

A STUDY OF ADMINISTRATION
OF THE MAINTENANCE DEPARTMENT
OF HILLCREST MEMORIAL HOSPITAL
WACO, TEXAS

A Project Report
Submitted to
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Master of Hospital Administration

by
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I. HISTORICAL SKETCH OF HILLCREST MEMORIAL HOSPITAL

The need for this hospital was recognized and expounded as early as 1908 by the Pastor of the First Baptist Church, Waco, Texas. It was not until 1912, however, that a committee was appointed by the Waco Baptist Association to study the advisability of constructing a hospital in this area. This committee recognized the need for such an institution and in 1916, a board of trustees was appointed and the same year a charter issued permitting the hospital to incorporate and to be operated on a nonprofit basis. Ground was broken in August, 1917, and work progressed on the building until 1918, when the prosecution of World War I caused all construction to be suspended. After the war, work was resumed and the hospital had its official opening on May 25, 1920, as the Central Texas Baptist Sanitarium. On March 14, 1938, the name of the hospital was changed to Hillcrest Memorial Hospital, and on January 22, 1945, the hospital became the property of the Baptist General Convention of Texas.

The hospital was originally built to accommodate sixty-five patients. The east wing (see Annex I) was constructed in 1921, and was for many years used as a nurses' home. The various floors were gradually opened to patients, however, until in 1944, the entire wing was

utilized for this purpose.

In April, 1951, the present maintenance shop (see Annex I) was completed merely by constructing a roof over what had been an unused driveway between the laundry and the main building. Concurrently, somewhat as an afterthought, the second and third floors were placed on this addition to augment the kitchen and the dining room respectively.

In January, 1953, the new million dollar wing as depicted in red in Annex I was opened. This increased the designated operating bed capacity to its present level of 175 adult beds and thirty bassinets. In actuality there are more nearly 200 adult beds currently ready for use, and space for approximately forty bassinets.

The addition on the first floor which currently houses the medical and general supply section, the laundry storeroom and part of the maintenance shop was completed in 1956.

Due to a mishap which rendered one of the two existing boilers completely useless, it became necessary in 1957 to install a new one. Since the new one was larger than the one which it replaced and would not fit in the basement of the old building, the addition at the extreme rear of the first floor was built to accommodate it.

Preliminary planning has been completed, including the architects sketch, for another major addition to the

facility. Initiation of construction awaits only the necessary capital, and that should be forthcoming in the foreseeable future. This new addition will contain approximately 100 additional adult patient beds as well as expansion of some existing diagnostic and therapeutic units, notably roentgenology and the medical laboratory. Responsible hospital officials anticipate no difficulty in keeping this proposed addition filled, since occupancy last year averaged nearly ninety percent and, currently, prospective patients are daily refused admission because of insufficient beds.

II. THE NATURE OF THE PROBLEM

As will be noted in the preceding Historical Sketch, Hillcrest Memorial Hospital experienced a long period of steady growth from its beginning prior to World War I up through World War II. Since then it has grown much more rapidly and this rapid expansion appears likely to continue in the immediate future.

According to current writers in the field of hospital literature and to the project reports of previous students of Hospital Administration, it frequently happens during periods of growth that departments or sections of the hospital not directly connected with patient care are overlooked, both as to allocation of adequate space and equipment with which to operate, and as to administrative and methodological improvements to better enable them to cope with their increased responsibilities. The maintenance department is frequently cited as a case in point. In this regard, Mr. A.D. Barnes had this to say:

I am certain that in any planning for new hospital facilities the major thoughts are given to those for patient care; and that of course, is as it should be. A hospital is primarily for patient care or for research which will improve patient care. I also believe that too many times the fact is overlooked that if these facilities are to function at their best, it must be made possible for engineering and housekeeping to contribute

their best efforts.¹

In this general area lies the crux of the problem at hand--that of making it possible for the maintenance department to more readily contribute its best efforts to the over-all goal of the facility, which is the best possible patient care at the least practicable cost. To be more specific, the recommendations resulting from this study will suggest changes designed to (1) improve the efficiency of the department, (2) improve control over individuals therein, (3) improve control over major equipment serviced, (4) provide the business manager with the necessary tools to cost the efforts of the maintenance department against the appropriate revenue-producing activities, and (5) provide the administrator with documentation which will enable him to evaluate on a current basis the work of the department, and, through cost histories, to determine the point at which it is no longer economical to repair a given piece of equipment.

