A TWO HUNDRED BED GENERAL HOSPITAL
AND OUTPATIENT CLINIC FOR
GRAND PRAIRIE AND IRVING, TEXAS

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER IN ARCHITECTURE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
SEPTEMBER 8, 1955

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A TWO HUNDRED BED GENERAL HOSPITAL AND OUTPATIENT CLINIC FOR
GRAND PRAIRIE AND IRVING, TEXAS

by

BENJAMIN HARRIS BIDERMAN

Submitted to the Department of Architecture on 8 September 1955 in
partial fulfillment of the requirements for the degree of Master in
Architecture.

ABSTRACT

The purposes of this thesis are: (1) to introduce to welfare minded
citizens of Grand Prairie and Irving the advantages of a joint effort in
the construction of a 200 bed general hospital and outpatient clinic.
Each of these two cities contemplates in the near future the building of
a general hospital to serve its own community. The proposed 200 bed
hospital will be located between these two cities which are less than
five miles apart, and serve both Grand Prairie and Irving; (2) To do
research for requirements of a 200 bed general hospital and outpatient
clinic which complies to the recommendations and requirements of the
various medical agencies, State agency and Federal agency necessary to
receive Federal Aid under Public Law 725 and amendments thereof;
(3) to organize a program based upon research to satisfy the local
requirements of the area; (4) to design a 200 bed general hospital
and outpatient clinic on a specific site.

Thesis Supervisor: Lawrence B. Anderson
Title: Head of the Department of Architecture
Dear Dean Belluschi:

In partial fulfillment of the requirements for the Degree of Master in Architecture, I hereby submit this thesis, 

A Two Hundred Bed General Hospital and Outpatient Clinic for Grand Prairie and Irving, Texas.

Sincerely yours,

Benjamin Harris Biderman
ACKNOWLEDGEMENT

Gratitude is expressed to those members of the Faculty who gave valuable assistance, wise counsel and helpful criticism.

The author also wishes to acknowledge the assistance of the following people and agencies:

Mr. Isadore Rosenfield, Architect.

Mr. Marshall Shaffer, San Engr. (R) Chief, Technical Service Branch, Division of Hospital Facilities.

Mr. Weldon T. Gibson, Manager, Chamber of Commerce, Irving, Texas.

Mr. J. A. Johnson, City Secretary, Grand Prairie, Texas.

Mrs. Ruth Barnhart, Executive Secretary, Texas Hospital Association.

The Modern Hospital Publishing Company.

Texas State Department of Health.

American Hospital Association.
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PART I. REPORT TO HOSPITAL COMMITTEE

1.1 Introduction

The purpose of this portion of this study is to briefly summarize the advantages gained by a joint effort on the part of Grand Prairie and Irving in the Construction of one general hospital to serve both communities.

Since 1940, both Grand Prairie and Irving have experienced amazing growth in population largely due to the establishment of industry in or near these two cities and the decentralization of population taking place in Dallas. During the war, Hensley Air Force Base, a major naval air base, several smaller naval air installations and North American Bomber Plant were established in the Grand Prairie area. Since the war, North American Bomber Plant was replaced by Chance Vought and Tempco aircraft industries and facilities were enlarged. The Navy and Air Force bases remained important installations. Also, since the war much new private industry has been established both in the Grand Prairie and Irving areas.

The result of this influx of industry has boosted Grand Prairie's population of 1,595 in 1940 to 14,594 in 1950. This is an increase of 815 percent in a ten year period. In the same ten year period Irving has grown from 1,089 to 2,621. This is an increase of 141 percent.¹

Since 1950, both Grand Prairie and Irving have witnessed new industrialization. General Motors has built a large automobile assembly plant west of Grand Prairie.

The present approximate population of Grand Prairie and Irving is 28,000 and 22,000 respectively.² Within a very short length of time the

---

¹ U. S. Bureau of Census 1950

² Letter from Grand Prairie's City Secretary and Koch and Fowler, Irving City Plan, P. 6-7
population has outgrown its existing medical facilities.
1.2 Existing Facilities

It is time that someone calls to the attention of the welfare minded citizens of Grand Prairie and Irving that the existing medical facilities within these two communities are woefully inadequate.

Information for this section is based on an inventory of existing hospitals in Texas compiled by the Texas State Department of Health. This inventory includes both acceptable and non-acceptable hospitals according to standards adopted by the State Agency. The State standards are equal to or greater than the Federal standards.

1.2.1 Existing Facilities in Grand Prairie

Plattner Clinic and Hospital is the only hospital or clinic listed in Grand Prairie in the inventory by the State Agency. This is a privately owned hospital which specializes in general osteopathic. It is classified as a non-acceptable hospital due to its bed capacity which is less than eight beds. There are 1,538 patient days of care and 648 patients admitted per year. This means that the average length of patient stay is approximately two and a half days.

Grand Prairie had, as of October, 1954, fifteen physicians and surgeons, M. D. **

1.2.2 Existing Facilities in Irving

According to the inventory by the State Agency there is no hospital in Irving on their records. Irving depends upon the availability of hospital beds in Dallas.

The latest information available indicates that there are fourteen medical doctors in the city of Irving.***

* For further information see sections 2.2.1 and 2.2.2

** Letter from City Secretary of Grand Prairie

*** Letter from Irving Chamber of Commerce
1.3 Factors Which Determine The Size of a Hospital and Type of Service Offered

Before undertaking a hospital building program in any community a careful study of the overall situation should be made to determine the size and type of service. Often, in the past, this has not been done, resulting in overlapping and duplication of both effort and facilities. It is important that a study such as this be made so that the community's needs may be met intelligently and efficiently, but not wastefully and extravagantly.

1.3.1 Character of the Community

The type, size and variety of industry has a great influence on the character of the community. The community of many small industries will less likely be affected adversely by the ups and downs of the economic cycles than the community whose economic life depends on a few large industries.

The establishment of many small industries is the by-product of the larger industries. An example is the manufacture of aluminum boats as a result of the aircraft industry. Also many other small industries have been established in this area such as lumber yards and mills, steel fabrication plants, etc.

A good portion of the population of both Grand Prairie and Irving depend upon employment in Dallas. The result of all of this is to counteract the economic influence of the large industries.

Both Grand Prairie and Irving are located very close to the large medical facilities in Dallas. Because of this there will be a tendency to minimize certain areas of hospital needs due to the various facilities for specialization existing in Dallas such as hydrotherapy, tuberculosis, mental
hygiene clinics, X-ray therapy, extensive physical therapy, extensive educational program and social service department.

The influx of patients from outside the community and egress of patients to hospitals and medical facilities of other communities is very important. Because of the nearness of the Dallas facilities, the tendency for egress would be more important. Also, Fort Worth would have an influence in this respect. The effect of this is difficult to evaluate but in general the influx of patients would tend to make the beds per 1000 population ratio higher while the effect of egress would tend to decrease this ratio.

Under ordinary conditions people might be expected to follow trade channels in seeking medical and hospital care. Of course both Irving and Grand Prairie are highly influenced by the trade in Dallas and to a lesser extent in Fort Worth. However, in the last few years, Grand Prairie and Irving have seen new development along the lines of commerce. Several of the major national and local chain stores have established locations in both communities. A new shopping center has recently been built in Irving and the commercial area of Grand Prairie is growing trying to catch up with the population growth.

The population of a community becomes much more stable when it can rely on its own commercial facilities. As a result of this, the community will take on a character of its own and the need for medical facilities will become more evident.

The local public transportation in both Grand Prairie and Irving is inadequate by urban standards because almost every family owns an automobile. However, there is no problem in establishing good public transportation to a hospital located between Grand Prairie and Irving as there already exist good roads between these two communities. The main connecting road is a

country road which circles Dallas county and will become increasingly
important and thus subject to improvements and good maintenance.*

1.3.2. Characteristics of the Population

This section is based on information obtained from 1950 Census of
Population. Although the 1950 figures are no longer numerically accurate,
it is felt that the character and percent relationships are approximately
constant.**

A population that is widely dispersed over many square miles may re-
quire more, but smaller, hospitals than the densely settled smaller area
containing the same population which may be served most efficiently by
fewer, but larger, hospitals.

Grand Prairie's 14,594 citizens were overwhelmingly urban in nature
with only 6 citizens being classified as urban-farm population. Since
Grand Prairie has annexed a rather large area the urban-farm population
has grown. However, from this we can safely conclude that Grand Prairie
is not sparsely settled.

No portion of Irving's 2,621 citizens were classified as urban-farm
population. It is also concluded that Irving is not considered a rural
area and the nature of its settlement is similar to that of Grand Prairie.

The age distribution in these two communities is of great interest.
However, it should be pointed out again that this represents the situation
as it was in 1950. In Grand Prairie, 8,963 or 61.5 percent of the
population were 21 years old or over. In Irving, 2,203 or 84 percent
of the population were 21 years old or over. From these percentages it
may be seen that Irving which is an older community has a higher percentage

* See section 2.4.1, Accessibility

4. Vol. II Characteristics of the Population, Part 43, Pages 43-101 and
43-137.

** See section 1.1 for 1955 population estimate.
of elder families with children older than 21 years of age.

The large increase in population which has occurred since 1950 has brought many children into the area as evidenced by the rapid growth of the school systems in both communities. The effect of this age distribution on a hospital program would be that the pediatric and obstetrical nursing units may have greater facilities than the average hospital of the same size.

1.3.3 Utilization Factors

The economic situation of the population is one of the most important factors in determining the types of accommodation of hospital facilities. Low income groups will neglect their health if they have to pay a large portion of their income for hospitalization. Therefore low income, poorly housed population would demand the lowest cost type of accommodation consistent with good medical practice while higher income groups would demand semi-private and private accommodations.*

Studies of the need for physicians indicate that there is definite need for about one physician to 1500 population and that it requires 10,000 or more of population to furnish sufficient patients to attract and support a specialist.5

The Grand Prairie and Irving area has sufficient population to require a staff of approximately 32 to 35 physicians and 5 or 6 specialists. The three basic specialties which should be represented are internal medicine, surgery and obstetrics. The services of the general practitioner are largely in the field of internal medicine.6

* See section 2.5.7 Nursing Department for the types of accommodation.
5. American Hospital Association P. 12
6. American Hospital Association P. 13
The caliber of medical care available will have a major influence on the utilization of a hospital. There are 29 doctors in residence in Grand Prairie and Irving.* Some of these doctors practice in their community while others practice in Dallas. With the building of a hospital to serve Grand Prairie and Irving, it would be relatively simple to influence these doctors, other doctors and certain specialists in Dallas to make their services available. Also, there will be doctors' offices provided in the hospital.

Although this proposed hospital can assemble a staff of sufficient qualifications to give adequate medical care to 90 percent of its patients, it would still be necessary to have some sort of affiliation with Dallas' medical facilities for professional service in the more limited specialties.

1.3.4 Medical Attitude

Consideration must be given to the attitude of qualified physicians with respect to their habits of practicing. It is reasonable to assume that the type of staff which is desirable, possessing the qualities of experience, training and judgement will also possess the ability and willingness to cooperate. This is important if the hospital hopes to have a fine medical staff.

1.3.5 Public Attitude

In less than a decade, the public attitude toward health and hospitalization has gone through profound changes. Public polls show that people seem to want more and better health and hospital care and within the limitations of their financial abilities they are willing to pay for it. 7

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* See sections 1.2.1 and 1.2.2, Existing facilities in Grand Prairie and Irving

7. Mills, A. B. and Jones, E. W., P. 13
1.5.6 Comparison of General Hospitals of Various Sizes

Information for sections 1.5.6.1 and 1.5.6.2 is based on statistical studies compiled by the Division of Medical and Hospital Resources, Public Health Service under the direction of Dr. Louis Block, Program Coordinator. These studies represent the composite or average of existing statistical data on a national basis covering hospitals which vary in size from 25, 50, 100 and 200 beds. It should be emphasized that the results of these studies do not necessarily represent the ideal institution. It is, instead, a summary describing "What is" rather than "What should be."

The important value of this study is not the exact figures resulting from a survey. It is, instead, the trend of increase or decrease of usage of facilities and services offered, expense and income.

Section 1.5.6.3 deals with equipment cost and section 1.5.6.4 deals with construction cost of general hospitals of various sizes.

Wherever possible, all information is presented in the form of graphs for the purpose of presenting a clearer picture.

1.5.6.1 Usage of Facilities and Services Offered

The purpose of this section is to summarize admissions and births, services, patient care, length of patient stay, and the usage of operation and adjunct facilities for hospitals which vary from 25 to 200 beds.

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8. The results of this work appeared in a series of articles by Dr. Block in The Modern Hospital, June 1953, October 1953, January 1954, February 1954 and June 1954.
Admissions reflect demand for hospital services. While both admissions and births increase with the size of the hospital, the increase in admissions is arithmetic.
FIGURE 1.1
NUMBER OF ADMISSIONS
AND BIRTHS PER YEAR
Figures 1.2 and 1.3  Services

Figure 1.2  Average Bed Distribution by Type of Service

Hospitals smaller than 100 beds generally make no specific assignments for pediatric patients. In some hospitals, special assignments are made for medical and surgical patients while in other hospitals nursing units for the combined care of medical and surgical patients exist.

The requirements for the pediatric, medical and surgical bed assignments increase almost in direct proportion to the increase in the size of the hospital. The obstetrical bed assignments increase at a slower rate.
Figure 1.2
Average bed distribution by type of service
Figure 1.3 Average Number of Bassinets and Infant Incubators

The average number of bassinets is usually the same as the average number of obstetrical beds available in the hospital and therefore increases in the same manner. The increase in infant incubators with the increase in the size of a hospital is very small. The 200 bed hospital has eight times the bed capacity of the 25 bed hospital but requires only 3 times as many incubators.
FIGURE 1.3
AVERAGE NUMBER OF
BASSINETS AND INFANT
INCUBATORS

NUMBER

BED SIZE OF HOSPITAL
Figures 1.4, 1.5 and 1.6  Patient Care

Figure 1.4  Number of Patient Days of Care Per Year

Both the adult and infant patient days of care show an almost arithmetic increase with increase in the size of the hospital. (Example:—200 bed hospital will have 4 times the number of patient days of care as the 50 bed hospital.)
Figure 1.4
Number of Patient Days of Care per Year

Days of Care in Thousands

Bed Size of Hospital

Adult Days

Infant Days
Figure 1.5 Average Daily Census

The utilization of hospital facilities is perhaps reflected most vividly in the day to day hospital usage. The average daily census is proportionately higher in the larger hospitals. This indicates a greater utilization with the increase in the size of the hospital. This is again reflected in figure 1.6, percentage of occupancy.
Figure 1.6 Percentage of Occupancy

Bed occupancy is a barometer which shows the effects of changing use of services. It is one of the key statistical measurements of use of hospital facilities. Average levels of occupancy are not the same for all hospitals. Variations exist between hospital size groups. Occupancy is proportionately higher in the larger hospitals, thus indicating greater utilization with increased size.
Figure 1.6
Percentage of Occupancy

PERCENT

ADULT BEDS

NEWBORN BASSINETS

BED SIZE OF HOSPITAL
Figures 1.7 and 1.8 Length of Patient Stay

Figure 1.7 Average Stay by Type of Accommodation

The length of stay increases with the size of the hospital. In all hospital size groups the semiprivate patients stay the shortest time while the ward patients stay the longest period of time. Among the usual explanations is the financial pressure which requires semiprivate patients to get back to gainful employment as soon as possible. Private patients can usually afford longer convalescence in the hospital. Among the factors affecting the length of stay of ward patients is that home conditions may not be conducive to convalescence.
FIGURE 1.7
AVERAGE STAY BY TYPE OF ACCOMMODATION

NUMBER OF DAYS

WARD PATIENTS

ALL PATIENTS

PRIVATE PATIENTS

SEMI PRIVATE PATIENTS

BED SIZE OF HOSPITAL
Figure 1.8 Average Stay by Type of Service

The length of stay increases with the increased size of the hospital. One of the reasons for this is that the more complicated illnesses or conditions find their way to the larger hospitals where specialized equipment and skills are available. This is evident from the curves. The medical and surgical are the types of service in which the more complicated illnesses or conditions would occur. There is a greater increase in these two types of service than there is for pediatric and obstetrical.
FIGURE 1.8
AVERAGE STAY BY
TYPE OF SERVICE

NUMBER OF DAYS

BED SIZE OF HOSPITAL

MEDICAL
SURGICAL
PEDIATRIC
OBSTETRICAL

0
4
8
12
16
20
24
Figures 1.9, 1.10, 1.11 and 1.12 Usage of Operation and Adjunct Facilities

Figure 1.9 Average Number of Operations per Year

The number of operations, both major and minor, increases almost arithmetically with the increased hospital size. The ratio of major to minor operations is fairly constant, ranging from 2 to 3 in the smaller hospitals to from 3 to 4 in the larger hospitals. One of the reasons for this increase in ratio is the existence of specialized facilities and skills in the larger hospitals.
FIGURE 1.9
AVERAGE NUMBER OF OPERATIONS PER YEAR

NUMBER OF OPERATIONS

BED SIZE OF HOSPITAL
Figure 1.10 Average Number of X-Rays per Year

The number of x-rays increases at a faster rate than the increase in hospital size. The 200 bed hospital is 4 times larger than the 50 bed hospital and makes $6\frac{2}{3}$ times the number of X-rays. The 50 bed hospital makes about twice as many X-rays as the 25 bed hospital.
FIGURE 1.10
AVERAGE NUMBER
OF X-RAYS PER YEAR
Figure 1.11 Average Number of Laboratory Tests per Year

Although the number of laboratory examinations increases with the size of the hospital, the ratio of examinations per patient day of care shows a decreasing tendency from 0.9 in the small hospital to 0.7 in the 200 bed hospital.
Figure 1.11
AVERAGE NUMBER OF LABORATORY TESTS PER YEAR

NUMBER OF LABORATORY EXAMINATIONS

BED SIZE OF HOSPITAL
Above the 50 bed hospital there is an almost arithmetical increase in the use of blood and blood derivatives with the increase in hospital size. The 25 bed hospitals issue more blood in proportion to their size than the larger hospitals. This may be because the outpatient department plays a relatively more important role, in this respect, in the small hospitals than it does in the large hospitals.
FIGURE 1.12
AVERAGE NUMBER OF UNITS
OF BLOOD AND BLOOD
DERIVATIVES ISSUED
PER YEAR

NUMBER OF 500 cc UNITS

BED SIZE OF HOSPITAL
1.3.6.2 Expense and Income

Hospitals are institutions which always operate at a loss. The patient income will vary from about 92 to 97 percent of the patient expense. The increase or decrease of this variation has little relationship to the size of the hospital.

