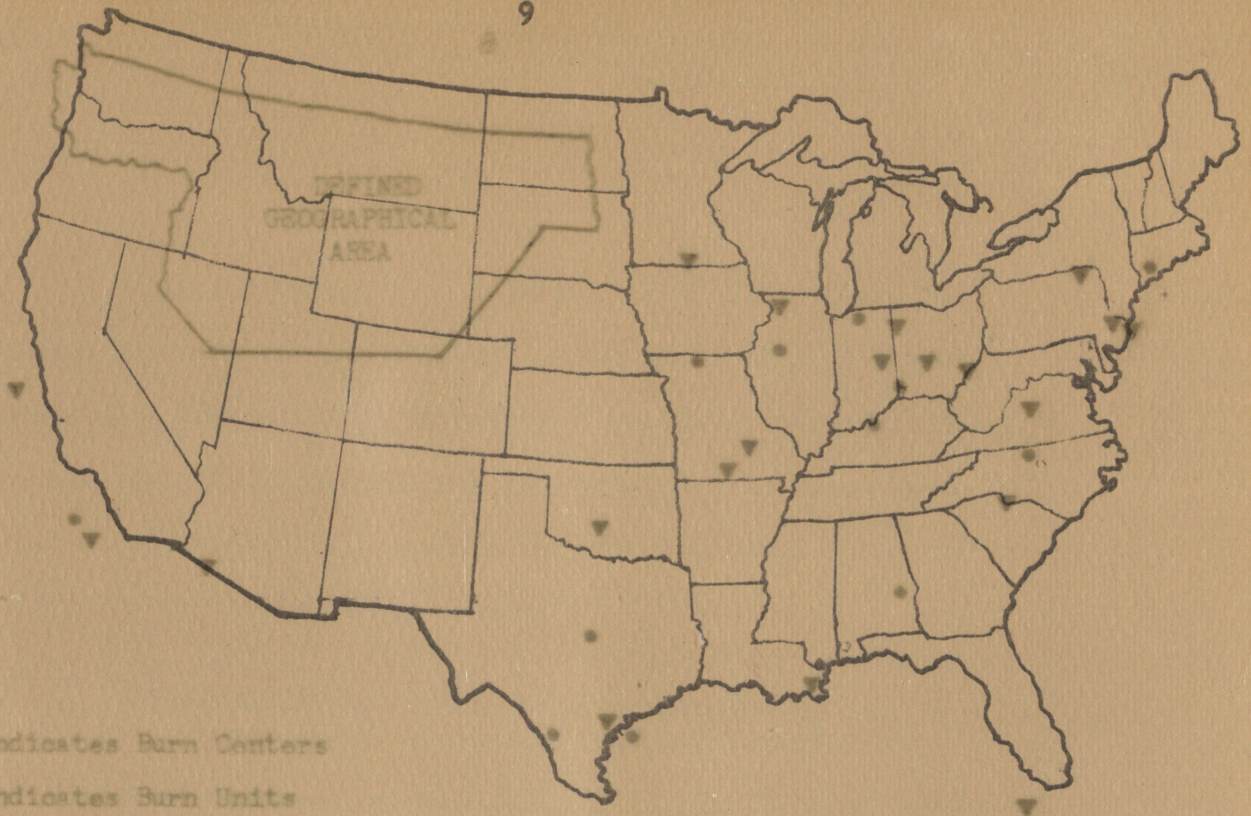
Annual Burn Admissions divided by 20 = Average Daily Burn Census

(This is based on an average length of stay of 18 days for burns of the skin, as reported by the Commission on Professional and Hospital Activities, Ann Arbor, Michigan.)

The census calculated above is the total for all levels of burn care; burn center, burn unit, and burn program. However, it is essential for planning to distinguish between the burn program demands, which require no special facilities, and the burn unit and center demands, which do. The remaining steps make this division, though no attempt is made to differentiate between burn unit and burn center demands since this distinction is too fine to be predictable.

5. Calculate the expected distribution of census to burn units and burn centers by multiplying the result of step 4 (total average daily burn patient census) by .53.
6. Calculate the number of burn unit or burn center beds required by DIVIDING the burn unit and burn census from step 5 by some appropriate proportion of occupancy. Round this number to the NEXT HIGHEST whole number.
7. Calculate the number of NEW burn unit and burn center beds which should be constructed in your community by subtracting the number of beds in existing facilities (if any) from the results of step 6.
8. Calculate the annual number of patients who would normally be treated in burn programs by multiplying the result of step 3 (annual burn patient admissions) by .60.
9. Subtract, from the results of step 8, the annual number of patients being treated in existing burn programs (if any). If this result is 25 patients or more, a new burn program is justified. Fewer than 25 patients per year (which is roughly equivalent to an average daily census of one patient) would not permit the staff to develop and maintain sufficient expertise in burn care.⁵

5. Planning and Designing a Burn Care Facility, I. Feller and K. Crane, Institute of Burn Medicine, 1971, pp. 7-9.



● Indicates Burn Centers

▼ Indicates Burn Units

Los Angeles, California
 Atlanta, Georgia
 Chicago, Illinois
 Iowa City, Iowa
 Boston, Massachusetts
 Ann Arbor, Michigan
 Cincinnati, Ohio
 Columbus, Ohio
 Dallas, Texas
 Galveston, Texas
 San Antonio, Texas
 Richmond, Virginia
 Mobile, Alabama
 Phoenix, Arizona
 Orange, California
 San Francisco, California