The discussion portion of this report will be presented under four headings entitled, Records, Personnel, Organization, and Preventive Maintenance, respectively. This does not mean that four separate studies are involved

¹A.D. Barnes, "Planning for Maintenance," Hospitals, XXIX (March, 1955), p. 116.

because all are inextricably interwoven. It is handled
in this way only for continuity and clarity of presentation.

III. THE STUDY

A. THE PROBLEM:

The problem herein reported upon is to examine and to evaluate the administration of the maintenance department of Hillcrest Memorial Hospital, Waco, Texas, and to recommend changes designed to result in optimum efficiency through balanced staffing, adequate records, revised organization, and a sound preventive maintenance program.

B. ASSUMPTIONS:

1. The proposed 100-bed addition to the existing facility will be completed within the next few years.

2. This proposed expansion will materially increase the workload of the maintenance department especially during the initial breaking-in period and later as wear begins to make itself felt.

C. FACTS BEARING ON THE PROBLEM:

1. The hospital administrator has been in his present position for approximately fifteen years.

2. All major departments within the hospital including the maintenance department are directly under the supervision of the administrator (see Annex II).

3. The maintenance supervisor (see Annex II) or maintenance engineer as he is termed in his job description, has no formal education relating specifically to his position but has filled this position for approximately twelve years.

4. The present work order system pertains only to a portion of the work accomplished by the maintenance department so no comprehensive work record exists.

5. There is no attempt to cost work performed either to departments or to equipment repaired.

6. The engineer does not see the work orders which are used so can neither approve them or properly plan for their accomplishment.

7. There is no central distribution system in the hospital.

8. There are no records upon which to base stockage of spare parts.

9. The present staff of the maintenance department consists of the maintenance engineer, six maintenance helpers and two yardmen.

10. These are not permanently "authorized" positions in the usual sense, additional personnel are hired as recommended by the engineer and approved by the administrator.

11. There is a written job description for the position of maintenance engineer but it is couched in the most general terms and does not relate specifically to this facility.

12. There are no job descriptions for the other eight employees of the department. They are hired as general utility men and are almost exclusively used as such.

D. DISCUSSION:

1. Records.

The use of work orders, written records and reports of any nature is at an absolute minimum in the maintenance department. Only the most rudimentary sort of a work order system is currently in use. The form presently being used (see Annex III) indicates only the date of the request, the location and description of the job and the date repaired. It contains no provision for indication of approval of the proposed work, cost of labor, cost of materials, name of individual performing the maintenance, or identification of the major piece of equipment involved, if applicable. The form is used for only a portion of the work performed, specifically those jobs involving the nursing units. These forms are normally initiated by one of the head nurses and sent to the office of the director of nursing service. They are picked up at various times throughout the day by one of the maintenance men who then attempts to accomplish the requested maintenance. When the work is completed, he returns the request to the office of the director of nursing service where it is filed for several months and then discarded.

There are several inadequacies inherent in this system. The work orders submitted as above are never seen by the maintenance engineer except in extraordinary cases. One man is assigned permanently to pick them up at the

director's office, perform the work, and return them. The engineer, therefore, essentially loses control of the man so assigned. He doesn't know at any given time what the man is doing, where he is working, or how much is being accomplished in this area. To this extent he loses the opportunity to plan and direct the efforts of his department, which is perhaps his most important function.