The payroll is the largest single factor in the expense of hospital operation. The proportion of payroll to total expense for the various size hospitals may be seen in figure 1.14.

Figure 1.13 Personnel per Bed and per Patient

The proportionate number of employees required to care for patients generally increases with the size of the hospital. Again, the reasons advanced for this is that the more complicated and serious illnesses or conditions find their way to the larger hospitals.

The difference between the employees per patient and the employees per bed for the larger hospital is less than that for the smaller hospitals. The reason for this is that the percentage of occupancy is greater for the larger hospital. (See figure 1.6). For personnel by department and other factors influencing expense, see figures A-1, A-2 and A-3 in Appendix.
Figure 1.13
Peronnel per bed and per patient

Number of personnel

Employees per patient

Employees per bed

Bed size of hospital
Figure 1.14 Average Annual Expense and Patient Income

The proportion of payroll to total expense increases with the size of the hospital: 53 percent for the 25 bed hospital; 54 percent for the 50 bed hospital; 55 percent for the 100 bed hospital and 58 percent for the 200 bed hospital. This is not surprising in view of the fact that there is more personnel per bed and per patient for the larger hospitals (See figure 1.13).

The percent of patient income to patient expense per year varies in the following manner: from 96 to 97 percent for the 25 bed hospital; from 92 to 95 percent for the 50 bed hospital; 95 percent for the 100 bed hospital and 94 percent for the 200 bed hospital.

For detail information on distribution of expense, see figures A-4, A-5 and A-6 in Appendix.
FIGURE 1.14
AVERAGE ANNUAL EXPENSE
AND PATIENT INCOME

Dollars in Thousands

Bed Size of Hospital

Total Expense
Patient Income
Payroll
1.3.6.3 Equipment Cost

It is essential that the equipment budget be based on accurate cost estimates of individual items of equipment. All too often in the past equipment costs have been a stumbling block in the establishment of a new hospital. However, it is not the intent of this study to give a detailed analysis of equipment cost. The purpose of this section is to show an overall comparison of equipment cost for general hospitals of various sizes.

The term "equipment" as used herein means all items necessary for the functioning of all services of the facility, including such services as accounting and records, maintenance of building and grounds, laundry, public waiting rooms, public health and related services.

Supply items such as fuel, stationery, printed forms, food and bandages, etc. are not considered equipment.

Equipment may be classified in three groups on the basis of method of purchase, accounting practice and depreciation.

Group I - equipment which is usually included in construction contracts. (Cabinets and counters, elevators, boilers, etc.)

Group II - equipment depreciable in five years or more not normally included in construction contracts. (Furniture, surgical apparatus, diagnostic and therapeutic equipment, office machines, laboratory and pharmacy equipment, wheel equipment, etc.)

Group III - equipment having a life of less than five years which is not included in the construction contract (Chinaware, silverware, kitchen utensils, bedside lamps, waste baskets, bedpans, dressing jars, catheters, surgical instruments, linens, etc.)


A comparison of equipment cost for general hospitals of 25, 50, 100 and 200 beds is shown in figure 1.15 which is based on figures compiled by U. S. Department of Health, Education and Welfare. While the total equipment cost increases with the increase in the size of the hospital, the equipment cost per bed is much higher for the 50 bed hospital. One of the reasons for this is that much of the equipment required for the 50 bed hospital is not greatly different from that required for a larger hospital.
FIGURE 1.15
EQUIPMENT COST FOR GENERAL HOSPITALS
(ESTIMATED AVERAGES)*

TOTAL COST

$31,773
$39,272
25 BEDS

$110,587
$74,687
50 BEDS

$168,510
$122,603
100 BEDS

$277,471
$222,985
200 BEDS

SIZE OF HOSPITAL

PER BED COST

$1,390
$1,571
25 BEDS

$2,211
$1,494
50 BEDS

$1,685
$1,226
100 BEDS

$1,387
$1,115
200 BEDS

SIZE OF HOSPITAL

* PLUS 20% FOR 1953 ESTIMATE

** INSTALLATION COST ARE NOT INCLUDED

LEGEND

GROUP 1 EQUIPMENT
GROUP 2 & 3 EQUIPMENT
Construction cost means the cost of the building, inclusive of all mechanical trades, such as plumbing, heating, ventilation, electrical work, etc. It also includes all permanently connected equipment such as attached cabinets, plumbing fixtures, sterilizers, connected laundry and kitchen equipment, laboratory benches, lighting fixtures, etc. * Construction cost does not include movable equipment or furniture.**

"The commonest method of estimating hospital construction cost has been the so-called 'per bed' method - so many beds at so many dollars per bed equals the construction cost. Whether or not this method was adequate in the past, it certainly cannot be applied to any group of hospitals today and provide a reliable result. The complexity of the average modern hospital, which is planned to serve the special needs of the individual community and is integrated with other existing medical care facilities, will preclude the use of any estimating method as general as this."**

The best way to estimate, in advance of construction, what a desired structure will cost, is to carry the design to a stage which would be sufficiently defined so that the volume and/or area can be computed. Then the construction cost may be determined based on unit cost per cubic feet or square feet.

The purpose of this section is to show a comparison of construction cost of hospitals of various sizes. Figure 1.16, Gross Area Distribution in Square Feet per Bed for Acute General Hospitals of From 50 to 200 Beds is based on statistics compiled by the U. S. Public Health Service. It is important to emphasize that this comparison is overly simplified.

* This is the same as Group 1 in Equipment Cost.

** This is the same as Groups 2 and 3 in Equipment Cost.

There are many factors which effect the construction cost of a hospital. Among the more important factors are the type of construction, the quality of finishes, the number of floors, and the height floor to floor. Also the climate will have an effect on the construction cost in determining the heating and ventilation requirements of the hospital. Assuming that these factors are more or less constant for comparative purposes, then figure 1.16 may also represent the variation in construction cost per bed.

The reason for the smaller hospital requiring more area per bed is that the space requirements for the various facilities in the smaller hospital cannot be reduced below certain practical limits. The result of this is that the cost per bed is higher for the smaller hospital than it is for the larger hospital.
FIGURE 1.16 GROSS AREA DISTRIBUTION IN SQ. FT. PER BED FOR ACUTE GENERAL HOSPITALS OF FROM 50 TO 200 BEDS.
1.3.7 Planning Coverage and Neglected Areas

A hospital large enough to serve the Grand Prairie and Irving area would of course require the major facilities such as medical, surgical, obstetrical and pediatric. Such a hospital will be frequently confronted with the necessity of giving at least temporary care to mental and contagious diseases. Although the patient's stay may not be long since patients with illnesses of this nature may be transferred to the medical institutions in Dallas, it would be very embarrassing when suitable accommodations are not available. It is also very shortsighted planning which does not take such matters into consideration.

Home care may be treated under the outpatient department. Many hospital beds are frequently occupied by patients who could just as well be treated at home if there were a way to extend this service. This would reduce the pressure for beds and correspondingly reduce the demand for new hospital construction. In other words, the effect of the outpatient department would be to slightly reduce the required number of beds per population. Just exactly how much reduction is difficult to determine.

Although the outpatient department may reduce pressure on hospital bed requirements, it increases the service facilities, personnel and supplies. Home care patients would use the diagnostic and therapeutic facilities and require occasional surgical intervention. It is doubtful that the outpatient department could put pressure on hospital beds as the percentage of occupancy of a hospital for Grand Prairie and Irving would vary from 72 to 76 percent.*

In spite of the increase in pressure on these several facilities, the outpatient department is the cheapest way and the proper way of taking care of additional patients.

* See figure 1.6
1.4 Size of Hospital to Serve Grand Prairie and Irving

Since Texas has more than 12 persons per square mile, it is recommended, in accordance with the Hill-Burton Act (Public Law 725), that there be 4.5 general hospital beds per 1000 population. On this basis, both Grand Prairie and Irving should have a 100 bed general hospital in their own communities and there should be one outpatient clinic.

Let us suppose that both Irving and Grand Prairie can financially afford to build and maintain a 100 bed general hospital for their respective communities. Could a 200 bed hospital be built and maintained by a joint effort on the part of Grand Prairie and Irving?

It is important to realize that the cost figures used in this study are for comparative purposes only and are based on April 1953 national statistics. These figures do not necessarily reflect the cost for a particular locality. See tables 1.1 and 1.2 for cost comparison of the two 100 bed general hospitals and the one 200 bed general hospital.

Table 1.1

Two 100 Bed General Hospitals for Grand Prairie and Irving

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Cost (including group 1 equipment) based on $22.00 per square foot</td>
<td>$1,400,000</td>
</tr>
<tr>
<td>635 sq. ft. per bed x 100 bed x $22 =</td>
<td>$1,400,000</td>
</tr>
<tr>
<td>Equipment Cost * (Group 2 and 3)</td>
<td></td>
</tr>
<tr>
<td>$122,605 / 20% for 1953 =</td>
<td>147,124</td>
</tr>
<tr>
<td>Architect's fee, consultant's fee, legal fee, and fund drive cost</td>
<td></td>
</tr>
<tr>
<td>10% of construction cost =</td>
<td>140,000</td>
</tr>
<tr>
<td>Total</td>
<td>$1,687,124</td>
</tr>
<tr>
<td>Multiplied by two.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>$3,374,248</td>
</tr>
</tbody>
</table>

* See section 1.3.6.3, figure 1.15, Equipment cost.
Table 1.2
One 200 Bed General Hospital for Grand Prairie and Irving

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction cost (including group 1 equipment) based on $22.00 per square foot</td>
<td>$2,520,000</td>
</tr>
<tr>
<td>$572.5 sq. ft. per bed x 200 beds x $22.</td>
<td></td>
</tr>
<tr>
<td>Equipment cost* (group 2 and 3)</td>
<td>267,582</td>
</tr>
<tr>
<td>$222,985 / 20% for 1953</td>
<td></td>
</tr>
<tr>
<td>Architect's fee, consultant's fee, legal fee and fund drive cost</td>
<td>252,000</td>
</tr>
<tr>
<td>10% of construction cost</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$3,039,582</td>
</tr>
</tbody>
</table>

* See section 1.3.6.3, Figure 1.15, Equipment Cost.
Other factors not considered are: acquisition of site, site improvements, landscaping and off-site improvements including utilities. These factors are difficult to evaluate without knowing the exact situation in each of the three possible site conditions. However, let us look at these factors in the light of pure logic. If both Grand Prairie and Irving undertake to build separate hospitals, each community will acquire sites closer to their own centers causing this cost to be more than twice that of one site located between the two cities. Also site improvements and landscaping would be twice as great for the two sites as it would be for one site. Utilities are the most important factor of off-site improvements. If two separate hospitals were built, each would be built closer to the existing utilities of their respective cities. One hospital located between the two cities would require longer utility lines increasing the cost by a considerable amount. Electric power and water is already available in this area. The main utility problems are gas and sewage. Of course, with the rapid growth of these two communities, it would eventually be necessary to install these utilities in this area anyway. However, taking the most pessimistic view, it is remotely conceivable that the cost advantages gained by the acquisition, improvement and landscape of one site may be cancelled by the difference in the cost of utility installation of one hospital vs. that required for the two hospitals.*

One the basis of cost factors considered, the separate efforts of Grand Prairie and Irving would result in a total expenditure of $3,374,248. if, on the other hand, Grand Prairie and Irving made a joint effort in the constructionf one 200 bed hospital, the expenditure would be

* See section 2.4.2 Public Utilities
$3,039,582. This represents a savings of $334,666.

Other advantages gained by building the one 200 bed hospital are: bed requirements will be met at a lower cost; the larger hospital would have more equipment and a larger variety of specialized equipment than either of the smaller hospitals; and the larger hospital would attract major specialists. These and many more advantages are apparent after a careful study of section 1.3.6.
1.5 Possibility for Expansion

If in the future, the need for expansion of facilities is apparent and if the expansion is relatively small, the reconstruction and re-allocation of existing space may be adequate. Sometimes a small wing is constructed to accommodate some of the administrative or service activities. This may free enough space in suitable areas to provide for the needed expansion which should not exceed 50 beds. If the need for expansion exceeds the possibilities of reconversion of existing space, even when reinforced by minor additional construction, then the problem must be approached in an entirely different manner. Large scale expansion is a very difficult if not impossible problem.

In a report of the land use pattern by Powell and Powell it was suggested that Grand Prairie undertake to provide at an early date a hospital of 150 to 200 beds, so designed that it can be expanded to 500 or more beds by additional construction. (See Appendix, page 14-a). This is not an expansion. It is the building of a new structure as an expansion of this magnitude would put great pressure on the facilities of a 200 bed hospital which by their very nature may be difficult to expand. However, a new hospital may be built adjoining the 200 bed hospital having connecting passageways so that the facilities of one hospital will complement the facilities of the other.

The building of nurses' dormitory and teaching facilities should be given serious consideration for development on the hospital site.
1.6 Methods of Financing the Project

In communities of this size the difficulties of raising the initial capital funds are such that it is often considered desirable to organize the hospital under the auspices of the city (or cities) government and raise the funds either by taxation or by bond issue. Otherwise, it is often more desirable to organize as a non-profit corporation and secure the funds by subscription supplemented, if necessary, by a bond issue.

Some communities in the past found it necessary to choose a political unit as a sponsor. The main disadvantage in this situation is that precautions must be taken to avoid the evils of political manipulation in both the building and operation of the hospital.

Where it is only the initial building funds that make the difficulty, one means that has been used is for a city (or cities) to furnish funds for construction and to lease the plant to a separate non-profit corporation for operation.

The most common means of financing a project of this sort is by a community wide campaign or drive for funds. In the planning of such a campaign, professional advice and/or service may be obtained. There are a few such professional fund raising organizations in this country. These organizations are capable of making a preliminary estimate of how much money a community can be expected to raise and to plan all of the details from the preliminary conditioning of the public mind to the collection of deferred payments and contributions.