Washington, D.C.
 Miami, Florida
 Detroit, Michigan
 St. Paul, Minnesota
 St. Louis, Missouri
 St. Louis, Missouri
 Albany, New York
 Brooklyn, New York
 New York, New York
 Chapel Hill, North Carolina
 Akron, Ohio
 Toledo, Ohio
 Tulsa, Oklahoma
 Pittsburgh, Pennsylvania
 Houston, Texas
 Milwaukee, Wisconsin

Step 1 required that I first locate all existing burn centers and units in this country. After doing this it became evident that the northwest is barren of qualified burn facilities. The next step was to determine a geographical area using Great Falls, Montana as a theoretical location for this facility. Great Falls was chosen for the following reasons:

1. fifty-one percent of the total population of Montana is located within a 150 mile radius of Great Falls
2. it is the most updated facility in the state of Montana
3. Great Falls has the newest airport facilities
4. the existing hospital has its own heliport
5. Malmstrom Air Force Base and the Montana Air National Guard are able to handle large emergency transportation if necessary and requested.

Drawing a straight line from Great Falls to the nearest burn facilities and bisecting each distance at the halfway point gives a rough geographical area.

Any city within the defined geographical area might qualify as a better or equally good location for this facility. Montana was an arbitrary choice and Great Falls is the best location in the state.

Step 2 Determine the population within this area.⁶

Washington	3,410,000
Idaho	715,000
Montana	700,000
North Dakota	618,000
Wyoming	333,000
TOTAL	<u>5,776,000</u>

Step 3 Expected annual burn patient admissions
geographical population ÷ 28,000.

$$5,776,000 \div 28,000 = 2,062$$

Step 4 Expected average daily burn census
Annual Burn Admissions 20
 $2,062 \div 20 = \underline{130}$

Step 5 Expected distribution to burn facilities
Average Daily Burn Census x .53
 $130 \times .53 = \underline{55}$

Step 6 Number of burn center beds required for
the defined geographical area
Distribution to Burn Facilities ÷ .80
 $55 \div .80 = \underline{69}$

Step 7 Number of patients to be treated annually

There are 74,000 burn injuries annually that require hospitalization. Of these, 10% require treatment at a burn facility. Applying this 74,000 as a percentage of the total population of the United States (211,210,000) and to the defined geographical area population of 5,776,000 the total expected burn injuries of the area can be computed.

$$\frac{211,210,000}{5,776,000} = \frac{74,000}{x} = x = 2,051$$

$$\frac{2,051}{.10} = 205 \text{ Patients Yearly}$$

6. United States Census Bureau, 1975.

Conclusions

1. As shown earlier a burn center requires at least six beds. These calculations show a requirement of sixty-nine beds for the defined geographical area.

2. A burn center must treat at least fifty patients annually. These calculations show 205 patients would be treated at this center.

CHAPTER III

THE DESIGN PROCESS

My thesis statement can be simplified into two separate phrases.

1. The gathering of pertinent information with no preconceived architectural concept.
2. Will through thought and work produce an acceptable design solution.

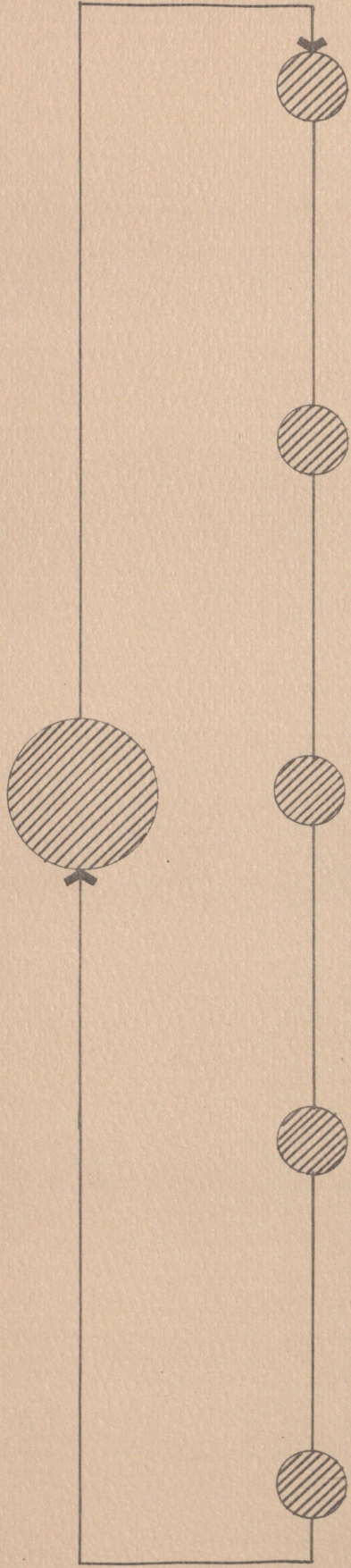
I attempted to separate this statement into two separate quarters of work but at the same time keep each in mind while working on the other. The first part explains what I believe to be the foundation of architecture. We as architects must foremost be informed in order to intelligently design. We must seek out all studies and information relating to any commission that is of value to our continuing education in the field.