Additionally, these work orders pertain only to relatively minor matters in the nursing units, such as changing light bulbs, changing light switches, unstopping plumbing, etc. The other maintenance requests come to the maintenance department either by phone (although no attempt is made to provide continuous telephone coverage in the engineer's office), or through chance encounters in the corridors with the engineer or one of his staff. While this informal approach would probably work well enough in a very small facility, in a hospital of this size it appears to be somewhat wasteful. Here again the engineer loses a degree of control over his operation because all of these requests are not referred to him. Inevitably some of these informal requests are forgotten, resulting in the necessity for resubmission, and frustration on the part of the individual making the request. A further complicating factor in this area is the fact that there is no designated individual in each department authorized to initiate requests. Therefore two different people in a department

may make the same request to two maintenance men resulting again in lost motion.

One further difficulty with regard to the written work orders is the manner of delivering them to the director of nursing service. Since there is no distribution system in the organization, these requests usually arrive in bundles, once just before noon when the nursing service personnel come down for lunch and again about 3:00 P.M. when the shift changes. These two times are, of course, about the least advantageous as far as the maintenance man is concerned.

The first step in resolving these difficulties is considered to be adoption of a revised work order form. A proposed work order form to replace the one currently in use is presented in Annex III. This form is very similar to the one suggested by Doctor Malcolm T. MacEachern,² with certain changes to better adapt it to this facility.

It will be noted that the top half of this proposed form is much like the one currently in use except that it provides for the approval of the appropriate department head or his designated representative and the maintenance engineer. The lower part of the form is designed to collect

²Malcolm T. MacEachern, Hospital Organization and Management (Chicago: Physicians' Record Co., 1947), p. 945.

the necessary information for computation and assignment of the cost of maintenance.

The current hospital literature abounds with evidence that in this period of ever-increasing costs, hospitals more and more are following the lead of industry in methods of cost control.³ Industry has long since realized that in order to control costs, it is first necessary to ascertain exactly what the various elements are, hence cost accounting and cost analysis. Many hospitals, both large and small, have instituted cost accounting systems; and since hospital Boards of Governors are usually composed, at least to some extent of businessmen who are familiar with modern business methods, it would seem inevitable that sooner or later they will begin to demand that hospital accounting policies more closely approach that of industry. If and when this does come to pass at Hillcrest, this form will provide information necessary to properly assign the cost of operating the maintenance department.

³Jane Hartman, "How To Prepare Dietary Budgets for Smaller Hospitals," Hospitals, XXXII (January 1, 1958), p. 84; Sister Eugene Marie, "Success Formula: Central Purchasing Plus Close Stock Control," Hospitals, XXXII (February 16, 1958), p. 60; H.I. Stine, "How To Compute Outpatient Department Costs," Hospitals, XXXII (March 1, 1958), p. 45; Frank Cerruzzi, "Big Dividends for Small Hospitals," Hospitals, XXXII (April 1, 1958), p. 61; and Robert H. Reeves, Albert G. Proseus, and Frederick C. Morgan, "Accounting and Financial Management," Hospitals, XXXII (April 16, 1958), p. 29.

Even though not currently needed for cost accounting purposes, however, this information should be very valuable to the maintenance engineer and to the hospital administrator if these statistics relating to the various departments are tabulated periodically and the resulting trends analyzed to determine their cause.

The item on the form relating to type and number of equipment or appliance contemplates a complete inventory of all major installed equipment and appliances and numbering each piece permanently. Such an inventory and marking system would be of considerable value to the preventive maintenance program discussed in a subsequent section, would provide information for the business office in preparing financial statements and would provide a measure of control over the equipment. In addition, a maintenance record file system, such as the one utilized by Dr. Peter A. Peffer,⁴ should be set up for every piece of equipment and appliance, showing their location in the hospital. This file should give complete information including cost, when and from whom purchased, and should be kept current as to preventive maintenance performed as well as the nature, the date, and the cost of all repairs. This record will then provide a consolidation