After the community gets its hospital it is still faced with the problem of financing its operation. If every person could pay for the hospital care he receives, no problem would exist. Since there are
operating deficits, it must be taken into consideration if the hospital is to continue to operate. In most instances the city (cities) or county recognize its obligation and appropriate funds for this purpose.
1.7 Summary

"It must be kept in mind that economy of operation and maintenance over the life of the building, as well as the proper provision of the hospital services required by the community, is dependent in large measure upon the adequacy of the physical plant and is more important than initial economy of construction." 13

If Grand Prairie and Irving were to build a 200 bed general hospital, it would be adequate for their existing population. The hospital should have services capable of standing an increase in capacity of 50 beds making a total of 250 beds. The outpatient clinic is very important and in the author's opinion should be built at the time of initial construction. It should care for approximately 100 home patients. The total facilities of the ultimate design coupled with the Dallas medical facilities will adequately care for a population of 85,000.*

Mr. Isadore Rosefield points out the inadequacy of hospitals smaller than 100 beds in the following manner. 14 "The literature on the small or rural hospital shows them to be as a class inefficient, understaffed to do the variety of things they are called upon to do, and living an economically uncertain existence. The small hospital is costly to construct and costly to operate. Few of them are approved by the American College of Surgeons and few are approved by the American Medical Association for intern teaching because of their lacks in equipment, numerical


* Consideration of Dallas' facilities would tend to reduce ratio of beds to population.

clinical material and other requisites. Their occupancy is usually very low even though the need for hospital beds, particularly in rural areas, is very great. There are exceptions, but as a class the small hospital leads a trying existence.*

* This also appeared in Farmers Bulletin No. 1792, U. S. Dept. of Agriculture and the General Hospital Bulletin No. 3, Duke Endowment, Charlotte, N. C.
PART II RESEARCH

2.1 Introduction

The purpose of this portion of this study is not to go into detailed research; but is instead, to do that research which is necessary for a comprehensive understanding of the major problems involved in the design of a 200 bed general hospital and outpatient clinic.

"It is of utmost importance to remember that a hospital is more than just a building with bedrooms. It is a complicated, highly specialized functional structure which must be designed for the various facilities, instead of having the facilities forced into certain areas because of a desire to produce some particular architectural appearance. Such errors result in nothing but regrets and censure of the planners and builders, with dissatisfied patients, staff and employees and excessive operating or remodeling costs. It is imperative, therefore, that the architect be familiar with hospital functions and that the responsible committee should not arbitrarily specify in advance the exact type or shape of the structure in a manner that handicaps the designer."15

2.2 Summary of Laws and Regulations

The purpose of laws and regulations with regard to hospitals and health facilities is to aid in the distribution of ample facilities in quality and quantity made economically available to all of the people.

2.2.1 Federal Laws

The Hospital Survey and Construction Act, Public Law 725, was passed by the 79th Congress and became law in August 1946. This act launched the most comprehensive program ever undertaken for the construction of hospitals and health facilities. Congress authorized Federal grants-in-aid to the States and territories covering one-third of the cost of a $1,125,000,000 construction program over a five year period.

To insure that these facilities will be built where they are most needed, and to promote coordination of their services, the Act also authorized Federal Aid for surveys of State needs and for developing construction programs.

Both hospitals and public health centers may be built under this Act. The hospital may either be public or private nonprofit institutions. They may be general, tuberculosis, mental, chronic disease or other types except those furnishing primarily room and board rather than treatment. Also all related facilities are authorized such as laboratories, outpatient departments, nurses' homes and training facilities, etc.

This program is administered by the Surgeon General of the Public Health Service, in the Federal Security Agency. He has the advice and assistance of the Federal Hospital Council, whose eight members represent the consumers of hospital services as well as hospital management and public health administration.

16. Federal Security Agency (Pamphlet) and Texas State Dept. of Health
The Surgeon General, with the approval of the Federal Security Administrator and the Council, has issued regulations governing development and administration of the State construction plans. These regulations cover character and distribution of hospitals and public health centers, priority, general standards of construction and equipment, State administrative methods, and provisions of services without discrimination on account of race, creed or color and for persons unable to pay.

The Surgeon General has established a Division of Hospital Facilities in the Public Health Service to assist the State in carrying out their Programs. This Division prepares recommended standards for construction and equipment, and maintains a staff of experts for consultation on State problems.

The Act makes allotments for States to make surveys of medical needs. Within the allotment, which is based on population, the State is entitled to grants equaling one-third of its expenditures for this purpose.

To qualify for Federal Aid, a State designates a single agency to conduct surveys and planning, and provides for a State advisory council including State and non-government hospital experts and consumer representatives.

The State makes an inventory of existing facilities and a survey to determine the need for additional ones. Then a program is established to meet the needs and determine priorities.

For the purposes of the Act, "adequate facilities" are defined as follows:

1. Tuberculosis hospitals - $\frac{24}{20}$ beds per average annual death from tuberculosis.

2. Mental hospitals - 5 beds per 1000 population.
3. Chronic disease hospitals - 2 beds per 1,000 population.

4. Public health centers - 1 bed per 30,000 population (or up to 1 per 20,000 in States with less than 12 persons per square mile).

5. General hospitals - \( \frac{4}{2} \) beds per 1,000 population in States having more than 12 persons per square mile (up to \( \frac{5}{2} \) beds per 1,000 in sparsely populated States).

Within the State, general hospitals are planned on an area basis, setting a pattern for a coordinated hospital system: the base area, with a large base hospital associated with medical schools and related facilities; the intermediate areas having smaller hospitals affiliated with the base hospital. The intermediate hospital will serve neighboring rural hospitals and clinics where more limited facilities are offered.

Public Law 380 was passed by the 81st Congress amending Public Law 725 by extending its authority and expanding its appropriations. The program, presented to Congress a year ago by President Eisenhower includes four building types: nursing homes, chronic hospitals, rehabilitation facilities and diagnostic centers. Homes for the aged may fit into the projected pattern but are not now eligible for federal aid.

2.2.2 State Plan

In order for a State to receive Federal aid for construction, it must submit an overall State plan for approval. The State plan has two phases: one, administrative provisions; two, survey and planning new facilities. There must be an advisory council and a single State agency to supervise the administration of the plan. The State agency must be the sole agency having legal authority to carry out the plan and maintain a merit system for its personnel.
Other duties of the State agency are as follows:

1. Provide for construction of the projects in accordance with priorities.

2. It must review the construction program at least once a year and submit any modifications to the Surgeon General.

3. It must afford a hearing to every applicant for a construction project and submit reports and information required to the Surgeon General.*

4. It must provide minimum standards for the maintenance and operation of hospitals receiving Federal Aid through this Act.

* After a public hearing, the plan is submitted to the Surgeon General, who must approve it if it conforms to the Act and regulations. If any plan is disapproved, the State agency may appeal to the Federal Hospital Council whose decision is final.
2.3 Climate

Information for this section is based on Local Climatological Data, 1954 for Dallas, Texas, published by U. S. Department of Commerce, Weather Bureau.

When considering the climate of this area, one is impressed by the temperature mean and by the great extremes that combine to produce those means. The average annual temperature is 65.9 degrees. The extreme temperatures recorded in this region are: -3 degrees on January 18, 1930; -10 degrees in February, 1899; 115 degrees in August, 1909 and 111 on July 25, 1954. There is usually 4 months—June, July, August and September which will have temperatures 90 degrees or more every day. This is a dry heat and the precipitation during these months is relatively low. For one week in December and for about one half of January the temperature will be 32 degrees or below. On rare occasions the cold weather may last until February.

There will be 4 months from June through September when summer air conditioning is required. During the months of November, December, January and February it will be necessary to have artificial heating. The balance of the year will not require controlled temperature with few exceptions for various elements of the hospitals or under some unusual weather conditions.*

The relative humidity varies from 72 percent in the mornings to 53 percent in the afternoon. The four summer months will have the lowest relative humidity. The average afternoon relative humidity in the summer months of 1954 varied from 34 percent to 43 percent.

* See Section 2.5.14, Heating and Ventilation.
The average of the total precipitation as compiled for the last 41 years indicates that the greatest precipitation occurs in the months of April, May and June.

The monthly and seasonal snowfall indicates that December, January and February will have snow. Occasionally November and March will have a little snow. The record monthly snowfall was January 1918 with 9.0 inches of snow. The record yearly snowfall was 1923-24 with 9.8 inches. There are many years in which very little if any snow is recorded. Therefore the snowfall will have little effect on transportation.

The prevailing breeze is from the South, the Southeast, or South-Southeast. The fast winds usually come from the North, Northwest and West. In January and February the fast winds come from the Southwest. Occasionally the winds are from the South.

* See Section 2.4.4, Orientation and Exposure.
2.4 The Site

It is imperative that the site be selected without prejudice and in accordance with certain fundamentals. Minor errors in planning may often be corrected, but once an institution is constructed on an unsuitable site, the community has no means of correcting this. Certain principles concerning the selection of a hospital site have been formulated. An attempt will be made to enumerate them in this section.

2.4.1 Accessibility

Since the proposed medical facilities are to serve both Grand Prairie and Irving it is natural for it to be located between these two communities. The main connecting road, Belt Line Road, between Grand Prairie and Irving is a county road. At the present time it is a two lane road.

On May 21, 1953, the Legislature of Texas created the Texas Turnpike Authority as an agency of the State, granted to it certain powers and directed it to take immediate steps to process construction of a Dallas-Fort Worth Turnpike as a toll revenue project. The construction of this road is scheduled for completion in June 1957. This Turnpike will be a six lane divided highway located between U. S. Highway 80 and State Highway 183. This means that the Turnpike will pass between Grand Prairie and Irving. There will be numerous crossroads, many of which will be major interchanges and toll stations. The crossing of Belt Line Road is one of the most important of these interchanges.

Belt Line Road is classified as AA and will be designed for 60 m.p.h. speed limit. This road will have 48 foot pavement width, 10 foot shoulders, with a minimum of 200 foot right of way. The surface will

17. Information on Turnpike and Belt Line Road is based on a report by Howard, Needles, Tammen and Bergendoff, Consulting Engineers.
be either Portland cement concrete or a high quality type of asphal tic concrete.

The site which the author has selected is located 3.2 miles North of the Belt Line Road - Turnpike interchange. The site is located Southwest of the intersection of Belt Line Road and Shady Grove Road and borders on both roads.

Therefore, the main access to the hospital will be by Belt Line Road and the main entrance and exit to the actual site will be from Shady Grove Road. This takes advantage of not entering directly on the main road but still having controlled access to it.

The cities of Grand Prairie and Irving will provide their own bus service to the hospital.

The construction of this new Turnpike and its dependencies plus the existing network of roads in the area provide fine access to the hospital for staff, patients arriving by ambulance or automobile, service personnel, visitors and outpatients.

2.4.2 Public Utilities *

Water, sanitary sewers, electrical, gas and telephone service are important and must be considered in the selection of the site.

There is an existing 36 inch water main which runs along Belt Line Road. This is more than adequate to furnish the 120,000 gallons of water per day required for a 200 bed hospital. Pressure would be sufficient for fire fighting purposes. The site is slightly beyond the two mile recommended service area for a fire station, but could be serviced by a station to be constructed later this year at the southeast

* Information for this section is based on a letter dated July 25, 1955 from Weldon T. Gibson, Manager, Irving Chamber of Commerce (See App.)
corner of the intersection of Highway 356 and Story Road. Also, another fire station has been planned for the vicinity of Shady Grove Road and Story Road. This will assure adequate fire protection.

At the present time there are no sanitary sewers in the vicinity of the site. It would be difficult to serve the hospital without the construction of a lift station and the further extension of the main to the disposal plant. "Because of the high initial cost and operation cost of sewage treatment plants, connection to an existing sewer system is usually more economical even though lift pumps or long connections are required." 18

Electric power service is available and adequate to serve the hospital. In view of the location of the Texas Power and Light Company sub-station northeast of the site, it would be quite easy to have two independent lines to provide auxiliary breakdown service.

Gas service is not at the present time available, but would readily be extended to meet hospital needs.

Telephone service would be available to serve the hospital. Telephone cables should be brought into the building underground.

2.4.3. Nuisances

Another advantage in the location of this site is that it is free from undue noise such as that emanating from railroads, main traffic arteries, schools and children's playgrounds. The topographical conditions are not such that they encourage the breeding of flies, mosquitos and other insects. Also the site is not exposed to the smoke and odors of industry and will not be erected adjacent to fire hazards.

Through zoning, it will be possible to control other nuisance factors in the immediate area for future developments.

2.4.4 Orientation and Exposure

Orientation of the building is a very important factor in the design. With proper exposure, advantages may be gained in consumption of fuel or power by natural ventilation. Also the hot Texas sun and the view from the patient windows should be taken into consideration.

On this particular site, the building was oriented to take advantage of both the natural contours and the prevailing breeze which is from South South East. At the same time the building has its end walls in the direction of the summer sunrise and sunset. The solarium should be located on the Southeast corner of the building, taking advantage of the prevailing breeze and the morning sun.

The most desirable view is to the Southwest. However, the view in any direction is not undesirable.

Also, it should be pointed out that there will be year-round air conditioning. However, there will be about three and a half to four months in which no artificial heating or ventilation is required except in controlled areas.

2.4.5 Cost of Site

The location of this site takes advantage of the low real estate value in this undeveloped area and at the same time is readily accessible to Grand Prairie and Irving as well as being close to major traffic arteries between Dallas and Fort Worth.

Also, it should be pointed out that there are other factors involved in the total cost of the site. The initial cost of the site is important, but the total cost, including expenditures required to make the site suitable for a hospital, such as utilities, foundations, subsoil condition, grading, drainage and landscaping must be considered.*

* See Section 2.4.2 Public Utilities, Section 2.4.7 Topography and Section 2.4.8 Landscaping.
2.4.6 Dimensions

The general rule of thumb is that the site should be at least large enough to allow for 100 percent in building area for expansion, adequate parking area, traffic circulation and still retain attractive grounds and eliminate objectionable appearance of overcrowding.

The site the author has selected measures 1509 feet from the West property line to the right of way of Belt Line Road and 974 feet from the South property line to the right of way of Shady Grove Road. A site of this size will adequately meet the requirements of a hospital site and even allow space for facilities such as nursing schools and dormitory.

The large site will allow for the hospital to be set back away from the roadways, fine landscape areas, and give the hospital authorities the possibilities of controlling its future environment.

2.4.7 Topography

The site is located on relatively high ground taking advantage of natural drainage. However, the slope of the site is quite gradual offering no handicap to ambulatory patients. A sloping site such as this can be a considerable asset as it is often possible to locate basement service entrances at natural grade level.

Information for the subsoil conditions is taken from the Texas Turnpike Authority Preliminary Design Report. Based on this information without taking actual test borings on the site, the following results might be expected. The top 10 to 20 feet consist of clays, silts and silty sands. Below this level we might expect to find an Eagleford Shale which represents a perched water table. This is an indication that there will be good subsoil drainage and that no unusually difficult waterproof problems will be incurred.

2.4.8 Landscaping

"The psychological effect of attractive grounds on patient welfare, public good will and staff morale cannot be overestimated." \(^{20}\)

The site is heavily wooded with oak and elm trees on the sloping areas while the high ground is relatively bare. These trees vary in height from 15 to 25 feet with an occasional tree reaching a height of about 40 feet.

The area immediately adjoining the hospital and its dependencies will be landscaped as gardens, plazas and courts, while the areas further from the hospital will take advantage of the natural beauty of the site.

2.4.9 Parking and Vehicular Circulation.

The parking and vehicular circulation which must be taken into consideration are as follows:

1. Patients arriving or leaving by automobile or ambulance.
2. Outpatient traffic and parking facilities.
3. Bus stops and circulation for visitors, outpatients and employees.
4. Automobile circulation and parking for visitors. There should be one car for every two patient beds.
5. Controlled ingress and egress of employees with proper parking facilities.
6. Reserved parking for staff in a convenient area to the administration.
7. Service traffic for loading and unloading. This is with particular reference to kitchen, storage areas and morgue.
8. Provision for ambulance storage near emergency entrance should be made.

In the design of exterior traffic circulation and parking for a hospital, conflicting or crossing traffic should be avoided. At the same time, too

many entrances and exits to the site should also be avoided in order to eliminate confusion.* This dispersion of traffic should take place on the site with the exception of a separate entrance for the ambulance.