I feel that without the research I have done I could not have reached what I believe to be Part 2 of my statement - an acceptable design solution.

Over a period of five years I have become familiar with two design processes which I believe when combined are excellent. Neither method, in my opinion can be relied upon to yield a correct solution when used alone.

Following are illustrations of the design process as seen by Hilliers and also Christopher Alexander.

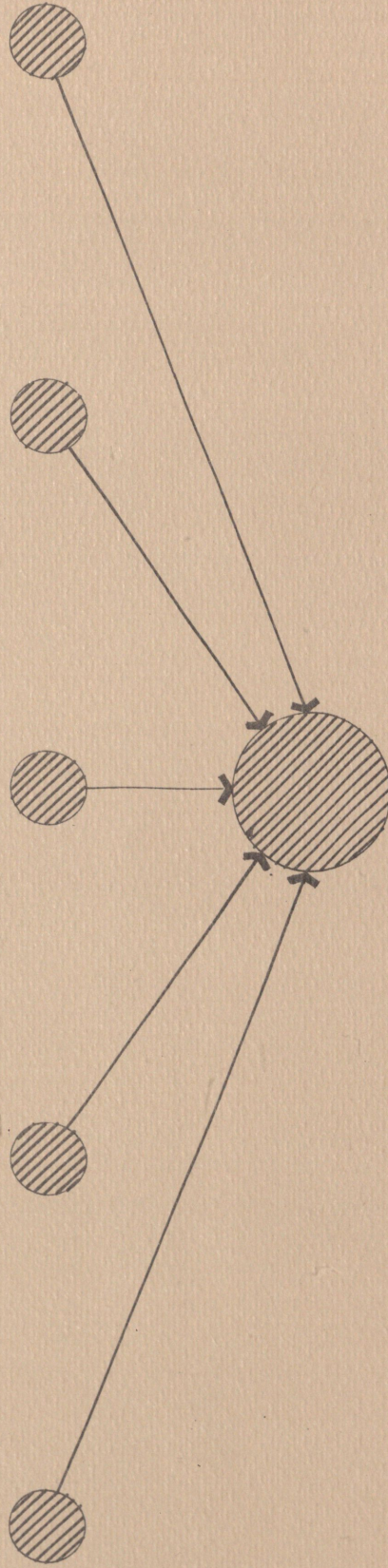
CONJECTIVE OF STRUCTURE



ANALYSIS OF CONJECTURE AGAINST CRITERIA

HILLIERS

DESIGN DATA ANALYSIS



DESIGN SOLUTION SYNTHESIS

ALEXANDER

CHAPTER IV

THE SOLUTION

The personnel using such a facility are the authorities on the functional aspects of the building. I thusly have prepared the following examples of room layouts for comment by the personnel. The first sheet is from preliminary Design No. 1. From here I developed preliminary Design No. 2 which is sheet 2 in each case. All areas of the building would be blown up and given to the staff for comments at each stage of preliminary design in book form. These suggestions would then be used in the design where feasible.

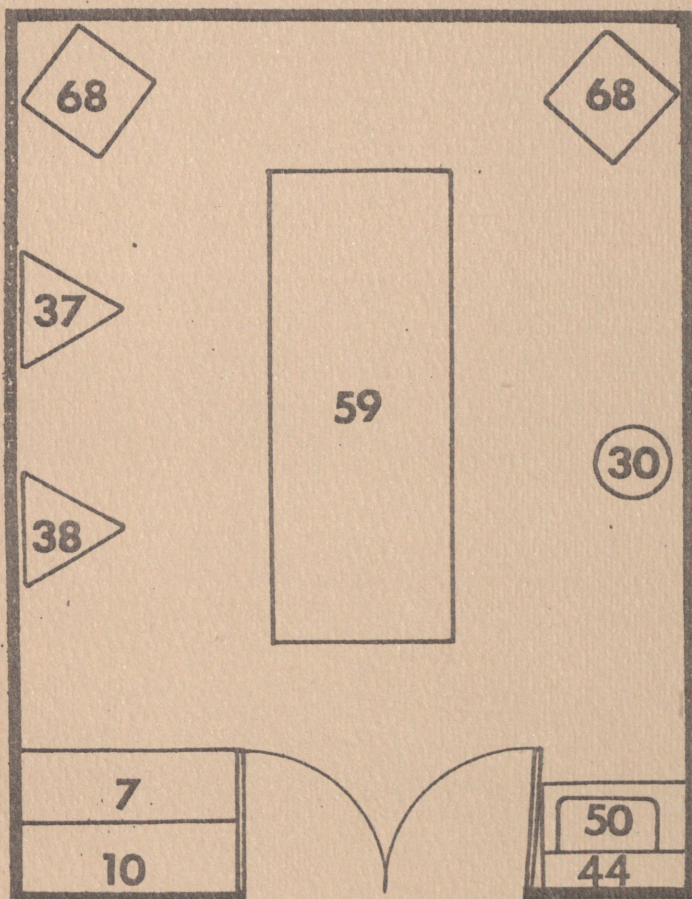
Please put any and all comments deemed necessary by you in reference to any aspects of the room layout on the sheet following each example.