⁴Peter A. Peffer, M.D., and Richard H. Parady, "A Sound Preventive Maintenance Program," Hospitals, XXX (June, 1956), p. 76.

of the information necessary to determine at what point a given piece of equipment can no longer economically be repaired. Along this same line, Dr. MacEachern says:

Even the small hospital should maintain clear-cut work records for the purpose of computing maintenance costs. Furthermore, a monthly study of repair orders and work orders will often disclose the need for major overhauling or complete replacement of some piece of equipment, section of a building or steam, water, or electrical lines.⁵

At the present time this function is entrusted to the memory and discretion of the maintenance engineer. While this trust is undoubtedly well placed, the engineer will be the first to admit that the hospital has grown too large and complex for him to accurately retain mentally all of the data necessary to make or recommend these decisions.

In this same general area, according to Doctor MacEachern, "A well-organized neatly kept storeroom for mechanical parts and tools is a must."⁶ The tools owned by the hospital do not present a serious problem although for maximum economy of use, they should be more neatly and functionally arranged and more control should be exercised over them. Stockage of spare parts, on the other hand, definitely needs to be placed on a more businesslike basis. The current method is most informal and results in considerable waste of time and perhaps waste of supplies as

⁵MacEachern, op. cit., p. 939.

⁶Ibid.

well. When a certain repair part is needed and it cannot be found in the shop, the job must stop and it is necessary for the engineer to leave what he is doing and go into town to get it. If it happens to be a common item, he frequently gets one or more spares for future use. These are stored in the maintenance shop but in no particular place, creating the danger that they may not be found when next needed, and resulting in still another unnecessary trip to town.

The first step in overcoming this difficulty is establishment of a small spare parts storage area in the shop. This could well be adjacent to, or in conjunction with, the storage of tools. It should be equipped with shelves and bins which would permit easy location and ready access to any item stocked. The question of what and how much to stock will be answered over a period of time by the use of the proposed work order form. Tabulation of the data contained in the item relating to "materials used" will furnish an accurate supply experience factor both as to type and amount of items for a given period. Then, establishment of a stock level of, for example, thirty days supply, and replacing those items used every thirty days should greatly decrease the time lost by the engineer through frequent trips to town and reduce time lost by repairmen while awaiting spare parts.

In order for the proposed work order form to be of

maximum benefit, a work order must, of course, be prepared for all maintenance performed. This is necessary to provide approval of all work done, a comprehensive record of all maintenance activities, a true picture of the cost breakdown for maintenance, and accurate supply experience records for stockage of spare parts.

Work orders for routine jobs should be initiated in the requesting department prior to the work and signed by the individual designated for that department. In an emergency, the actual request could be made by telephone but a work order should still follow as soon as possible. Work orders for work performed in other than a specific hospital department (boiler repairs, central air conditioner, etc.) should be initiated in the maintenance department and the work charged to an appropriate account. There is no reason why scheduled, recurring maintenance such as "blowing down" the boiler, etc., cannot be consolidated periodically on one work order as long as all work is accounted for.

The problem of transporting the work requests from the initiating unit to the engineer's office is left unsolved and in the absence of a central distribution system, no completely satisfactory solution is apparent. One possibility would be to have all work requests made to the maintenance department by telephone and have the written work order initiated there. This, however, would

place upon the maintenance department an unwarranted administrative burden which actually belongs to the initiating departments. A more equitable and better solution would be to designate the dumb waiter closest to the maintenance shop as the receptacle for work orders and provide a box or a metal clip on the side to receive them. They could then be deposited in the dumb waiter at any time and picked up by maintenance personnel on an hourly or half-hourly schedule. This should provide rapid service and would allow the engineer to review all requests and thereby properly plan his work and direct his operation.