* Conference with Mr. L. B. Anderson, Head of Department of Architecture, M.I.T., July 7, 1955.
2.5 The Building

A 200 bed general hospital, according to the Texas State Plan for Construction of Hospitals and Public Health Centers, is a medical facility which would normally be a base hospital. A hospital of this size is considered a rather large facility and would be expected to be found in a base area.* However, one should be reminded at this point that the 200 bed hospital here is the result of the combination of two 100 bed hospitals neither of which would be considered a base hospital. Both hospitals would be subordinated to the Dallas facilities which is the base area for this particular medical region. As a result of this, the hospital for Grand Prairie and Irving is not a base hospital and therefore will not contain a great amount of optional facilities which will be repetitious with those facilities in Dallas such as medical schools.

The staff and clinical facilities for this hospital should be adequate to handle competently practically all types of major and minor surgery, obstetrics, internal medicine, pediatric, eye, ear, nose and throat conditions, dentistry, physiotherapy and industrial medicine and surgery. Also communicable diseases, including venereal, would be cared for, and at least the primary diagnosis of tuberculosis and neuropsychiatric conditions. It is therefore important to have approved x-ray, pathology, bacteriology and chemical laboratory in order to fulfill these functions.

2.5.1 Overall Relationship Between The Various Functions

It is very important to have a very good understanding of the proper relationship between the functions of the various elements of a hospital. One of the best ways of obtaining this knowledge is to study the traffic flow of the different types of personnel and patients. For this purpose, figure

* Base area is the nucleus of a medical region.
2.1 shows the key flow chart for an acute general hospital. 21

The traffic flow within the hospital is so complex that some crossing of traffic streams is inevitable. The correct relationship of departments and its dependencies to services will facilitate orderly traffic flow.

The main traffic streams which must be considered are as follows:

1. Patients
   a. Incoming patients who must proceed through the admitting office to patient areas such as emergency room, x-ray department or other services, etc.
   b. Outgoing patients who leave the hospital by way of the business office or social service department.
   c. Interdepartmental patient traffic.
   d. Deceased patients who must leave the hospital by way of the mortuary in the most unobtrusive way.
   e. Outpatients should be routed to the laboratory, pharmacy, x-ray, physical therapy, etc.

2. Visitors should be under close supervision to and from the patient areas as well as their entire stay in the hospital.

3. Staff should be routed past the record library and the administration area for physicians to be checked in or out.

4. Employees should be routed past their time control stations and lockers.

5. Service such as food, supplies, and wastes must be completely separated from all patient and visitor traffic.

FIGURE 2.1
KEY FLOW CHART ACUTE GENERAL HOSPITAL

NURSING

ADJUNCT DIAGNOSTIC FACILITIES
SURGERY
DELIVERY

NURSERY

HEALTH CENTER
OUTPATIENT DEPARTMENT
EMERGENCY
ADMINISTRATION

PATIENTS
STAFF OF HEALTH CENTER
OUT-PATIENTS
AMBULANCE
STAFF PATIENTS
VISITORS

SERVICE
LAUNDRY, KITCHEN, DINING, RMS, HELP'S LOCKERS, NURSES LOCKERS, STORAGE, AND MECH. PLANT

SERVICE & HELP
2.5.2 Administration

The administration unit is divided into two sections, one for medical and the other for business purposes.

The medical section includes conference, viewing, library, medical record room and staff lounge. These areas may be separated from the main entrance and lobby.

The section intended for business administration should be so located as to have close contact with all personnel passing through the main lobby.

The two sections of the administration unit should be accessible to each other. Also the administrative offices should be located in a "dead end" area in such a manner that there will be a minimum of traffic passing by the offices. However, its location should be apparent so that those people who have business in the administration area will have no difficulty in finding it.

2.5.3 Adjunct Diagnostic and Therapeutic Facilities.

The adjunct diagnostic and treatment facilities should be accessible to inpatients from the nursing units and outpatients from the outpatient department.

These facilities have three major divisions: (1) Diagnostic which includes radiology and pathology (laboratory, bacteriology serology, basal metabolism, electrocardiography, specimen room, office, morgue and autopsy); (2) treatment which includes x-ray therapy, physical therapy and occupational therapy; and (3) pharmacy.

All of the diagnostic facilities with the exception of the morgue and autopsy should be grouped together. The morgue and autopsy should be located near an exit for obvious reasons. The treatment facilities are generally located so as to be very accessible to the diagnostic facilities.
It is recommended that the pharmacy be located on the first floor or the same floor with the outpatient department for dispensing drugs to outpatients. It should also serve the inpatients, possibly by dumb waiter. A pharmacy for a hospital of this size will have a manufacturing laboratory.

2.5.4 Emergency Department

The emergency department should be located so that patients arriving by automobile or ambulance will have direct access to the emergency suite. Therefore, this department is generally located on the ground floor at the rear of the hospital. Care should be taken to locate this department in such a manner that the ambulance does not pass under patient windows.

The emergency rooms should be accessible to the operating suite by vertical circulation. It should not be directly connected to the operating suite nor should the emergency room be counted as an operating room.

The entrance should have a covered protection for patients being transferred from ambulances or cars. Loading platform or ramp may be provided for easy handling of patient.

2.5.5 Intern Living Quarters

Intern living quarters should never be located in patient areas. If it is to be in the hospital proper, it is best located on a separate floor such as the penthouse. It need not be served by an elevator.

In a hospital of this size, accommodations for twelve interns should be sufficient.

If a separate library and study room is provided, it will not be necessary to have a private room for each intern. There should be a common bath, a small kitchen, possibly connected by dumbwaiter to central kitchen, a recreation room and solarium.
2.5.6 Nursery Facilities

The nursery should be located on the same level with the obstetrical ward and delivery suite. It is desirable to locate the nursery in such a way so that the newborn infants do not have to be carried down contaminated corridors and at the same time it should not be located within the delivery suite. It should also be readily reached by visitors who wish to observe the infants through the nursery windows with a minimum of traffic through the corridors in patient areas.

There are three types of nurseries: (1) normal nursery; (2) premature nursery; (3) suspect nursery.

It is suggested that the normal nurseries be limited to a maximum of 8 bassinets each. There should be three normal nurseries or a total of 24 bassinets.

The premature nurseries will be similar to the normal nurseries. There should be a maximum of 4 premature infants in any one nursery. A hospital of this size requires two such nurseries. There should be 5 or 6 incubators which may be kept in the normal nursery when not in use.

The function of the suspect nurseries are to provide for the observation and care of newborn infants who develop symptoms suggestive of communicable disease. An infant who has definitely been diagnosed as having a communicable disease will be cared for in an isolation unit. This nursery should be completely separated from the normal and premature nurseries. There should be six bassinets with not more than three in any one nursery.

All three types of nurseries should not be entered from the corridor. Controlled access through the nurses' station or anteroom is desirable. All nurseries will have controlled temperature and humidity at all times.
2.5.7 Nursing Department

The nursing department is the largest department in a general hospital and is divided into several sections as follows: (1) medical; (2) pediatric; (3) surgical; (4) obstetrical; (5) isolation for special patients and temporary care of contagious and mental patients.

This brings up the question of what type of accommodations should be provided. Much of the current high construction cost may be attributed to an unjustified demand for a high percent of private rooms, unnecessary optional service and recreational facilities not required for an acute general hospital. Private rooms are thought to be desirable because of the high income they are supposed to bring. Such accommodations cost more to build. Also private rooms require a larger amount of service area and are an unreliable source of income since they are the first to become vacant in an economic recession. Also it should be noted that even in prosperous times, private rooms do not produce adequate revenue due to their low occupancy rate as a result of the charges for such accommodations.

"Aside from what patients can afford, there is also the question of how many private rooms are requisite to the proper care of patients. The answer may be found in a study made by Doctors Goldwater and Bluestone who concluded that only 14.4 percent of the patients in a general hospital needed such accommodations."²² This applies primarily to the medical and surgical nursing units. The pediatric unit handles a high percentage of contagious diseases. Therefore, about 25 percent of these patients should have private rooms. The obstetrical patients stay the shortest time and have the fastest turnover of any of the patients. Therefore, these patients can afford better accommodations and the administration can easily allow for this service. The obstetrical patients will probably have more visitors in proportion to the

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number of patients than any of the other nursing units.

The exact distribution and type of accommodation will be described in the program.

All types of nursing units have similar service requirements with slight variations. Figure 2.2 is a diagramatic drawing of the services required for a typical nursing unit. The variations referred to primarily occur in the isolation rooms.

The isolation rooms will have private baths and subutility rooms. The rooms for the care of psychiatric patients will have psychiatric screens on the windows and special safety features on the plumbing fixtures to keep the patient from drowning himself.

Seriously ill patients with contagious diseases and mental disorders will be transferred to Dallas hospitals. More harm than good may be done to a patient by trying to treat him with inadequate facilities.
FIGURE 2.2

FLOW CHART FOR TYPICAL NURSING UNIT
2.5.8 Obstetrical Facilities

The delivery suite should be located on the same floor as the maternity patients and as far away as possible from the pediatric patients. Maternity patients and newborn infants are very susceptible to pediatric diseases. Also the delivery suite should be planned in a "dead end" area so that there will be no through traffic. Strict segregation is imperative and may be facilitated by the use of a floor or a wing with separate facilities, equipment and supplies.

The exact requirements of the obstetrical facilities are enumerated in the program.

2.5.9 Offices for Doctors

Medical offices for private practitioners should be included in a hospital for a community of this size. This is not important in a large hospital, presumably in an urban center as it is in a smaller community. There are several advantages to this arrangement. The physicians would be close to their hospitalized patients and have access to the various facilities for diagnosis and treatment.

The medical offices should be located in a manner to be accessible to the administration, the outpatient department and the adjunct diagnostic and treatment facilities.

2.5.10 Outpatient Department

Since outpatient service is not now available, this facility must be provided by the hospital if it is to meet its community responsibility.

The outpatient department is usually assigned space on the main or ground floor accessible to the administration area, especially the record room, and to all adjunct services.
It is desirable to have a separate entrance from the rest of the hospital without steps. It is important to isolate the outpatient department and traffic as much as possible from the areas occupied by the inpatients. However, there should be convenient access without undue traffic from the outpatient department to the pharmacy, radiology, therapeutic facilities, laboratory and rehabilitation areas.

This department will include essentially two separate functions which are closely related to each other. There will be the administrative section which includes waiting room, facilities for admitting, appointments and cashier, and medical social service offices. The second section is for clinical functions and contains examining rooms and their dependencies, treatment rooms, dental and other specialty rooms. The exact requirements of this department are enumerated in the program.

2.5.11 Surgical Facilities

The operating suite should be located in a separate wing on the same floor with the surgical patients. It should be completely isolated from the patient and visitor areas and should have no through traffic in its corridor.

The operating suite may be divided into three closely related functions: (1) operating rooms cystoscopic room fracture room; (2) dependencies such as lockers, scrub-up, anesthesia, instrument storage, substerilizing, clean-up, supervisor, etc.; (3) central sterilizing supplies.

The operating rooms should be arranged in pairs with scrub-up and sub-sterilizing rooms between each pair. The orientation of the operating rooms is no longer considered important because artificial light will be used.
Since this institution is not a teaching hospital, observation galleries will not be provided.

A cystoscopic room should be provided in the operating suite so that continuous surgical supervision can be given. A connecting toilet should be provided.

The fracture room may either be located in the emergency suite or operating suite, the latter being preferable. Splint and plaster closets should be provided adjacent to the fracture room.

It is recommended that the central sterilizing and supply room be located at the entrance to the surgical suite. In this way it may serve the operating suite directly and the other areas by dumbwaiter and access by door to corridor. In some large hospitals the central sterilizing is located in a separate area.

It is important that the central supply service be concentrated in one location to facilitate the care and assembling of instruments, packs, equipment and clinical supplies, with sterilization and distribution as required to all hospital departments. The results of this will be a saving of unnecessary duplication of equipment, supplies, and effort with increased efficiency and a higher standard of work by skilled personnel.

2.5.12 Service Department*

The service facilities are divided in five sections: (1) dietary facilities; (2) housekeeping facilities; (3) mechanical facilities; (4) employees facilities; (5) storage.

The detailed requirements of this department are enumerated in the program. It is the purpose of this section to discuss the location of

* Heating and ventilation are discussed in Section 2.5.14.
the service facilities with respect to each other and other elements of the hospital.

The dietary facilities are primarily composed of the kitchen and its dependencies and the dining rooms. These services should have adequate natural light and ventilation. Sometimes these facilities have been located on the upper or top floors to eliminate odors, noise and heat. However, this location would utilize space which is more desirable for patients. Also location at grade level eliminates undesirable service traffic through other areas of the hospital.

The housekeeping facilities are composed of the laundry and its dependencies. These services may be located in the basement with high windows or windows which open into areaways. The laundry area will depend to a large extent on artificial lighting and ventilation. The laundry service rendered by a hospital laundry will differ from that done by a commercial laundry. The hospital laundry will handle a higher percentage of large pieces which require no hand work or sorting.

It is desirable to locate the laundry accessible to the elevators. However, it should be pointed out that the speed of the laundry service is not a matter of life and death. Also the laundry does not employ the use of skilled personnel as does the pharmacy, central sterilizing, etc. Therefore, its priority in distance to the elevators will not be as high as some of the other services.

The mechanical facilities include the boiler, electric equipment, air conditioning equipment, engineers office, maintenance shops and related storage. These are located relatively close to each other and generally assigned to basement areas.

During the preliminary design stage, the approximate size of the boiler room, spaces required for air conditioning equipment, pump rooms, electrical equipment, etc. must be determined and space allotted. Chases and furring
spaces must be provided for risers of the various mechanical services. The design of the structure must be such that it will accommodate these mechanical facilities. Spandrel beams and other members must be designed to clear convector pipes and riser chases with free space for expansion and insulation.

Employees facilities are composed of nurses' locker room, male help's locker room and female help's locker room. It is desirable practice to permit neither professional nor non-professional employees pass through the hospital in their street clothes. Therefore, the lockers should be located close to the employee's entrance.

The storage facilities are generally grouped together on the same level as the service entrance and referred to as central storage. This storage area is divided into several sections: anesthesia; bulk food; bulk storage; case storage; furniture room; issue and receiving; and pharmacy room. The anesthetic storeroom should be near the entrance for access in case of fire and easy handling of heavy tanks.

Central suction and oxygen should be provided to outlets in patient rooms in the surgical nursing unit, the operating rooms, delivery rooms, nursery, and pediatric nursing units. This will be provided by pipes in suspended ceiling of corridors or service core.

2.5.13 Structure

There are two main criteria in the design of a hospital structure. These are: (1) to design a structure which is simple, flexible and completely subservient to the vast mechanical and physical services and (2) to design a fireproof structure for the safety of the occupants.

To facilitate the realization of the first criteria, the hospital structure should be based on a structural module consistent with the area requirements of the functions of the various elements. The structure in
sense becomes the "common denominator" which must allow for the required flexibility.

A hospital of this size will generally be a five or six story structure. There are two choices in the selection of a structural material in keeping in mind that the hospital must be fireproof construction. This choice is between reinforced concrete and structural steel. The cost comparison of these two materials will vary in different parts of the country depending on local conditions. It has been well established that in the Dallas area it is more economical to use reinforced concrete as opposed to structural steel with concrete fireproofing (both standard and lightweight) to obtain equivalent fire rating for buildings up to a height of ten to twelve stories. Above this height fireproof steel construction becomes more economical.

The importance of fireproofing cannot be overemphasized. When a person enters a hospital, his main concern is his own personal problems and therefore he has little interest left for the basic precautions which he would otherwise observe.

On the basis of the previous discussion, it should be evident that reinforced concrete is the proper selection. The next step is to select a framing system. There are several concrete framing systems suitable for hospitals. The actual selection will depend upon many considerations of architectural requirements and technical limitations such as foundations, etc. Among the more commonly used systems are wide beam and slab, flat slab, beam and two-way slab and concrete joints utilizing either filler blocks or metal pans. With few exceptions, the first two systems, the wide beam and slab and the flat slab are the most economical when considering suspended ceilings and partitions as well as form work.23

2.5.14 Heating and Ventilation

It is highly desirable that a hospital built for this section of the country have year-round air conditioning.

With the exception of special areas in the hospital which must maintain controlled environment continuously, the balance of the hospital should have heating, cooling and natural ventilation for one-third of the year respectively. It is obvious that a building of this size will require zoning to facilitate good mechanical air conditioning for all the types of services required. Where ever possible elements which have similar requirements should be grouped or stacked if it is still consistent with the operations of that department. Those elements which require controlled conditions are delivery suite, nursery, operating suite, central sterilizing and supply, morgue and autopsy and emergency suite.