3. **ADMITTING.** An area other than the patient's bedside is needed to admit the burned patient to the facility. This area eliminates any need for training the emergency room staff to evaluate and provide initial care to the patient who requires admission. Moreover, it is easily combined with the hydrotherapy area — since a thorough cleansing of the body by tubbing is part of the admission procedure.

The admitting process involves starting I.V.'s, catheterization, physical examination, cleaning and shaving of the body, and applying dressings, using aseptic technique.

EQUIPMENT

- 7 Base Cabinet with Counter
- 10 Wall Cabinet
- 30 Kick Bucket
- 37 Linen Receptacle
- 38 Trash Receptacle
- 44 Shelf Over Sink
- 50 Hand Wash Sink
- 59 Hi-Lo Stretcher
- 68 Prep Tables (2)
- Paper Towel Dispenser
- Soap Dispenser
- Bulletin Board
- Clock

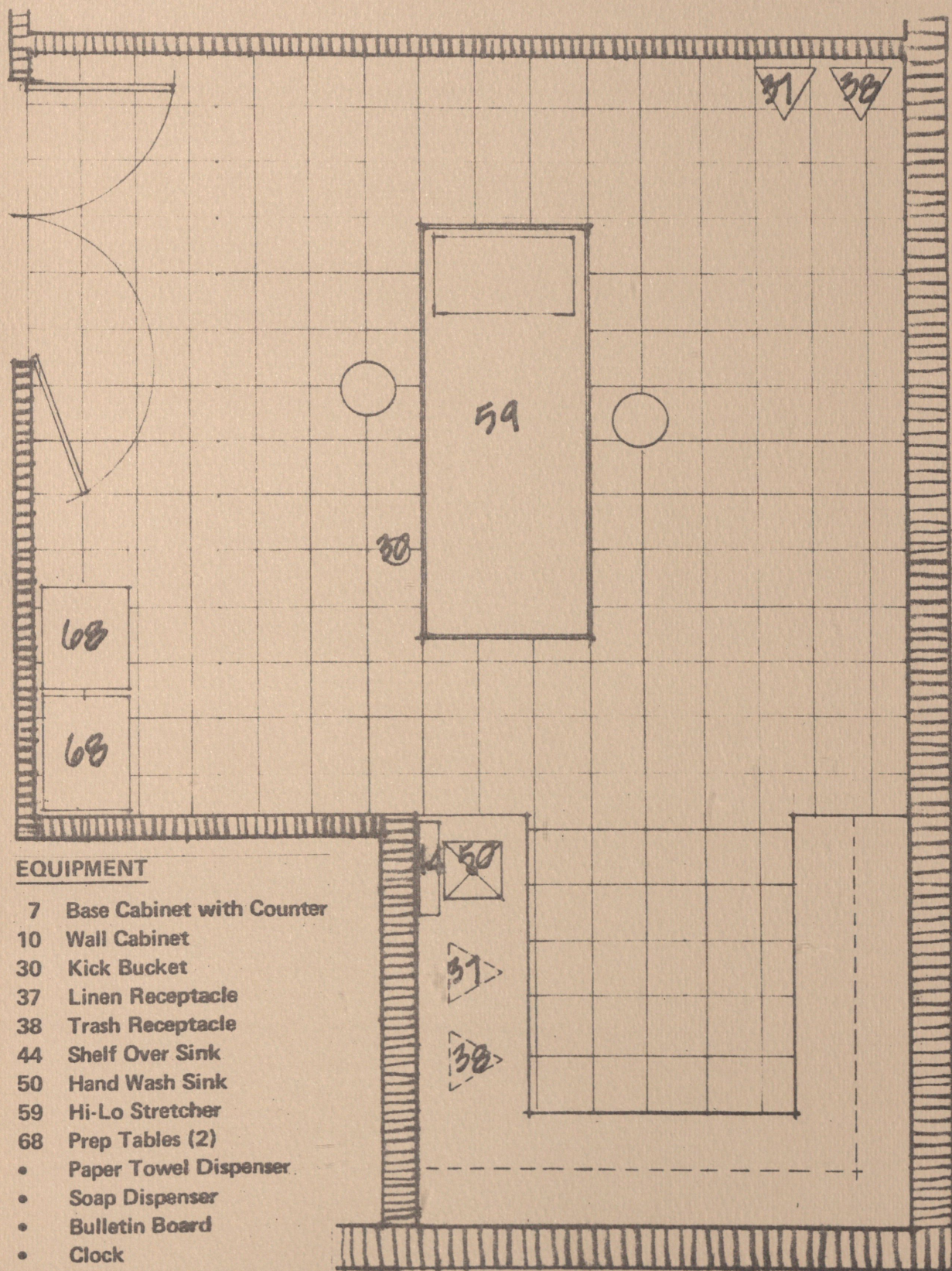


SCALE: 3/8 inch = 1'