2. Personnel.

There are presently assigned to the maintenance department in addition to the maintenance engineer, six maintenance helpers and two yardmen. None of these positions are "authorized" as such. Individuals are simply hired as deemed necessary by the administrator upon the recommendation of the department head. The two yardmen are utilized exclusively for the menial tasks related to grounds keeping such as watering, mowing, weeding, raking, etc. Although they are assigned to the maintenance department, their function is not considered to be a part of this study and will not be further commented upon.

Of the remaining seven individuals, the engineer and four helpers work days from 8:00 A.M. to 5:00 P.M. and provide single coverage on weekends on a rotating basis

with compensatory time off during the week. The other two work the two night shifts permanently. The man on the 5:00 P.M. to midnight shift is responsible for all emergency maintenance during that period as well as some routine maintenance if time permits. The man on the midnight to 8:00 A.M. shift is strictly a watchman, primarily to check the boiler periodically and to call the engineer in the event of an emergency. The four day-men are classified as helpers in the organizational chart, and are used as general utility men primarily, although each is, of course, more skilled in one facet of maintenance work than the others. These men are assigned work by the engineer on a job-by-job basis or, in his absence they undertake maintenance on their own initiative when and however they hear of the need for it.

Inasmuch as no record exists of work performed in the past, and since two weeks is not deemed to be a sufficient time to adequately study workload, no justifiable recommendation can be made as to the adequacy of the quantity of employees in the maintenance department. All that can be reported with any degree of accuracy is that during this study, no evidence appeared to indicate that staffing was either inadequate or excessive in terms of quantity. It seems inescapable, however, that if the system of work orders, records, and reports outlined in the preceding section is adopted, one additional individual

must be hired to serve as administrative assistant to the maintenance engineer. This individual could be made responsible for all of the above administrative and filing duties, maintenance of the tool and spare parts stockroom including stock control, provide office coverage and such other duties as the engineer may assign. These functions could not be done by the maintenance engineer if he is to properly plan and direct the operation of his department, inspect completed work, train his subordinates, and act as engineering consultant to the administrator. Although it is of course not possible to offer empirical proof in terms of dollars, it is firmly believed that the additional expense of hiring an administrative assistant will be more than offset by the advantages to the engineer and the administrator, which should accrue from his efforts, as previously outlined. Many current writers, including Doctor Peter A. Peffer,⁷ Mr. Edmund Mottershead⁸ (Mottershead and Associates, Chicago), Mr. U.F. Black,⁹ Mr. Daniel M. Roop,¹⁰

⁷Peffer, loc cit.

⁸Edmund Mottershead, "Four Phases of Preventive Maintenance," The Modern Hospital, LXXXIV (February, 1955), p. 120.

⁹U.F. Black, "Get The Kinks Out of Your Preventive Maintenance Program," Hospitals XXX (January, 1956), p. 78.

¹⁰Daniel M. Roop, "Put Planning in Your Maintenance," Hospitals XXIX (September, 1955), p. 112.

and no less an authority than Doctor MacEachern,¹¹ agree that keeping accurate and complete maintenance records is of the utmost importance and will eventually pay dividends.

As has been previously stated, the only position in the maintenance department for which a written job description exists is that of the maintenance engineer. It is very general in nature, does not apply specifically to this facility and is inaccurate in many respects (see Annex IV). A proposed revision of the job description for this position is presented in Annex V.

The other positions in the department, with the possible exception of the night watchman, should also have written job descriptions. These can be valuable management tools in a number of ways. First, of course, they provide a yardstick by which to measure applicants for positions on the maintenance staff. As suggested by John H. Holmgren, they are "an important step in establishing salary rates."¹² They provide a means by which the maintenance engineer can measure work performance. Last, but of great importance, they indicate to the employee exactly what is expected of him and in which area

¹¹MacEachern, loc. cit.

¹²John H. Holmgren, "How to Write a Job Description," The Modern Hospital, LXXXIX (August, 1957), p. 60.

he should make the maximum effort to improve his knowledge and skill.