The patient rooms and other areas such as administration should have individual control.

"Air-conditioning for the hospital building is expected to be more expensive than for the average commercial installation of the same size. There are two reasons for this higher cost. In the surgery and delivery suites no recirculation of air is permitted, 100 percent outside air must be used, and this necessitates a substantial increase in heating and cooling equipment. In nursing areas recirculation of air from one room through the conditioning apparatus and back to another room is generally not permitted. Whatever recirculation is used must be within the one room. The reasoning behind these generally accepted practices is, of course, the minimizing of cross-infection through airborne contamination and the further hazard of anesthesia gas explosion in operating, delivery and anesthetizing rooms."24

Heating will be accomplished by a hot water system because of the lower operating cost and uniform control. Hot water will be circulated through convectors under windows. A fan will be used to circulate air around coils. Chilled water will be circulated through the coils in the summer time. The corridor and service core may employ a forced air system for heating and cooling.

2.5.15 Elevators and Dumbwaiters

It is preferable to group the elevators together than have them widely separated. It is desirable to have separate elevators for service and passengers. In larger hospitals one car may be designed with doors at both ends so that it can be used from a service corridor during certain hours and passengers for the balance of the time.

In locating elevators, special consideration should be given to the flow of traffic. The elevators are the most vital means of circulation in a multi-story hospital. The location of the elevators should be apparent upon entering through the main lobby of the hospital.

The elevators will be expected to carry beds and wheeled stretchers, food trucks, laundry trucks, mobile x-ray machinery and various other heavy or bulky equipment. The elevators must be large enough to accommodate a hospital bed and attendant. The minimum size of the elevator should be 5'-8" x 8'-4" with a 3'-10" door opening. It should have a capacity of 4000 pounds.

Hydraulic elevators have recently reappeared probably due to the cost factor. They operate fairly satisfactorily up to 3 floors.

"The conventional worm-gear traction and gearless traction machines with the machine mounted in a penthouse will continue to be the most popular and satisfactory for hospital use. The main objection to the
basement-mounted machine is its excessively long cables which are expensive to maintain.\textsuperscript{25}

All elevators should have self-leveling device and use the "Selective-Collective" system which permits operation with or without an operator. The elevators should have all safety features as well as a telephone in each car for emergency purposes.

A hospital of this size could be served by three elevators. However, it is preferable to have four elevators, especially in view of the expected visitor traffic flow, service and possible increase in bed capacity.

Dumbwaiters are installed to eliminate unnecessary elevator traffic. In general they will be used in the central sterilizing and supply, the kitchen and the pharmacy.

The dumbwaiter should be fully automatic with dispatched and arrival signals. The car size should be not less than 24" x 24" x 36". For heavy duty purposes, the car size should be 32" x 27" x 36".

\textbf{2.5.16 Stairs and Corridors}

The number and location of stairways will depend upon traffic demands and local ordinance. The maximum distance to the nearest exit must not exceed 100 feet in order to comply with accepted five safety regulations. The stairways should lead directly to the exterior of the building or to safe corridors which lead to the exterior.

The width of the stairway should be a minimum of 3'-3" for each run to permit the carrying of stretchers with adequate turning space at the landings. Standard risers and treads without winders should be used. It is desirable to use treads with incorporated abrasive.

The width of the corridors throughout the hospital must not be less than 7'-6", and preferably 8'-0". In areas where a great deal of wheeled

\textsuperscript{25} Rosenfield, Isadore (2nd Edition), P. 328.
stretches and beds are moved about such as delivery suite corridors, operating suite, elevator areas, etc., should have corridor width of between 10'-0" to 12'-0".

The finish of corridor walls should be smooth, washable and finished in attractive light colors which reflect light readily.

The ceiling height should not exceed 9'-6" and should be acoustically treated. The ceiling height may be reduced to provide for duct space, pipes and other facilities above a suspended ceiling.

The lightings should be provided by simple designed ceiling fixtures. Night lights and electrical outlets for mobile x-ray work and for cleaning machines should be provided in convenient places. Electric clocks and call systems must be provided in easily visible areas. All corridor exits must be clearly marked with electric signs.
PART III. PROGRAM

"Many times it has been found that a program of anticipated hospital operation is necessary to properly develop both the areas of community needs and hospital design, construction and equipment. Without knowledge of hospital operation, little real advancement would be made in either of these areas."26

It is important to realize that written programs are largely based on both experience and facts. Facts, especially in the field of hospital design, are largely obtained from statistics.

The statistical information described in the preceding portions of this study as well as discussions of local conditions and requirements are intended as a guide in the crystallization of the following program.

26. Block, Louis Dr. P. H.; The Modern Hospital, June 1953, P. 51.
### 3.1 Administration Suite

<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration Office</td>
<td>320</td>
</tr>
<tr>
<td>(Private Toilet)</td>
<td></td>
</tr>
<tr>
<td>Admitting Office</td>
<td>160</td>
</tr>
<tr>
<td>Assistant Director of Nursing</td>
<td>240</td>
</tr>
<tr>
<td>Business Offices (vault, etc.)</td>
<td>880</td>
</tr>
<tr>
<td>Director of Nursing</td>
<td>240</td>
</tr>
<tr>
<td>Information of Telephone Switchboard</td>
<td>100</td>
</tr>
<tr>
<td>Main Lobby and Waiting Room (including telephones)</td>
<td>1000</td>
</tr>
<tr>
<td>Personnel Toilets (2)</td>
<td>320</td>
</tr>
<tr>
<td>Public Toilets (2)</td>
<td>320</td>
</tr>
<tr>
<td>Record Room</td>
<td>560</td>
</tr>
<tr>
<td>Retiring Room</td>
<td>160</td>
</tr>
<tr>
<td>Secretary (to administrator)</td>
<td>160</td>
</tr>
<tr>
<td>Staff Lounge, Library and Conference Room (toilet)</td>
<td>700</td>
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</table>

Total 5,160
### 3.2 Adjunct Diagnostic and Therapeutic Facilities

<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pathology:</strong></td>
<td></td>
</tr>
<tr>
<td>Basal Metabolism, Electrocardiography and Specimen Room</td>
<td>200</td>
</tr>
<tr>
<td>Bacteriology Serology</td>
<td>320</td>
</tr>
<tr>
<td>Laboratory (wash &amp; sterilizing)</td>
<td>1100</td>
</tr>
<tr>
<td>Morgue and Autopsy</td>
<td>850</td>
</tr>
<tr>
<td>Office</td>
<td>200</td>
</tr>
<tr>
<td><strong>Pharmacy:</strong></td>
<td></td>
</tr>
<tr>
<td>Compounding and Dispensing</td>
<td>400</td>
</tr>
<tr>
<td>Manufacturing Laboratory and active storage (and vault)</td>
<td>300</td>
</tr>
<tr>
<td>Solution Room</td>
<td>100</td>
</tr>
<tr>
<td>Occupational Therapy</td>
<td>600</td>
</tr>
<tr>
<td>Physical Therapy (Includes Hydrotherapy)</td>
<td>1300</td>
</tr>
<tr>
<td>Blood Bank*</td>
<td>500</td>
</tr>
<tr>
<td><strong>Radiology:</strong></td>
<td></td>
</tr>
<tr>
<td>Diagnostic</td>
<td>1300</td>
</tr>
<tr>
<td>Therapeutic</td>
<td>400</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,570</td>
</tr>
</tbody>
</table>

* This may be in Outpatient Department.
## 3.3 Emergency Department

<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Operating Room</td>
<td>340</td>
</tr>
<tr>
<td>Observation Room–</td>
<td>200</td>
</tr>
<tr>
<td>Office and Waiting</td>
<td>300</td>
</tr>
<tr>
<td>Stretcher and Wheel Chair Storage</td>
<td>100</td>
</tr>
<tr>
<td>Supplies</td>
<td>50</td>
</tr>
<tr>
<td>Toilet</td>
<td>40</td>
</tr>
<tr>
<td>Utility and Bath</td>
<td>220</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1250</strong></td>
</tr>
</tbody>
</table>
### 3.4 Intern Living Quarters

<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bath Room (1 required)</td>
<td>210</td>
</tr>
<tr>
<td>Bed Rooms (6 double rooms)</td>
<td>1200</td>
</tr>
<tr>
<td>Kitchen</td>
<td>200</td>
</tr>
<tr>
<td>Recreation</td>
<td>740</td>
</tr>
<tr>
<td>Solarium</td>
<td>260</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,610</strong></td>
</tr>
</tbody>
</table>
3.5 Nursery

There will be a maximum of 8 bassinets to any one normal nursery, 4 bassinets to any premature nursery, and 3 bassinets to any one suspect nursery.

<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursery * (24 bassinets)</td>
<td>800</td>
</tr>
<tr>
<td>Premature nursery* (8 bassinets)</td>
<td>600</td>
</tr>
<tr>
<td>Suspect nursery* (6 bassinets)</td>
<td>400</td>
</tr>
<tr>
<td>Total</td>
<td>1800</td>
</tr>
</tbody>
</table>

* Each nursery area includes its own ante-room, work-space and examination room.
3.6 Nursing Department

The nursing department is divided into four major divisions as follows:

<table>
<thead>
<tr>
<th>Name</th>
<th>No. of beds</th>
<th>Private</th>
<th>Accomodations</th>
<th>Wards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Single</td>
<td>(2 beds)</td>
<td>(4 beds)</td>
</tr>
<tr>
<td>Medical</td>
<td>64</td>
<td>4</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Pediatric</td>
<td>32</td>
<td>8</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Surgical</td>
<td>64</td>
<td>4</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Obstetrical</td>
<td>40</td>
<td>24</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>40</td>
<td>36</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Bed Rooms</td>
<td>7350</td>
</tr>
<tr>
<td>Pediatric Bed Rooms</td>
<td>4100</td>
</tr>
<tr>
<td>Surgical Bed Rooms</td>
<td>7350</td>
</tr>
<tr>
<td>Obstetrical Bed Rooms</td>
<td>7350</td>
</tr>
<tr>
<td>Subtotal</td>
<td>26,150**</td>
</tr>
<tr>
<td>Treatment Rooms (4)</td>
<td>840</td>
</tr>
<tr>
<td>Solaria (3)</td>
<td>780</td>
</tr>
<tr>
<td>Visitors</td>
<td>1200</td>
</tr>
<tr>
<td>Nurses' Stations (7)</td>
<td>840</td>
</tr>
<tr>
<td>Service Units (7)</td>
<td></td>
</tr>
<tr>
<td>Toilet, Bath, Linen, Bed pan</td>
<td>2750</td>
</tr>
<tr>
<td>Utility Rooms (4)</td>
<td>1000</td>
</tr>
<tr>
<td>Sub-utility (3)</td>
<td>630</td>
</tr>
<tr>
<td>Floor Pantry (4)</td>
<td>1000</td>
</tr>
<tr>
<td>Storage</td>
<td></td>
</tr>
<tr>
<td>Janitor, Stretcher, Wheel chairs, closets</td>
<td>1000</td>
</tr>
<tr>
<td>Total</td>
<td>36,190</td>
</tr>
</tbody>
</table>

* Bassinets

** Includes toilets, baths and isolation sub-utility rooms.
### 3.7 Obstetrical Facilities

<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean-up Room</td>
<td>200</td>
</tr>
<tr>
<td>Delivery Rooms (2)</td>
<td>740</td>
</tr>
<tr>
<td>Doctors' lockers and toilet</td>
<td>315</td>
</tr>
<tr>
<td>Janitor's closet</td>
<td>20</td>
</tr>
<tr>
<td>Labor Rooms (3)</td>
<td>940</td>
</tr>
<tr>
<td>Nurses' lockers</td>
<td>160</td>
</tr>
<tr>
<td>Nurses' Station</td>
<td>60</td>
</tr>
<tr>
<td>Scrub-up Alcove</td>
<td>60</td>
</tr>
<tr>
<td>Storage:</td>
<td></td>
</tr>
<tr>
<td>Nonsterile (also linen)</td>
<td>80</td>
</tr>
<tr>
<td>Sterile</td>
<td>100</td>
</tr>
<tr>
<td>Stretcher</td>
<td>60</td>
</tr>
<tr>
<td>Sub-sterilizing</td>
<td>120</td>
</tr>
<tr>
<td>Total</td>
<td>2,855</td>
</tr>
</tbody>
</table>
3.8 Offices for Doctors

The doctor offices should be especially attractive near doctors' lounge, records and library as well as outpatients, diagnostic and treatment facilities. It is hoped that some of the local doctors will take advantage of having their offices in the hospital.

The design of the doctor offices should be very flexible to fit the requirements of any doctor who may wish to occupy this space. For this reason, it may be desirable not to force this arrangement into the cellular type of structural module of the large hospital, but instead, locate it in front of the hospital in a one story structure connected to the hospital.

Provisions should be made for eight doctor offices. Approximately 500 square feet should be allowed for each office or a total of 4,000 square feet. Each office should have the following space:

- Waiting Area
- Dressing booths
- Examination and Treatment Room
- Consultation Room.
### 3.9 Outpatient Department

<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appointments and Cashier</td>
<td>260</td>
</tr>
<tr>
<td>Dental suite</td>
<td>410</td>
</tr>
<tr>
<td>Eyes, ears, nose and throat</td>
<td>410</td>
</tr>
<tr>
<td>Examination rooms including:</td>
<td></td>
</tr>
<tr>
<td>dressing booths</td>
<td></td>
</tr>
<tr>
<td>immunizing</td>
<td></td>
</tr>
<tr>
<td>personnel toilet</td>
<td></td>
</tr>
<tr>
<td>utility</td>
<td></td>
</tr>
<tr>
<td>office</td>
<td>1300</td>
</tr>
<tr>
<td>History and Screening</td>
<td>120</td>
</tr>
<tr>
<td>Public Toilets</td>
<td>220</td>
</tr>
<tr>
<td>Social Service</td>
<td>300</td>
</tr>
<tr>
<td>Surgery</td>
<td>350</td>
</tr>
<tr>
<td>Waiting Area *</td>
<td>800</td>
</tr>
<tr>
<td>Total</td>
<td>4,150</td>
</tr>
</tbody>
</table>

* Waiting area may also be used for adjunct diagnostic and therapeutic facilities and for the doctor offices.
### 3.10 Surgical Facilities

<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anesthesia Storage</td>
<td>200</td>
</tr>
<tr>
<td>Central Sterilizing and Supply</td>
<td>850</td>
</tr>
<tr>
<td>Clean-up Room</td>
<td>140</td>
</tr>
<tr>
<td>Cystoscopic Room</td>
<td>200</td>
</tr>
<tr>
<td>Darkroom (x-ray)</td>
<td>30</td>
</tr>
<tr>
<td>Doctors' Locker Room</td>
<td>260</td>
</tr>
<tr>
<td>Fracture Room</td>
<td>260</td>
</tr>
<tr>
<td>Plaster Closet</td>
<td>35</td>
</tr>
<tr>
<td>Splint Closet</td>
<td>85</td>
</tr>
<tr>
<td>Instruments</td>
<td>145</td>
</tr>
<tr>
<td>Janitors' Closet</td>
<td>20</td>
</tr>
<tr>
<td>Major Operating Rooms (4)</td>
<td>1350</td>
</tr>
<tr>
<td>Minor Operating Room</td>
<td>330</td>
</tr>
<tr>
<td>Nurses' Locker Room</td>
<td>260</td>
</tr>
<tr>
<td>Recorder</td>
<td>70</td>
</tr>
<tr>
<td>Scrub-up Alcoves (2)</td>
<td>185</td>
</tr>
<tr>
<td>Storage Closet</td>
<td>145</td>
</tr>
<tr>
<td>Stretcher Space</td>
<td>60</td>
</tr>
<tr>
<td>Sub-sterilizing Rooms (2)</td>
<td>245</td>
</tr>
<tr>
<td>Surgical Supervisor</td>
<td>130</td>
</tr>
<tr>
<td>Unsterile Supply Room</td>
<td>160</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,160</strong></td>
</tr>
</tbody>
</table>
### 3.11 Service Department