ADMITTING ROOM COMMENTS

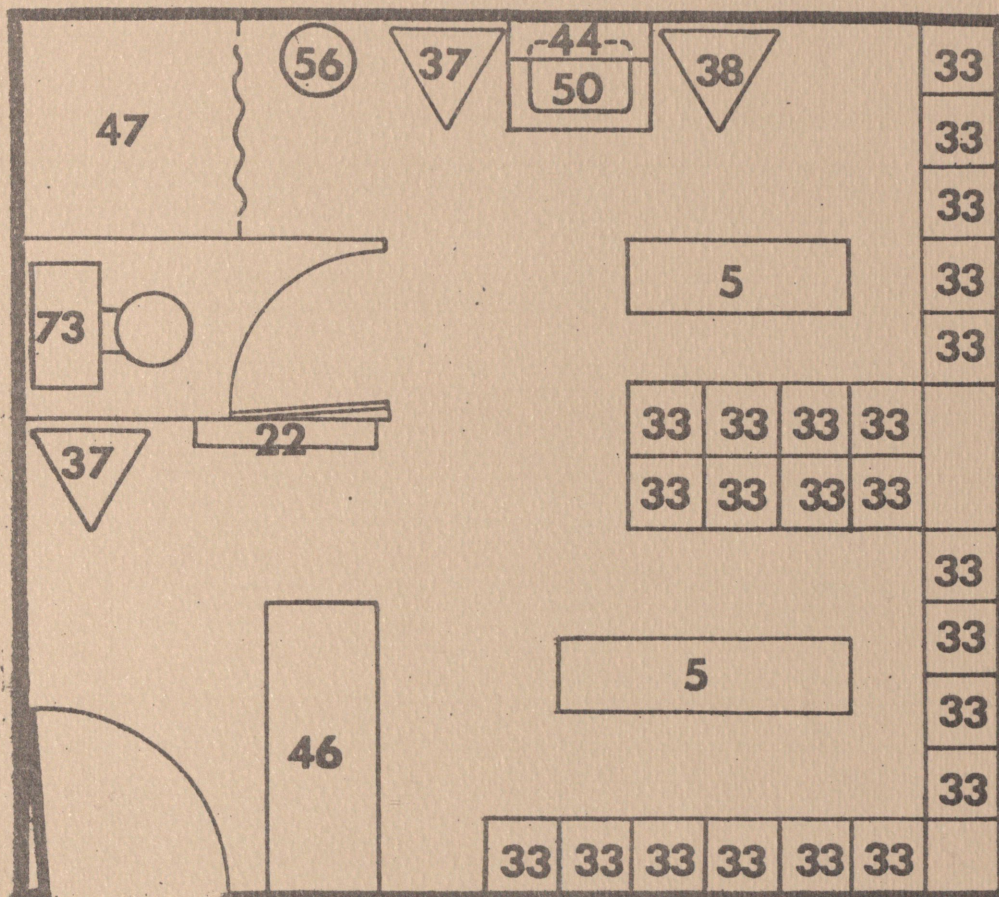
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ADMITTING ROOM COMMENTS

2. FEMALE CHANGING AND TOILET. This room is analagous to the male changing room, and its design requirements are very similar.



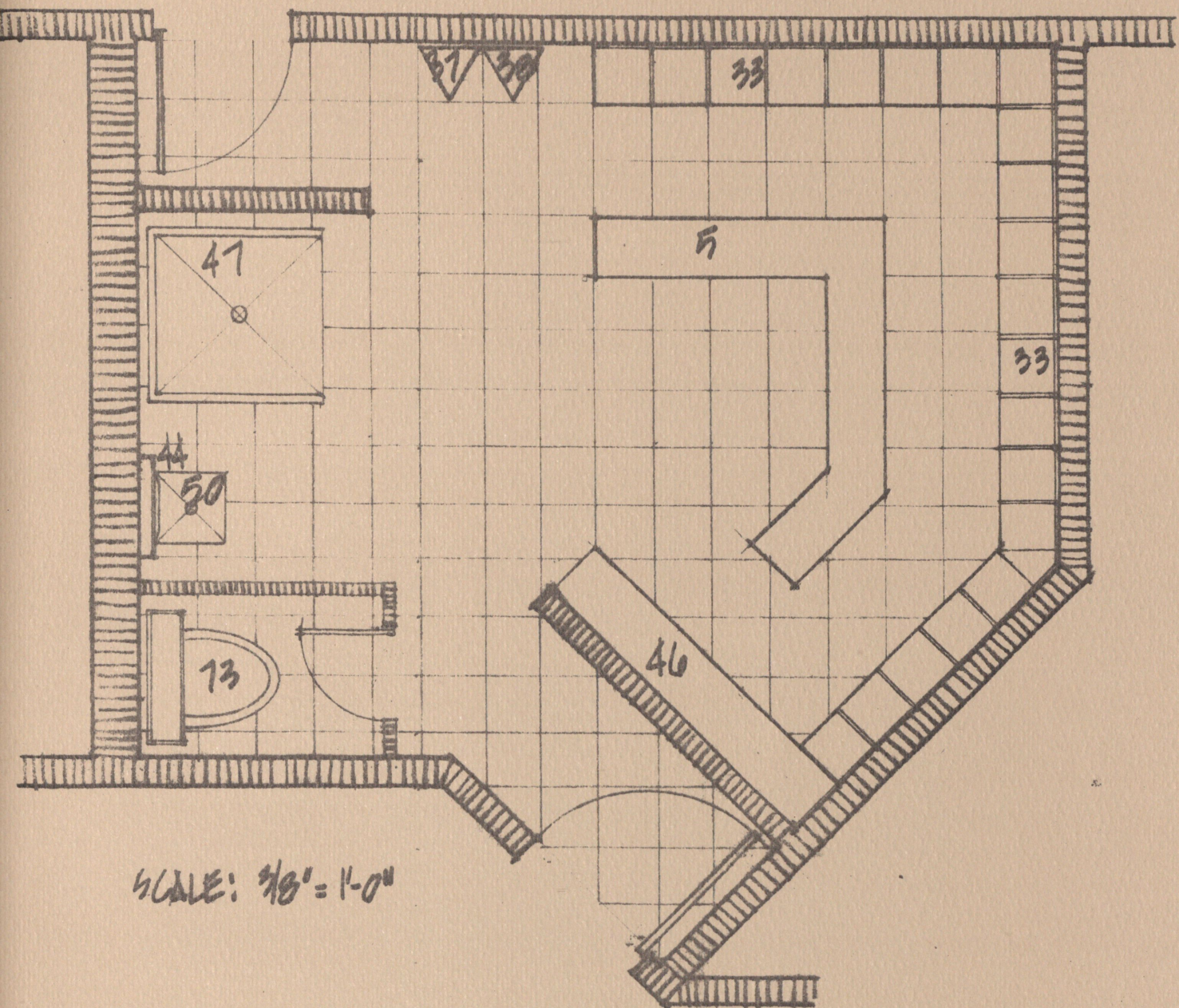
SCALE: 3/8 inch = 1'