In line with the latter advantage listed above, these job descriptions should not be written in the usual manner, describing the positions as they presently exist. Instead, an effort should be made to begin to specialize within the department. It is realized, of course, that in a staff of this size, complete specialization is not possible nor desirable. As pointed out by Arthur L. McElmurry,¹³ flexibility must be maintained. There will undoubtedly be many instances which will require individuals to work in other than their designated specialty. However, only through the establishment of quasi-specialized jobs can the hospital be reasonably assured of maintaining a balanced staff, and the employees be assured of the nature of their primary responsibility.

From observation during the brief period of this investigation and discussions with all concerned (and in the absence of any past records), it appears that the necessary positions would be, (1) maintenance engineer, (2) administrative assistant, (3) electrical repairman, (4) refrigeration mechanic - plumber, (5) carpenter - painter - plasterer, maintenance, (6) watchman, and (7)

¹³Arthur L. McElmurry, "Job Combinations in the Small Hospital," Hospital Management, LXXXVII (January, 1959), P. 6.

and (8) apprentices to (3) and (4) above. Proposed job descriptions for positions (1) through (5) above are presented in Annex V. Job descriptions are not included for the watchman since no special skill is required, nor for the apprentices. These latter would be similar to their principal but would indicate that they are learning the prescribed skills rather than that they possess them. The format for the proposed job descriptions and some of the content are from a book prepared by the United States Department of Labor in cooperation with the American Hospital Association, entitled Job Descriptions and Organizational Analysis for Hospitals and Related Health Services.¹⁴

3. Organization.

The foregoing suggested changes will, of course, require that the organization of the maintenance department as depicted in Annex II be changed. A proposed revision of this departmental chart is presented in Annex VI.

Certain other organizational shifts must also come about as a result of the above changes. There is no longer a permanent night-man for the early shift, just a watchman for the late shift. It will therefore be necessary to

¹⁴United States Department of Labor, Job Descriptions and Organizational Analysis for Hospitals and Related Health Services (Washington: United States Government Printing Office, 1952), pp. 435-480.

cover the 5:00 P.M. to midnight shift with one of the five assigned maintenance men on a rotating basis. This should not prove disadvantageous, however. It relieves one man of permanent night duty. Additionally and more important, it insures that at least one of the night shifts is covered by an individual familiar with the day-to-day maintenance problems of the hospital, and he should therefore be more capable of handling similar situations which arise at night. Further, this night duty should provide each man with valuable experience in specialties other than his own, thus providing for the flexibility which is essential in so small an organization.

It will also be noted that the two apprentice level individuals will now come under the supervision of the two craftsmen in their respective fields. This delegation will relieve the maintenance engineer of a portion of his supervision and training duties, although final responsibility for its accomplishment still rests with him.

4. Preventive Maintenance.

A preventive maintenance program has been initiated at Hillcrest fairly recently. It is inadequate in some respects but is certainly a step in the right direction. There are essentially two phases in the present program. The first is a monthly check and lubrication of all major equipment and all appliances involving electric motors, including the cleaning of filters in window air conditioners

and the ducts of the centrally air-conditioned portion of the building. The second phase requires the night men to check for burned out light bulbs, leaking faucets, clogged plumbing, malfunctioning door checks and latches, and such other conditions as they may note.

In regard to the first phase above, the list of equipment which is used is not all inclusive. Also it is listed by room number instead of by equipment number. Therefore equipment which is frequently shifted from room-to-room, such as window air conditioners, fans, etc., could easily be overlooked. Although a schedule is established, these inspections are usually done only when there is a lull in other work and usually they are performed by the least qualified individual because he is more readily available. These factors tend to depreciate the importance of the program and to dilute its effectiveness.

The preparation of a complete inventory and marking of all equipment as suggested previously in regard to records should serve to eliminate the first two deficiencies. In regard to actual accomplishment of the work, renewed supervisory emphasis is definitely indicated. Every effort should be made to adhere to schedules once they are established and individuals actually performing the work should be carefully trained because here is the place where much major maintenance work can be avoided through early detection of wear or maladjustment.