<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dietary Facilities</strong></td>
<td></td>
</tr>
<tr>
<td>Day Storage</td>
<td>150</td>
</tr>
<tr>
<td>Dietitian's Office</td>
<td>165</td>
</tr>
<tr>
<td>Dining Space, including serving space, Staff, supervisory employees and nurses (2 sittings)</td>
<td>1125</td>
</tr>
<tr>
<td>Dining for help</td>
<td>530</td>
</tr>
<tr>
<td>Dishwashing and Truck Washing</td>
<td>255</td>
</tr>
<tr>
<td>Formula Room and Bottle Wash</td>
<td>390</td>
</tr>
<tr>
<td>Garbage and Can Wash</td>
<td>110</td>
</tr>
<tr>
<td>Main Kitchen and Bakery</td>
<td>2405</td>
</tr>
<tr>
<td>Receiving Area</td>
<td>90</td>
</tr>
<tr>
<td>Refrigeration (walk in):</td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td>60</td>
</tr>
<tr>
<td>Dairy Products</td>
<td>35</td>
</tr>
<tr>
<td>Fruit and Vegetables</td>
<td>95</td>
</tr>
<tr>
<td>Ice Manufacturing</td>
<td>50</td>
</tr>
<tr>
<td>Sub-total</td>
<td>5,460</td>
</tr>
<tr>
<td><strong>Employee's Facilities</strong></td>
<td></td>
</tr>
<tr>
<td>Nurses' Locker Room (96 lockers, 4 w.c., 4 showers)</td>
<td>1000</td>
</tr>
<tr>
<td>Male Help's Locker Room (50 lockers, 3 w.c., 1 urinal 4 showers)</td>
<td>480</td>
</tr>
<tr>
<td>Female Help's Locker Room (50 lockers, 4 w.c., 4 showers)</td>
<td>800</td>
</tr>
<tr>
<td>Sub-total</td>
<td>2,280</td>
</tr>
<tr>
<td><strong>Housekeeping Facilities</strong></td>
<td></td>
</tr>
<tr>
<td>Central Linen Room, Sewing Room and Housekeeper's Office</td>
<td>500</td>
</tr>
<tr>
<td>Laundry</td>
<td>2100</td>
</tr>
<tr>
<td>Soiled Linen (Sorting) and toilets</td>
<td>500</td>
</tr>
<tr>
<td>Sub-total</td>
<td>3,100</td>
</tr>
<tr>
<td><strong>Mechanical Facilities</strong></td>
<td></td>
</tr>
<tr>
<td>Air Conditioning Machinery, Battery Room, Boilers, Incinerator, and Transformer Vault.</td>
<td>4500</td>
</tr>
</tbody>
</table>

* Designed for centralized bulk service.
<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpenter Shop</td>
<td>800</td>
</tr>
<tr>
<td>Elevator Machinery</td>
<td>1000</td>
</tr>
<tr>
<td>Engineer's Office</td>
<td>200</td>
</tr>
<tr>
<td>Ran Rooms for Air Conditioning Located</td>
<td>3000</td>
</tr>
<tr>
<td>throughout Building (22)</td>
<td></td>
</tr>
<tr>
<td>Gear Closet</td>
<td>35</td>
</tr>
<tr>
<td>Maintenance and Electrical Shop</td>
<td>350</td>
</tr>
<tr>
<td>Paint Storage</td>
<td>200</td>
</tr>
<tr>
<td>Refinishing Shop</td>
<td>200</td>
</tr>
<tr>
<td>Miscellaneous (pipe chase, dust space, and stack)</td>
<td>2600</td>
</tr>
<tr>
<td>Sub-total</td>
<td>12,885</td>
</tr>
</tbody>
</table>

**Storage:**

- Central Stores
  - Anesthesia
  - Bulk Food
  - Bulk Storage
  - Case Storage
  - Furniture Room
  - General Storage
  - Issue and Receiving
  - Pharmacy Stores
  - Truck Bay: 4800
  - Garage and Ambulance Driver*: 1200
  - Record Storage (inactive): 400

Sub-total: 6,400

**Total:** 30,125

* This includes emergency entrance loading area.
### 3.12 Site Requirements

<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parking:</strong></td>
<td></td>
</tr>
<tr>
<td>Employees Parking (40 cars)</td>
<td>12,000</td>
</tr>
<tr>
<td>Outpatient Parking (25 cars)</td>
<td>7,500</td>
</tr>
<tr>
<td>Staff Parking (25 cars)</td>
<td>7,500</td>
</tr>
<tr>
<td>Visitors' Parking (100 cars)</td>
<td>30,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>57,000</td>
</tr>
</tbody>
</table>

**Traffic Circulation:**

Allowance for ambulance, automobile, bus and trucks must be considered for proper ingress and egress to their appropriate areas.
3.13 Circulation Space

Allowance for ample circulation area for connections of a vital function of the hospital is absolutely essential. There are four types of circulation which must be considered. They are: (1) Patient traffic; (2) staff traffic; (3) service traffic and (4) visitor traffic.

Vertical and horizontal circulation must be simple and well studied with consideration for stretcher and ambulatory patients. Vertical circulation will be by stairs, elevators and dumbwaiters.

Approximately 27,000 square feet of circulation area will be required for a hospital of this size.
### Summary of Areas

<table>
<thead>
<tr>
<th>Name of Space</th>
<th>Approximate Area (Square Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration Suite</td>
<td>5,160</td>
</tr>
<tr>
<td>Adjunct Diagnostic and Therapeutic Facilities</td>
<td>7,570</td>
</tr>
<tr>
<td>Emergency Department</td>
<td>1,250</td>
</tr>
<tr>
<td>Intern Living Quarters</td>
<td>2,610</td>
</tr>
<tr>
<td>Nursery</td>
<td>1,800</td>
</tr>
<tr>
<td>Nursing Department</td>
<td>36,190</td>
</tr>
<tr>
<td>Obstetrical Facilities</td>
<td>2,855</td>
</tr>
<tr>
<td>Offices for Doctors</td>
<td>4,000</td>
</tr>
<tr>
<td>Outpatient Department</td>
<td>4,150</td>
</tr>
<tr>
<td>Surgical Facilities</td>
<td>5,160</td>
</tr>
<tr>
<td>Service Department</td>
<td>30,125</td>
</tr>
<tr>
<td>Circulation Space</td>
<td>27,000</td>
</tr>
<tr>
<td><strong>Total Building Area</strong></td>
<td><strong>127,870</strong></td>
</tr>
<tr>
<td><strong>Parking Area</strong></td>
<td><strong>57,000</strong></td>
</tr>
</tbody>
</table>
PART IV. DESIGN

If those functions of the hospital which are similar and depend on the same types of mechanical and physical services are grouped together so as to facilitate simpler operations, then the massing of the building, an important aspect of aesthetics, is determined. The fenestration of the exterior should be expressive of the function of the interior space.

An atmosphere of quiet, healthfulness, cleanliness and secure cheerfulness are inherent in the functional disposition of the elements of a properly designed hospital. It is the architect's duty to do everything in his power to enhance these qualities which are automatically present.

If the hospital is well organized and planned based on the above principles as well as those considerations mentioned in the earlier portions of this study, then not only will a building result which will serve the functions of a hospital, but it will also have an aesthetic quality which will be expressive of itself and may then be called "architecture."
LEGEND

INTEGRATED AREAS

- GRAND PRAIRIE (ANNEXED)
- GRAND PRAIRIE (FIRST READING)
- DALLAS • FT. WORTH (ANNEXED)
- DALLAS • FT. WORTH (FIRST READING)
- OTHER MUNICIPALITIES (ANNEXED)
- OTHER MUNICIPALITIES (FIRST READING)
- OTHER MUNICIPALITIES (UNDER CONSIDERATION)

AREAS WITHIN METROPOLITAN DRAINAGE AREA AND POTENTIAL FOR URBAN DEVELOPMENT

DRAINAGE AREA LIMITS

APPROXIMATE LIMITS OF DALLAS DRAINAGE SYSTEM AS ESTABLISHED BY THE CITY OF DALLAS

THE DALLAS-FT. WORTH METROPOLITAN AREA

THE CITY PLAN FOR GREATER

GRAND PRAIRIE

TEXAS 1954

THE CITY PLANNING COMMISSION
FRITZ J. JACOB, CHAIRMAN

DALLAS, TEXAS
VIEW OF SITE FROM 16,000 FEET
PICTURE 4
APPENDIX

Figure A.1 Personnel by Department

The largest single factor in hospital personnel is nursing which accounts for at least half of all the employees. Personnel requirements in all departments increase proportionately with the increased size of the hospital. However, above the 50 bed hospital, the X-ray, laboratory and other professional services assume greater relative importance in terms of personnel. For hospitals larger than 100 beds, the dietary personnel assumes greater importance. The reason for this may be seen in figure A-3.
FIGURE A.1
PERSONNEL BY DEPARTMENT

NUMBER OF EMPLOYEES

BED SIZE OF HOSPITAL
The amount of linen laundered per year is much lower for the smaller hospitals than it is for the larger hospitals. The proportion of hospitals that operate their own laundries increase with the size of the hospital.

The 25 and 50 bed hospital averages 1 laundry employee for every 12 to 15 hospital beds; the 100 bed hospital averages 1 laundry employee for every 13 to 14 hospital beds, and the 200 bed hospital averages 1 employee for every 15 to 16 hospital beds.
FIGURE A.2
AVERAGE NUMBER OF POUNDS AND PIECES
OF LINEN LAUNDERED PER YEAR
Figure A.3 Average Number of Meals Served per Year

The proportionate number of meals increases in hospitals over 100 beds in size. The ratio of patient meals to personnel and other meals is one to one in the 25 bed hospital; one and a half to one in the 50 bed hospital; two to one in the 100 bed hospital and two and a half to three in the 200 bed hospital. Although there is a rapid increase in personnel meals for the 200 bed hospital, the effect on hospital expense is negligible. This effect may be seen on Figure A-6.
FIGURE A.3
AVERAGE NUMBER OF MEALS SERVED PER YEAR
Since the employees per patient is less for the 50 bed hospital than any of the other sized hospitals, it is not too surprising that the expense for this sized hospital is also lower. (See figure 1.13).

There is an increase in expense, patient income and payroll per patient day with the increase in hospital size. One of the reasons for this is that the illnesses of a more specialized nature finds its way to the larger hospitals.
FIGURE A.4
AVERAGE EXPENSE AND
PATIENT INCOME PER
PATIENT DAY

TOTAL EXPENSE
PATIENT INCOME
PAYROLL

DOLLARS

BED SIZE OF HOSPITAL
Expense per patient stay increases with the size of the hospital. The total expense of care to the patient for his stay in the hospital is affected by both the length of his stay and the cost per day. Both factors increase with the increase in the size of the hospital. (See figures 1.7, 1.8 and A-4).
FIGURE A.5
AVERAGE EXPENSE AND PATIENT INCOME PER PATIENT STAY

EXPENSE

PATIENT INCOME

DOLLARS

BED SIZE OF HOSPITAL
Above the 50 bed hospital, the percentage distribution of expenses remains fairly constant with only slight increase in administration and slight decrease in nursing. In hospitals smaller than 50 beds, the nursing, dietary, laundry and maintenance are more important while x-ray, laboratory, pharmacy, other professional service and administration are less important in terms of percent distribution of expenses. The main reason for this is the lack of extensive specialization in the small hospital.
FIGURE A.6
PERCENTAGE DISTRIBUTION OF EXPENSES BY DEPARTMENT
THE LAND USE PATTERN

Regardless of the decision on the recommendation the City should not dispose of any of the property it now owns either in the Grand Prairie Road tract or the present municipal buildings site, in expectation of ultimate removal to the airport site or to any other location, until the final character of the downtown area is more definitely known. These properties may well be required for location of some particular branch of the City Government, for municipally owned parking facilities or for some other public use; the present City Hall site might be developed to very good use as a midtown rest area or park. In any event, none of this property will decrease in value with the passage of time and it can always be sold to advantage if the City finds it has no use for it with the ultimate development of the downtown area. Meanwhile the City may consider itself very fortunate to have under public ownership in the downtown area as much property as it has, and this fact may quite possibly save the City some serious land acquisition problems in the future as the City grows to its ultimate stature.

THE MUNICIPAL AUDITORIUM

Although Grand Prairie does not have a municipal auditorium, the auditorium in the recently completed High School is well appointed, and is suitable - and used - for various civic functions. This auditorium has a total seating capacity of 934 (676 lower floor, 258 balcony) and should fill most of Grand Prairie's immediate needs for auditorium space. A municipal auditorium would of course be a definite asset to Grand Prairie, and when there develops a more-than-occasional demand for additional seating space or for more commodious stage facilities (as, for example, for symphony orchestra performances, grand opera or the more pretentious stage performances) than are afforded by the high school auditorium, a municipal auditorium should be built as soon as funds can be provided for it. When that time comes, an auditorium of moderate size, seating perhaps 1500 to 2500 people might be built, as there will always be a need for one of this size for activities attracting moderate patronage, with a larger auditorium planned for still later construction to complete the ultimate municipal buildings plan.

THE MUNICIPAL HOSPITAL

Grand Prairie should have as soon as convenient, a hospital adequate to serve the needs of her own people and of the doctors who now and will in the future practice in this locality. Whether or not the hospital should be provided as a public facility is a question on which there is divided opinion, but there certainly is adequate precedent if Grand Prairie desires to undertake the construction and operation of a hospital as a municipal activity.

Generally accepted standards provide that there should be about \( \frac{1}{2} \) general purpose hospital beds for each 1000 population in the area served by the hospital. This factor is for medium sized cities, and increases to about 6 beds per 1000 for large cities. On this basis Grand Prairie needs about 120 hospital beds for her present population, and will require about 400 beds in the early future, when her population has reached 85,000. For the ultimate 500,000 population, 2,250 to 3,000 beds will be required.

I-94
There are, of course, hospital facilities in Dallas and Fort Worth which are available to Grand Prairie citizens, and Grand Prairie citizens (as citizen of the County of Dallas) have in the past contributed and will continue to contribute to the support of the publicly owned hospital facilities of the area ... the old Parkland Hospital and its successor, the new $2,000,000.00, 750-bed Parkland Memorial Hospital, now nearing completion, which will be operated in cooperation with the Southwestern Medical School of the University of Texas. The responsibility for operation of this hospital, and amortization of its cost, is expected to pass to a County-wide hospital district, in which Grand Prairie citizens will be participants on an equivalent basis with all other Dallas County citizens, with the adoption of a proposed State Constitutional amendment to be submitted to the voters in November of this year.

So again Grand Prairie’s situation in the metropolitan area puts an entirely different light on her problem. For a City of 26,000 or so, located by itself as the center of its surrounding territory and with no near-by larger cities, a hospital would be a virtual necessity. For Grand Prairie citizens, the existing hospital facilities in Dallas are available, they are as close to Grand Prairie as they are to parts of the City of Dallas, and in a sense they belong as much to the citizens of Grand Prairie as they do to the citizens of Dallas. Construction of a Grand Prairie Hospital is not, therefore, a project of extreme urgency, nor one justifying an all-out effort for accomplishment in preference to other needed improvements.

This is not to say, however, that a general hospital in Grand Prairie, primarily for Grand Prairie citizens, is not a desirable improvement, and one which should be provided as soon as funds for its construction and operation can be assured. There will ultimately be required several such hospitals in the Grand Prairie area; the first should be built as soon as possible, and there is adequate need and justification for it today, even with the available and near-by hospital facilities of Dallas.

There will be in Dallas, with completion of the Parkland Memorial Hospital, a total of 2,721 beds of all types, according to information furnished by the Dallas City Health Department. These are not all "general" beds. The total includes the Veteran's Hospital at Lisbon (347), not for general public use, and several semi-private or special purpose hospitals such as Timberlawn. If this total is related to the present estimated population of the City of Dallas (509,276), a ratio of 5.34 beds per 1000 is indicated — which should be adequate for the City of Dallas. But if the present estimated population of the Dallas Metropolitan Area (Dallas County) is considered, probably now in the neighborhood of 750,000, the ratio becomes only 3.6 beds per 1000, and about 650 additional beds would be required today to equal the 4.5 bed per 1000 standard. When it is considered that the Dallas hospitals serve a considerable area beyond Dallas County, it is readily seen that the Dallas area is not oversupplied with hospital facilities and there is adequate justification, on the basis of need, for constructing additional hospitals. The need is increasing daily as the population increases.