EQUIPMENT

- | | | | |
|-----------|------------------------------|-----------|----------------------------------|
| 5 | Benches (2) | 73 | Toilet |
| 22 | Coat Hooks | • | Mirror Over Sink |
| 33 | Lockers (23) | | with Light |
| 37 | Linen Receptacles (2) | • | Full-Length Mirror |
| 38 | Trash Receptacle | • | Paper Towel Dispenser |
| 44 | Shelf Over Sink | • | Soap Dispenser |
| 46 | Open Shelf Unit | • | Toilet Paper Dispenser |
| | (Or Exchange Cart) | • | Sanitary Napkin Dispenser |
| 47 | Shower | • | Paper Cup Dispenser |
| 50 | Hand Wash Sink | • | Bulletin Board |
| 56 | Stool | • | Clock |

FEMALE CHANGING AND TOILET ROOM COMMENTS

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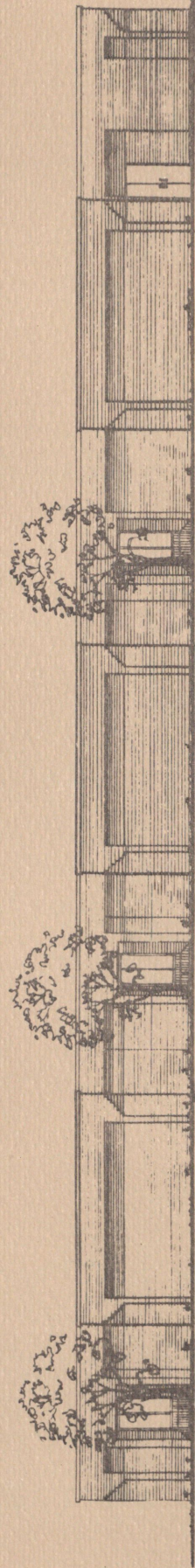
FEMALE CHANGING AND TOILET ROOM COMMENTS

THESIS STATEMENT

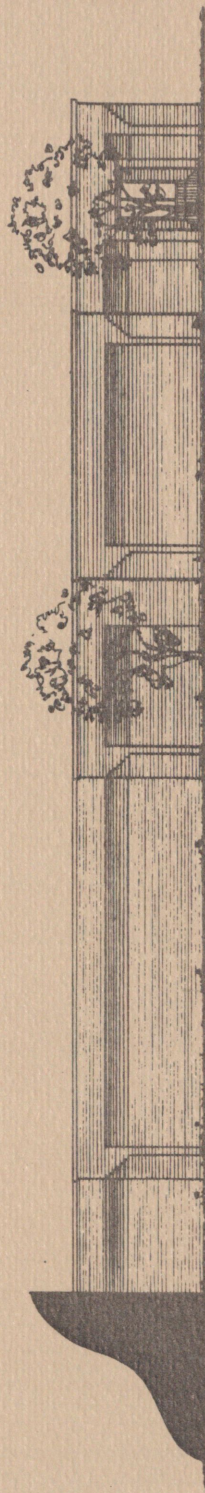
•THOUGHT IS IGNITED BY RESEARCH. THOUGHT PRODUCES ENERGY.
ENERGY PRODUCES RESULTS. THE GATHERING OF PERTINENT
INFORMATION WITH NO PRECONCEIVED ARCHITECTURAL CONCEPT
WILL, THROUGH THOUGHT AND WORK PRODUCE AN ACCEPTABLE
DESIGN SOLUTION.