Grand Prairie might logically undertake to provide at an early date a hospital of 150 to 200 beds, so designed that it can be expanded to 500 or more beds by additional construction as the City grows and its patronage increases. Hospital construction and operation, however, is a major fiscal item and
THE LAND USE PATTERN

certainly is not to be undertaken lightly. Hospital construction costs average about $16,000 per bed, and annual operating costs amount to about one-third of the construction cost. Hospitals are notoriously not money-making institutions, and the patients normally will pay not more than 85% to 90% of the total cost of operation. The balance must come from other sources ... in the case of a City-owned hospital, usually from the municipal tax budget.

A 200 bed municipal hospital for Grand Prairie would cost about $3,000,000.00 and the City would be called on to contribute to its support perhaps $150,000 per year, in addition to the bond amortization costs.

Two rules should be observed in selecting a hospital site. First, the location must be readily accessible to the major trafficways, and as nearly as practicable centrally located in the general area it will serve ... a matter of minutes can mean life or death in an ambulance run. A location surrounded by narrow and crooked streets, particularly if traffic density is high, is not suitable for a hospital. Second, the location must be well separated and removed from the noise and other disturbing influences of City life. For the well-being of the patients an atmosphere of peace and quiet should prevail; adequate ground area, appropriately landscaped and developed in the character of a park, should be available for sunshine and fresh-air therapy for convalescents.

The present Grand Prairie Airport has been suggested as a suitable site for both a municipal center and a City Hospital. There is adequate area here to permit a hospital to be set apart from the other buildings, in the midst of a park area adequate to isolate it from all surrounding activity; and this location is readily accessible from all parts of the Grand Prairie area over the proposed major street network.

In view of the cost of constructing and operating a hospital, it is not considered likely that the City of Grand Prairie will be in position to undertake such a project in the near future, as the expected rapid growth of the City will strain all of the City's resources just to provide the services necessary to keep up with the growth. It is suggested that a general hospital, available to the public, is a public service regardless of ownership and, should the City be successful in obtaining title to the Airport property, the site selected for a hospital might be leased or sold outright, for a nominal fee, to any semi-public or endowed agency which might be prepared to undertake the project. Construction of additional hospitals, perhaps one in Grand Prairie, might eventually be undertaken by the hospital district to be established for the administration of the Parkland Memorial Hospital.

OUTLYING SERVICE AREAS

The larger Cities, including Dallas, are finding it necessary and convenient to de-centralize some of their municipal activities which deal directly with the public, and to provide "branch offices" in locations convenient and accessible to the residential areas. It is recommended that Grand Prairie keep in mind the ultimate needs for such de-centralization, and acquire suitable properties as convenient.
THE LAND USE PATTERN

The facilities to be included here comprise offices for daily transaction of public business with the private citizen: e.g., offices for payment of water bills, tax and public information offices: also to be included are municipal service facilities: e.g., fire stations, police substations, route headquarters and storage facilities for garbage and refuse collection, street and sanitary sewer maintenance crews, and automotive service facilities for City owned vehicles. Care must be exercised in locating and arranging these facilities which must of necessity in many cases be surrounded by property devoted to residential use. The possibility is suggested that integrated arrangements of several of these facilities can be located adjacent either to park properties or to suburban business centers, and designed to minimize their impact on adjoining residential areas.

FIRE STATION

The location of fire stations, as well as the location of fire hydrants and the design of the water distribution system and other factors affecting the ability of the City to prevent excessive damage from fire, are controlled by well defined rules and regulations of the State of Texas, and need not be discussed here. The City has both full time and volunteer personnel who are fully familiar with these requirements and are competent to determine where new fire stations should be located to best meet the requirements.

It is recommended that the Fire Department administrative personnel be given the opportunity to determine in advance of development, and on the basis of the major street plan, the approximate locations where future fire stations will be required, and that preliminary negotiations be made with the property owners toward acquiring the necessary property and/or planning the subdivision plat to include a suitable fire station site at the time the property is developed.

Two cardinal rules should be observed in locating fire stations: first, the station must have ready access to the major street system to permit quick movement of the apparatus to other areas when required, and the residential street system in the area to be served by the station should provide as direct access as possible to all parts of the area; second, the station must be as unobtrusive as possible when viewed from the surrounding residential areas. Location together with other service facilities and adjacent to or in commercial areas or parks should be provided wherever feasible.
Dallas is located in north central Texas, approximately 250 miles inland from the Gulf of Mexico. It is near the headwaters of the Trinity River, which lies in the upper margins of the coastal plain. The rolling hills of the Blackland Prairies range from five to seven hundred feet in elevation in the area, providing rich grass and farm lands, interspersed with woodlands along the many perennial and intermittent streams.

At one time in the distant past, a range of mountains lay across the present location of Dallas. As this range eroded, the region lowered gradually to below sea level, so that for millions of years a shallow layer of water covered the area. The relatively recent period of mountain building lifted this area into a gently sloping, fertile coastal plain.

It appears that moist, mild conditions prevailed during the early history of this area. One can surmise that low stratus clouds and warm humid air moved inland from the south then, just as now. The local mountain range served as a barrier over which the air was forced to rise, resulting in cloudy skies and heavy rainfall. As these mountains eroded and the surface subsided, the coast moved closer, tending to maintain the humid conditions. The mountain building period forced the sea to recede, resulting in the development of a more continental climate.

When considering the climate of the Dallas area, one is impressed by the temperature extremes that prevail, and on the other hand, by the great extremes that coalesce to produce those means. A yearly normal temperature of 66.5°F, and a normal annual rainfall of 34.42 inches places Dallas in a region where sudden changes in temperature and moisture occur. The high temperatures that occur during the summer months are generally associated with the fair skies, westerly winds and dry air that are favorably located immediately to the west. A strong outbreak of extremely cold Canadian air in January 1930 brought a record low temperature of -3 degrees to Dallas on the 18th. At the other extreme, a high temperature of 111 degrees was recorded on July 25, 1954. Records made by cooperative observers prior to the establishment of a regular Weather Bureau Office at Dallas show an extreme minimum temperature of -10 degrees in February 1899 and a maximum of 115 degrees in August 1909.

The prevailing surface winds are southerly. Strong winds from the north occur frequently from fall through spring, however, but they are of relatively short duration. Except for the low clouds and fog of the cool months and the afternoon showers that occur during the summer, the prevailing southerly winds produce fair skies, allowing 79 per cent of the possible sunshine in July. The cloudiness associated with the frequent frontal systems of the cool months reduces this to between 50-55 per cent in December, January, and February.

The character of the rainfall is typical of the Great Plains area, having a sharp peak in the spring as the moist tropical air pushes inland. The total for the year, and the totals for the dryer months are higher than those for most of the stations on the plains, however. This is largely due to the proximity of the source of moisture. A large part of the precipitation is the result of shower activity. Although most showers are light, an extreme fall of 4.77 inches in a two-hour period has been recorded.
### METEOROLOGICAL DATA FOR THE CURRENT YEAR

#### LATITUDE 32° 51' N

#### LONGITUDE 96° 51' W

#### ELEVATION (ground) 497 FEET

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<th>Month</th>
<th>Temperature</th>
<th>Precipitation</th>
<th>Relative Humidity</th>
<th>Wind</th>
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<td>Daily Low</td>
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#### YEARLY Averages

- **Temperature:**
  - Daily High: 50.0°F
  - Daily Low: 40.0°F
  - Average: 45.0°F

- **Precipitation:**
  - Average: 20.0 in.
  - Monthly Total: 100.0 in.
  - Year Total: 200.0 in.

- **Relative Humidity:**
  - Average: 60.0%
  - Monthly Record: 70.0%
  - Year Record: 60.0%

- **Wind:**
  - Average: 10.0 mph
  - Speed: 20.0 mph
  - Direction: N

- **Number of days:**
  - Average: 300
  - Monthly Record: 350
  - Year Record: 300

####Normals, Means, and Extremes

- **Temperature:**
  - Normal: 50.0°F
  - Mean: 45.0°F
  - Extremes: 10.0°F

- **Precipitation:**
  - Normal: 20.0 in.
  - Mean: 10.0 in.
  - Extremes: 50.0 in.

- **Relative Humidity:**
  - Normal: 60.0%
  - Mean: 50.0%
  - Extremes: 70.0%

- **Wind:**
  - Normal: 10.0 mph
  - Mean: 5.0 mph
  - Extremes: 20.0 mph

- **Number of days:**
  - Normal: 300
  - Mean: 350
  - Extremes: 300

### Notes

- Yearly data includes measurements from January 1 to December 31.
- Normal values are based on the period 1921-1950, and values are adjusted to represent observations taken at the present standard location.

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**DALLAS, TEXAS**

**LOVE FIELD**

**1954**

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**LATITUDE 32° 51' N**

**LONGITUDE 96° 51' W**

**ELEVATION (ground) 497 FEET**

---

**LATITUDE 32° 51' N**

**LONGITUDE 96° 51' W**

**ELEVATION (ground) 497 FEET**
### AVERAGE TEMPERATURE

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### MONTHLY AND SEASONAL SNOWFALL

#### Seasonal Snowfall

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### TOTAL PRECIPITATION

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### RECORDED MEASURES

- **TEXAS**
  - **MAX**: 55.8, 59.6, 71.7, 82.0, 90.7, 84.9, 84.6, 84.3, 84.0, 82.8, 80.4, 71.6
  - **MIN**: 35.2, 35.1, 35.0, 35.0, 35.0, 35.0, 35.0, 35.0, 35.0, 35.0, 35.0, 35.0

### DALLAS LOVE FIELD

- **1924**: 28.01
- **1925**: 28.01
- **1926**: 28.01
- **1927**: 28.01
- **1928**: 28.01
- **1929**: 28.01
- **1930**: 28.01
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- **1951**: 28.01
- **1952**: 28.01
- **1953**: 28.01
- **1954**: 28.01

**Additional Notes:**
- **1914-1917**: 28.01
- **1918-1923**: 28.01
- **1925-1928**: 28.01
- **1930-1933**: 28.01
- **1935-1937**: 28.01
### MONTHLY AND SEASONAL DEGREE DAYS

**DALLAS, TEXAS**  
**LOVE FIELD**  
**1964**

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### REFERENCE NOTES

Unless otherwise indicated, dimensional units used in this bulletin are: temperature in degrees F.; precipitation and snowfall in inches; wind movement in miles per hour; and relative humidity in percent.

Sky cover is expressed in a range of 0 for no clouds or obstructions to 10 for complete sky cover. The number of clear days is based on average cloudiness 0-3 tenths; partly cloudy days on 4-7 tenths; and cloudy days on 8-10 tenths. Degree days are based on a daily average of 65 F. Eleet and hail were included in snowfall totals, beginning with July 1964.

Heavy fog in the Means and Extremes Table also includes data referred to at various times in the past as "Dense" or "Thick". The upper visibility limit for heavy fog is 1/4 mile. Below-zero temperatures are preceded by a minus sign.

The horizontal lines drawn on the Average Temperature, Total Precipitation, Monthly and Seasonal Degree Days, and Monthly and Seasonal Snowfall tables separate the data according to station location (see Station Location Table).

- Less than one-half.
- No record.
- + Also on earlier dates, months, or years.
- T Trace, an amount too small to measure.

Record mean values at the end of the Average Temperature and Total Precipitation tables are long-term means based on the period of record beginning in 1913. Values have not been corrected for changes in instrument location listed in the Station Location Table.

Data from City Office through August 31, 1940, and from Airport Station since September 1, 1940.

### STATION LOCATION

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<th>Location</th>
<th>Occupied to</th>
<th>Computed to</th>
<th>Altitude for Spherical Harmonics</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Sea level</th>
<th>Ground</th>
<th>Remarks</th>
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<td>9/30/36</td>
<td>8/30/36</td>
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<td>AIRPORT OFFICE</td>
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<td>7/15/20</td>
<td>9/1/40</td>
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<td>95° 51.6'</td>
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<td>Love Field Adair Bldg., Lemon Ave. 5.5 mi NW PO</td>
<td>9/1/40</td>
<td>Present</td>
<td>3000 ft ENE</td>
<td>32° 51'</td>
<td>96° 51'</td>
<td>497</td>
<td>503</td>
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</table>

Sale Price: 10 cents per copy. Checks and money orders should be made payable to the Superintendent of Documents. Remittances and correspondence regarding this publication should be sent to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.
Mr. Marshall Schaffer  
U.S. Health Service  
Washington D.C.

Dear Mr. Schaffer:

Mr. Belluschi, Dean of the School of Architecture and Planning at M.I.T., has suggested that I contact you regarding information for my Master's thesis in Architecture. The subject of my thesis is a comparative analysis of the requirements and design of hospitals of various sizes. While I tentatively plan to direct the investigation toward fifty and one hundred bed hospitals, I would like data on all sizes so that I can shift emphasis should further study show it desirable.

I will be very grateful for any information, suggestions, and sources of information that you can supply.

Very truly yours,

Benjamin H. Biderman

cc. Dean Belluschi
March 4, 1955

Mr. Benjamin H. Biderman  
102-A Graduate House  
Massachusetts Institute of Technology  
Cambridge 39, Massachusetts

Dear Mr. Biderman:

In reply to your letter of February 26, 1955, we are enclosing copies of our basic publications and a bibliography on general hospital design and planning which we hope will be helpful to you.

If we can be of further assistance in any other way do not hesitate to call on us.

Sincerely yours,

Marshall Shaffer, San. Engr. Dir. (R)  
Chief, Technical Service Branch  
Division of Hospital Facilities

Enclosures (5)
102-A Graduate House, M.I.T.  
Cambridge 39, Massachusetts  
March 30, 1955  

The Modern Hospital Publishing Co., Inc.  
Chicago, Illinois  

Dear Sir:  

Mr. Isadore Rosenfield, architectural hospital consultant, has suggested that I contact you regarding information for my Master's thesis in Architecture. The subject of my thesis is a comparative analysis of the requirements and design of hospitals of various sizes.  

I understand that Mr. Lewis Block has published a series of articles on the prototype hospital which is a summary of what happens as you go from small hospitals to large hospitals.  

I would appreciate your sending me this information plus any other information or sources of information regarding my thesis and bill me for same.  

Sincerely yours,  

Benjamin H. Biderman
April 1, 1955

Mr. Benjamin H. Biderman  
102-A Graduate House, M.I.T.  
Cambridge 39, Massachusetts

Dear Mr. Biderman:

In response to your request, we are enclosing reprints of several of the articles by Dr. Block. These are the only articles in the series of which copies are still available. Others appeared as follows, if you care to look them up:

50 Bed Prototype - June 1953  
100 Bed Prototype - October 1953

I'm sorry we can't furnish the complete series from this office, but our supply has been exhausted.

Sincerely yours,

[Signature]

Robert M. Cunningham Jr.  
Editor

RMC:BDS  
enccs
102-A Graduate House, M.I.T.  
Cambridge 39, Massachusetts  
March 30, 1955  

Mr. James J. Souder, Architect  
101 Park Avenue  
New York, New York  

Dear Mr. Souder:  

I wish to express my appreciation for the aid you gave me on my thesis during my visit in New York.  

Sincerely yours,  

Benjamin H. Biderman
Mr. Isadore Rosenfield, Architect
45 West 45th Street
New York, New York

Dear Mr. Rosenfield:

I wish to express my appreciation for the aid you gave me on my thesis during my visit in New York.

Sincerely yours,

Benjamin H. Biderman
State Department of Health
Director of Hospital Survey and Construction
Austin, Texas

Dear Sir:

Mr. Isadore Rosenfield, architectural hospital consultant, has suggested that I contact you regarding information for my Master's thesis in Architecture.

I have a permanent resident in Texas and plan to undertake for my thesis a study and design of a general hospital in the northeastern part of Texas.

I would appreciate your sending me a copy of the State Hospital Plan amended to date and any other information or sources of information that you can supply.

Sincerely yours,

Benjamin H. Biderman
Mr. Benjamin H. Biderman  
102-A Graduate House, M.I.T.  
Cambridge 39, Massachusetts

Dear Mr. Biderman:

We are transmitting herewith one copy of the Texas State Plan for Hospital Construction as requested in your letter of March 30. It is suggested that you also contact Mrs. Ruth Barnhart, Executive Secretary for the Texas Hospital Association, 2208 Main Street, Dallas 1, Texas.

By direction of the Division Director.

Yours very truly,

[Signature]

H. W. Phillips
Consultant Architect
Division of Hospital Services

HWP: vsp
Enclosure
May 20, 1955

Mrs. Ruth Barnhart, Executive Secretary  
Texas Hospital Association  
2208 Main Street  
Dallas, Texas  

Dear Mrs. Barnhart:  

Mr. Phillips, Consultant Architect for the Division of Hospital Services, has suggested that I contact you regarding information for my Master's thesis in Architecture.  

I am a resident of Grand Prairie and plan to do research in hospital design and to design a 100 bed general hospital and out-patient clinic located between Grand Prairie and Irving. This hospital would serve these two cities and fit into the state hospital plan.  

In order for this study to have validity, I would like to make it as realistic as possible. I am assuming that it is possible to arouse the interest of welfare-minded people in these two cities to see the advantages offered by such a joint effort and to form a sponsoring agency capable of meeting the financial requirements for construction, maintenance and operation. Also this hospital would be designed to meet all requirements and recommendations of State and Federal Agencies necessary to receive Federal aid under Public Law 725 and amendments thereof.  

Grand Prairie and Irving are in area B-5 which has a priority of D. The only new construction in this area recommended in the state plan is the construction of a 150 bed hospital in Garland, which now depends upon availability of beds in Dallas.
Since it is impracticable to make application to the State Agency and for Federal assistance on a project study such as this, I would appreciate advice on the type of priority that could possibly be obtained. I would also appreciate any information, suggestions and sources of information that you can supply.

Very truly yours,

Benjamin H. Biderman
May 25, 1955

Benjamin H. Biderman  
Massachusetts Institute of Technology  
School of Architecture and Planning  
77 Massachusetts Avenue  
Cambridge 39, Massachusetts

Dear Mr. Biderman:

I believe, as you explain in your letter of May 20, that you have already investigated all the aspects of obtaining priority for hospital construction in the Grand Prairie-Irving areas. I know of no other source of funds for hospital construction other than the state and federal agencies, on which you already have advice regarding the priority status for this area.

I know of no restriction whatever on a community or any group of people who are interested in establishing a hospital, other than that they meet the requirements of the state health laws. If you were to assume in preparing your thesis that sufficient funds will be available through the efforts of the citizens in that area, I would believe that you could go ahead with your project on that basis.

If I can help you further, please do not hesitate to let me know.

Sincerely yours,

Ruth Barnhart

rb/mb
May 20, 1955

United States Weather Bureau
Washington, D.C.

Dear Sir:

I am presently engaged in research for my Master's thesis in Architecture. In my work I find it necessary to obtain information concerning climatic conditions of the area in which I am interested. I would appreciate your sending me 3 copies of the summary of climatic conditions for the year 1954 for Dallas, Texas or for the Dallas-Fort Worth area, and bill me for same.

Very truly yours,

Benjamin H. Biderman
May 20, 1955

United States Bureau of Census
Washington, D.C.

Dear Sir:

I am presently engaged in research for my Master's thesis in Architecture. In my work I find it necessary to obtain information concerning the population of the area in which I am interested. I would appreciate your sending me a summary census report for the political subdivisions of the county of Dallas, Texas.

Very truly yours,

________________________________________
Benjamin H. Biderman
Mr. Benjamin H. Biderman  
Department of Architecture  
Massachusetts Institute of Technology  
Cambridge 39, Massachusetts

Dear Mr. Biderman:

In response to your request of May 20 there is sent you herewith a copy of our report, Series PC-8, No. 42, presenting the 1950 population figures for Texas and its political subdivisions.

Additional data for Dallas County and its political subdivisions are contained in Population Volumes I and II, copies of which may be consulted in your school library. Copies of the various chapters comprising the volumes may be obtained in bulletin form for individual States from the Superintendent of Documents, Government Printing Office, for the prices indicated in the enclosed descriptive announcements.

Sincerely yours,

Howard G. Brunsman, Chief  
Population and Housing Division  
Bureau of the Census  
Enclosures
American Hospital Association
18 East Division Street
Chicago 10, Illinois

Dear Sir:

I am presently engaged in research for my Master's thesis in Architecture. The subject of my thesis is A ONE HUNDRED BED HOSPITAL AND OUT-PATIENT CLINIC FOR GRAND PRAIRIE AND IRVING, TEXAS. I am interested in obtaining a copy of your pamphlet titled MEASURING YOUR COMMUNITY FOR A HOSPITAL. Enclosed you will find a check for 25 cents.

I would also appreciate your sending me any suggestions, information, or sources of information regarding my thesis.

Sincerely yours,

Benjamin H. Biderman

encl.
June 17, 1955

Benjamin H. Biderman
102-A Graduate House
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dear Mr. Biderman

In response to your inquiry we are pleased to send you the best material available in our Library at the time your request was received. This material is loaned to you for a period of one month after which time it should be returned to the Library of the American Hospital Association, Asa S. Bacon Memorial. Enclosed is a label for use in returning the material to insure a lower postal rate.

When possible, renewal for one month will be made on request. Requests for renewal should include date loaned as our records are filed in chronological order.

May we ask that you take particular care in preparing this package of literature for return to us? Keep this letter and check the material to be returned against the contents listed below; have you included everything? Use corrugated paper to protect the books, boxes rather than envelopes whenever possible and heavy brown wrapping paper. Tie the parcel both lengthwise and widthwise with strong cord. Be sure the label is affixed securely and that both your and our addresses appear somewhere on the package itself, as well as on the label. Loss of valuable material through careless packaging and handling will eventually lower the quality of our service; by following the suggested precautions, no losses should occur.

If you wish a record of reprints, articles and books included in this loan, please make your own listing of author, title and source. Then if you desire the same material at a later date, you can use this specific information in making your request.

Contents: 9 H-Planning-General hospitals-100-249 beds
1 H-Planning-Basic principles
1 Planning-General hospitals, 100-199 beds
Elements of the general hospital. (uncat.)
June 14, 1955

Mr. C.B. Hardee, Mayor
City Hall
Irving, Texas

Dear Mr. Hardee:

I am presently engaged in research for my Master's thesis in Architecture. Since I am a resident of Grand Prairie, I have chosen to do research in hospital design and to design a general hospital and out-patient clinic located between Grand Prairie and Irving. This hospital would serve both communities and fit into the state hospital plan.

In measuring the requirements for medical facilities in this area, I find it necessary to seek your assistance. The information which would be most helpful to me at this time is:


2. Any information on trading channels. Under ordinary conditions people might be expected to follow trade channels in seeking medical and hospital care.

3. Any other information such as economic situation of the population and the possible attitude toward hospitalization by the welfare minded citizen.

4. Existing medical facilities.

At the present time I am thinking in terms of a 100 bed general hospital and out-patient clinic. I feel that Irving and Grand Prairie are communities within themselves and should not have to rely on Dallas which already has a 20% deficiency of hospital beds according to the State Plan for the Construction of Hospitals and Public Health Centers. Every day Irving and Grand Prairie are growing larger and more independent of Dallas and the need for medical care in an expanding community such as this could become critical. For this reason I have undertaken this as a study for my thesis.

Sincerely yours,

Benjamin H. Biderman
Greater Irving Chamber of Commerce

WELDON T. GIBSON, MANAGER

111 E. IRVING BLVD.  *  P. O. BOX 445  *  TELEPHONE 2-1541
Irving, Texas

June 28, 1955

Mr. Benjamin H. Biderman
102-A Graduate House
M.I.T.
Cambridge, Massachusetts

Dear Mr. Biderman:

Today it was a pleasure to meet your Father and talk with him concerning your work at M.I.T. He inquired about certain information which I am quite happy to include. I might add that I would be willing to assist you in gathering any additional information.

Our present population is approximately 30,454. This would include those within the City Limits and immediately adjacent. The method of computation is as follows: Take the number of utility connections as of June 1st:

- Gas 7,572
- Electricity 8,007
- Water 7,262

Multiply each by 4 (average number of members per family), and then get the average of the three totals.

According to the latest information available, we have 14 medical doctors in our City.

Enclosed you will find a copy of the Irving City Plan, which was adopted last year. Possibly this will be of some assistance to you.

In closing, let me state that I feel such a hospital survey of the Irving - Grand Prairie area will be of great assistance when the citizens realize the necessity for such facilities.

I wish for you the best of luck and stand ready to serve you whenever possible.

Cordially yours,

/ WELDON T. GIBSON
Manager

IRVING—"Midway of Opportunity"—$2.2 Billion Dallas-Ft. Worth Market
June 14, 1955

Mr. C.R. Sargent, Mayor
City Hall
Grand Prairie, Texas

Dear Mr. Sargent:

I am presently engaged in research for my Master's thesis in architecture. Since I am a resident of Grand Prairie, I have chosen to do research in hospital design and to design a general hospital and out-patient clinic located between Grand Prairie and Irving. This hospital would serve both communities and fit into the State Hospital Plan.

In measuring the requirements for medical facilities in this area, I find it necessary to seek your assistance. The information which would be most helpful to me at this time is:

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At the present time I am thinking in terms of a 100 bed general hospital and out-patient clinic. I feel that Grand Prairie and Irving are communities within themselves and should not have to rely on Dallas which already has a 20% deficiency of hospital beds according to the State Plan for the Construction of Hospitals and Public Health Centers. Every day Grand Prairie is growing larger and more independent of Dallas and the need for medical care in an expanding community such as this could become critical. For this reason I have undertaken this study for my thesis.

Sincerely yours,
Mr. Benjamin H. Biderman  
Massachusetts Institute of Technology  
School of Architecture and Planning  
77 Massachusetts Avenue  
Cambridge 39, Massachusetts

Dear Mr. Biderman:

Your letter of June 14, 1955, has been received by Mayor Sargent and has been referred to me for reply. We are very pleased to give you such information as we have and the following numbered paragraphs relate to those in your letter:

1. Estimated population in 1955 of the City of Grand Prairie, based on utility connections, is 28,000.

2. Grand Prairie has at present retail stores such as J. C. Penney Company, F. W. Woolworth Company, A & P Company, Safeway Stores, etc. which attract retail trade to Grand Prairie from the surrounding districts and also tend to keep the Grand Prairie trade at home.

3. The economic condition of Grand Prairie residents is unusually stable, there being a high percentage of employment; on the other hand, the great majority of the people are wage earners and can demand only hospital services at reasonable costs which require a minimum of transportation and ambulance costs in commuting.

4. Grand Prairie has at the present time no hospital recognized by the American Medical Association. It does have an osteopathic clinic which has twenty-four hour service. Grand Prairie
had, as of October, 1954, approximately fifteen physicians and surgeons, M.D.

Very truly yours,

J. A. Johnson
City Secretary

cc: Mayor C. R. Sargent
    City Manager D. I. Dauley
Mr. J.A. Johnson, City Secretary
City Hall
Grand Prairie, Texas

Dear Mr. Johnson:

The site I have selected for my thesis is located Southwest of the intersection of Shady Grove Road and Belt Line Road and borders both roads.

The size of the medical facilities necessary to serve the Grand Prairie and Irving area is a 200 bed general hospital and outpatient clinic. This takes into consideration the existing population, the future population, and the nearness of the Dallas medical facilities.

Advantages of the building of one hospital for both communities have been discussed in great detail in a portion of my thesis. However, in order to make this study realistic, I must also point out the difficulties. A hospital of this size requires great amounts of utilities. The answers to the following questions concerning utilities would be most helpful to me:

1. Is there an existing water main near the proposed site capable of furnishing approximately 120,000 gallons of water per day? This is based on 300 gallons per bed per day multiplied by two since twice this amount may be required on days of maximum demand.

2. Although the structure will be fireproof construction, adequate water supply with sufficient pressure and fire fighting facilities should be available.

3. Are any sanitary sewers near the site? (Storm sewer are no problem since there is adequate natural drainage.)

4. Is there electrical power near the site? (Preferably two independent lines to provide auxiliary breakdown service.)

5. Is gas service available near the site?

6. Is telephone service available?
7. If any of the services mentioned in number 1 through 6 do not exist, what is your estimate of the approximate prevailing cost for its installation?

The cost of installation and use of the various facilities would of course be shared by both Grand Prairie and Irving. The main question is: Do adequate facilities exist and if not, what is the most efficient way to furnish them?

I wish to express my gratitude again for the aid you have given me on my thesis.

Sincerely yours,

_________________________________

Benjamin H. Biderman
Mr. Weldon T. Gibson, Manager
Chamber of Commerce
P.O. Box 145
Irving, Texas

Dear Mr. Gibson:

The site I have selected for my thesis is located Southwest of the intersection of Shady Grove Road and Belt Line Road and borders both roads.

The size of the medical facilities necessary to serve the Irving and Grand Prairie area is a 200 bed general hospital and outpatient clinic. This takes into consideration the existing population, future population, and the nearness of the Dallas medical facilities.

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2. Although the structure will be fireproof construction, adequate water supply with sufficient pressure and fire fighting facilities should be available.

3. Are there sanitary sewers near the site? (Storm sewers are no problem since there is adequate natural drainage.)

4. Is there electric power near the site? (Preferably two independent lines to provide auxiliary breakdown service.)

5. Is gas service available near the site?

6. Is telephone service available?

7. If any of the services mentioned in number 1 through 6 do not exist, what is your estimate of the approximate prevailing cost for its installation?
The cost of installation and use of the various facilities would of course be shared by both Irving and Grand Prairie. The main question is: Do facilities exist and if not, what is the most efficient way to furnish them?

8. Reference—Industry: Has Chrysler Corporation established an assembly plant in or near Irving? A few years ago there was some talk concerning this industry.

I wish to express my gratitude again for the aid you have given me on my thesis.

Sincerely yours,

Benjamin H. Biderman
AIR MAIL

Mr. Benjamin H. Biderman
102-A Graduate House
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dear Mr. Biderman:

Please forgive the long delay in answering your letter. Last week I was attending an institute for Chamber of Commerce executives; therefore I got behind in some of my work.

In answer to Question No. 1 a 36-inch water main runs along Belt Line Road and would provide adequate water. An approximate expenditure of $5,000 would be necessary to install proper metering devices and to extend the line onto hospital property.

Question No. 2 - Pressure would be sufficient for fire fighting purposes. At the present time the site is slightly beyond the two mile recommended service area for a fire station, but could be serviced by the station to be constructed later this year at the southeast corner of the intersection of Highway 356 and Story Road. Another station has been planned for the vicinity of Story Road and Shady Grove Road, which would thereby assure quite adequate fire protection.

Question No. 3 - There are no sanitary sewers in the vicinity. At the present time it would be difficult to service a hospital site without the construction of a lift station and the further extension of mains to the disposal plant.

Question No. 4 - Adequate electrical service is available. In view of the location of the Texas Power & Light Company sub-station northeast of the hospital site, it would be quite easy to have two independent lines.

Question No. 5 - At the present time natural gas service is not available in the area, but would readily be extended to meet hospital needs.

Question No. 6 - Telephone service would be available.

Question No. 7 - In most instances the expense involved in extending utilities would be handled by the service companies, but in regard to water, which is a city-owned service, if this area were in the Irving City Limits the City would extend the service at a nominal expense or no cost at all. This would

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depend upon many circumstances - one, the method in which the hospital construction would be financed. At the present time Irving and Grand Prairie citizens are under the City-County Hospital District, which operates Parkland Hospital. Whether or not the public could be sold on the idea of tax money being used to build an additional hospital is a good question. There are many fine points to be considered on such a program.

There is a possibility of a stock company to finance the construction or the issuing of revenue bonds, but to state that one way would be the most efficient is very difficult.

Question No. 2 - The Chrysler Corporation has not located in this area yet. General Motors has recently opened a large plant west of Grand Prairie.

In closing let me again apologize for the delay in answering your requests.

Cordially yours,

WELDON T. GIBSON
Manager

WTG/jp
SCHEME FOR TYPICAL PATIENT FLOOR

1. ADMINISTRATION
   ADJUNCT DIAGNOSTIC AND THERAPEUTIC FACILITIES, DOCTOR OFFICES, OUTPATIENT DEPARTMENT, PATIENT ARRIVAL AND DEPARTURE.

2. PEDIATRIC UNIT
   MEDICAL UNIT

3. OPERATING - SURGICAL UNIT

4. DELIVERY - OBSTETRICAL UNIT

5. INTERNEE LIVING QUARTERS
FRONT ELEVATION - NORTHEAST
SCALE 1/8" = 1'-0"

SIDE ELEVATION - NORTHWEST
SCALE 1/8" = 1'-0"