THESIS SUBJECT

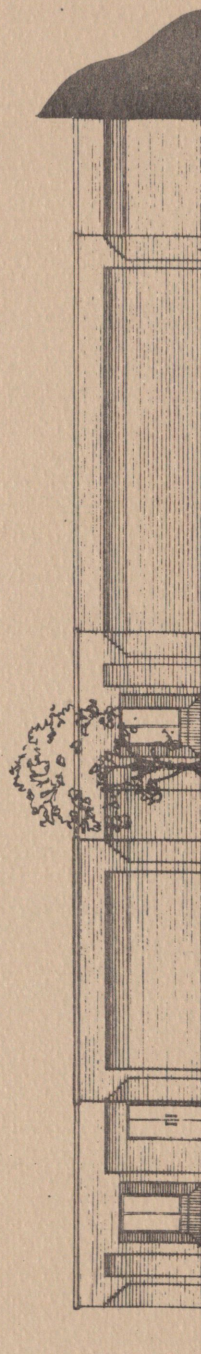
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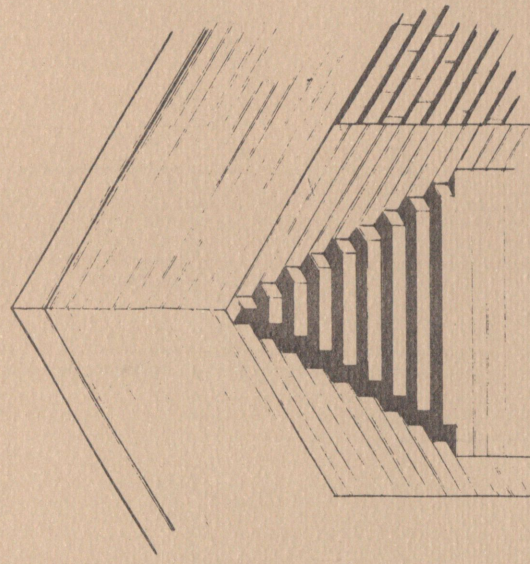
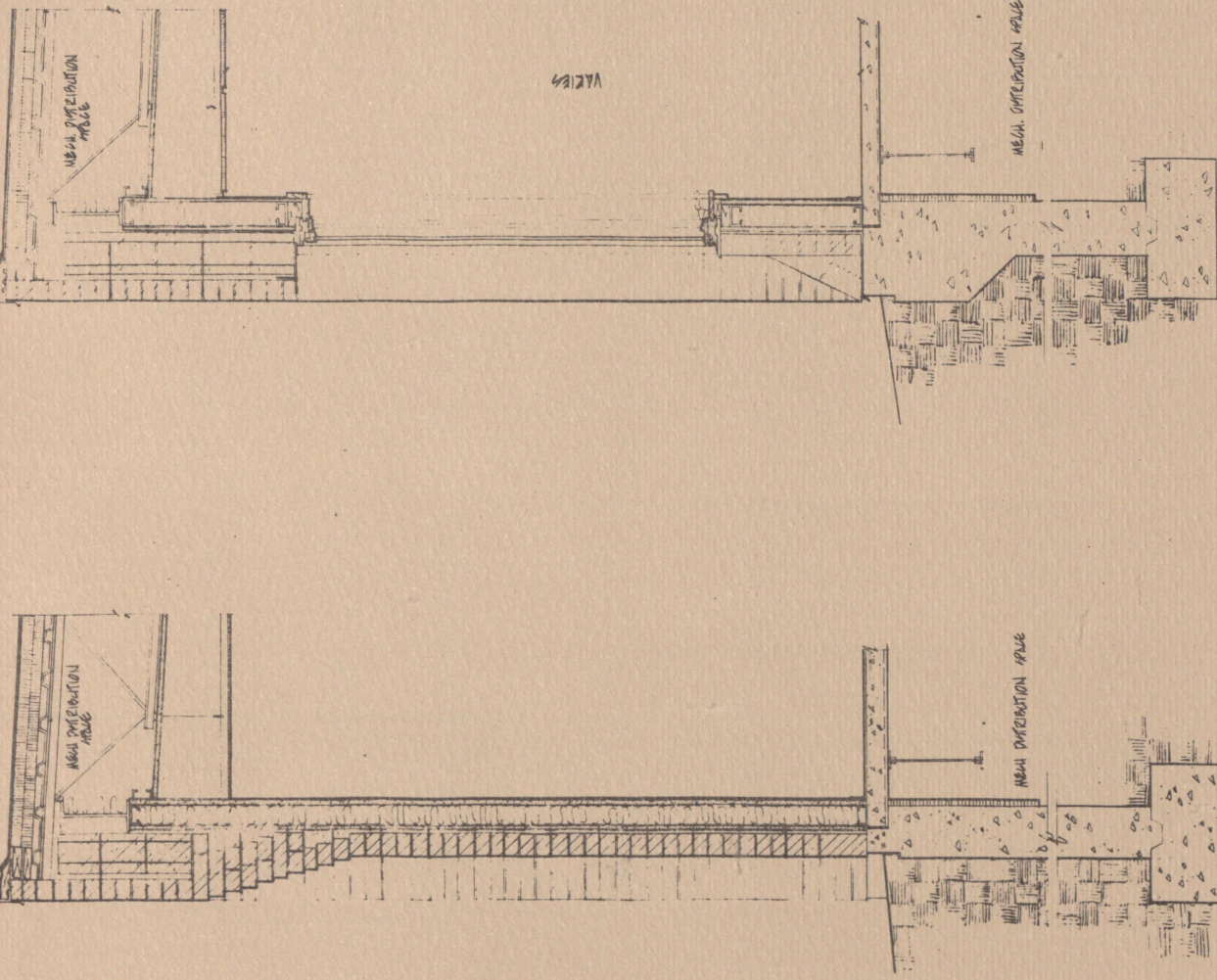
WEST ELEVATION
1/8" = 1'-0"



NORTH ELEVATION
1/8" = 1'-0"

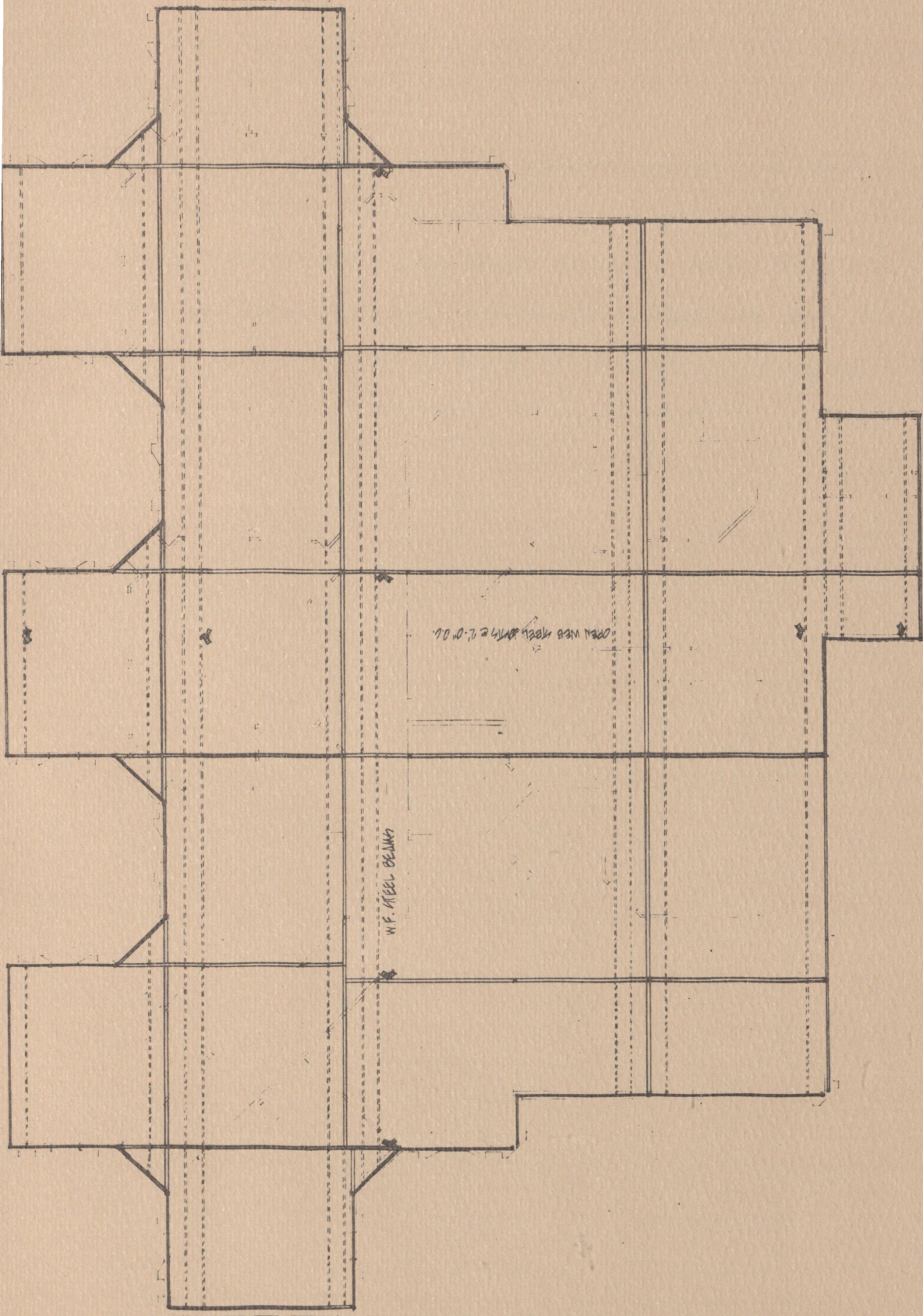


SOUTH ELEVATION
1/8" = 1'-0"



CORNER CORBEL ISOMETRIC
NO. 7415

TYPICAL WALL SECTIONS
1" = 1'-0"



FRAMING PLAN

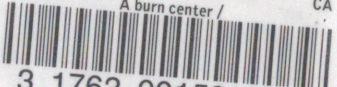
1/8" = 1'-0"

Conclusions

The greatest learning experience of my seven years of attendance at any college has been the past six months of thesis research and solution. The weight of such a subject as a burn facility forced me to dig for facts and knowledge as never before. This process concretized my thesis statement in every respect. It pleases me to know I am capable of such research and solutions.

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