The second phase involving inspections by night personnel is too loosely organized to be of maximum effect. This effort should be revised to require that defined areas of the facility be covered on a definite schedule. Only in this way can complete coverage be assured and maximum benefits derived from the program.

It is also considered important that the engineer initiate a system whereby either he or a designated representative spot-check the work done in this area. In addition to the more obvious benefits from such an inspection it would serve to emphasize the importance placed upon the program by those in authority.

These suggestions follow rather closely what Mottershead refers to as the "four phases of preventive maintenance, (1) get all the facts of the situation, (2) plan and program the work, (3) sell the program to management and staff, and (4) follow through."¹⁵

E. CONCLUSIONS:

The general conclusion which may be drawn from the foregoing is that in the evolution of this hospital from sixty-five beds to what will soon be over three hundred, no effort has been made to formalize the administration of the maintenance department and place it on a

¹⁵Mottershead, loc. cit.

more businesslike basis. The anticipated beneficial effects upon the efficiency and the economy of the Maintenance Department resulting from correction of the deficiencies cited below have been discussed in considerable detail throughout this paper. The suggested changes should also have a salutary effect upon the hospital as a whole, in its primary role of patient care. The efficiency aspect should result in more and better functioning equipment being available on a day to day basis, to those concerned directly with the care of the patients. Economy of operation of the department will have a less direct but nonetheless important effect on the rest of the hospital, too. This institution, like most others of a similar nature has very definitely limited financial resources and any savings can readily be utilized for provision of more charity care and better pay-patient care. The third and even less tangible advantage which may be expected to accrue to the hospital is an improvement in interpersonal relationships among the staff. Although the actual value of this is difficult to measure in the common terms of reference, the importance of teamwork in a hospital is well established. Specific conclusions are:

1. The present work order system is inadequate.
2. There is no record of work performed or cost of work performed.
3. There is no inventory of major equipment nor

individual equipment maintenance records.

4. There is no provision for approval of work orders.

5. No distribution system exists within the hospital for transporting work orders from the initiator to the maintenance office.

6. Hospital owned tools are not systematically stocked, stored, and maintained.

7. Spare repair parts are bought as needed rather than stocked in appropriate quantities.

8. There is no administrative assistant presently assigned to the maintenance engineer's office.

9. All personnel presently assigned to the maintenance department are hired and utilized as general "handy men."

10. In view of the short period of this study and the complete absence of past work records, no justifiable recommendation can be made relative to the number of employees needed.

11. There are no written job descriptions for the positions in the maintenance department except that of the maintenance engineer.

12. Correction of the above deficiencies will require revision of the organization.

13. Preventive maintenance schedules do not include all equipment to be serviced.

14. Equipment is not marked for ready identification.

15. Preventive maintenance schedules are not firmly lined out.

16. There is insufficient emphasis on preventive maintenance at the supervisory level and inspection of these activities is almost nonexistent.

F. ACTIONS RECOMMENDED:

It is therefore recommended that:

1. A work order form such as the one proposed in Annex III be adopted.

2. Cost of work performed be summarized periodically and permanent records be kept.

3. All equipment be inventoried, and permanently identified and that individual maintenance records be initiated.

4. Each work order be approved by the Engineer prior to performing work except in emergency cases.

5. The north dumb waiter be designated as receptacle for work orders and that they be removed by maintenance personnel on a regular schedule.

6. A stockroom be designated for storage of tools and spare parts and that stock levels be computed on the basis of actual experience.

7. An administrative assistant be assigned primarily for accomplishment of all of the above administration and

maintenance of the stockroom.

8. Semi-specialized job descriptions such as those presented in Annex V be adopted for the maintenance department positions.

9. A departmental organizational chart such as that presented in Annex VI be adopted.

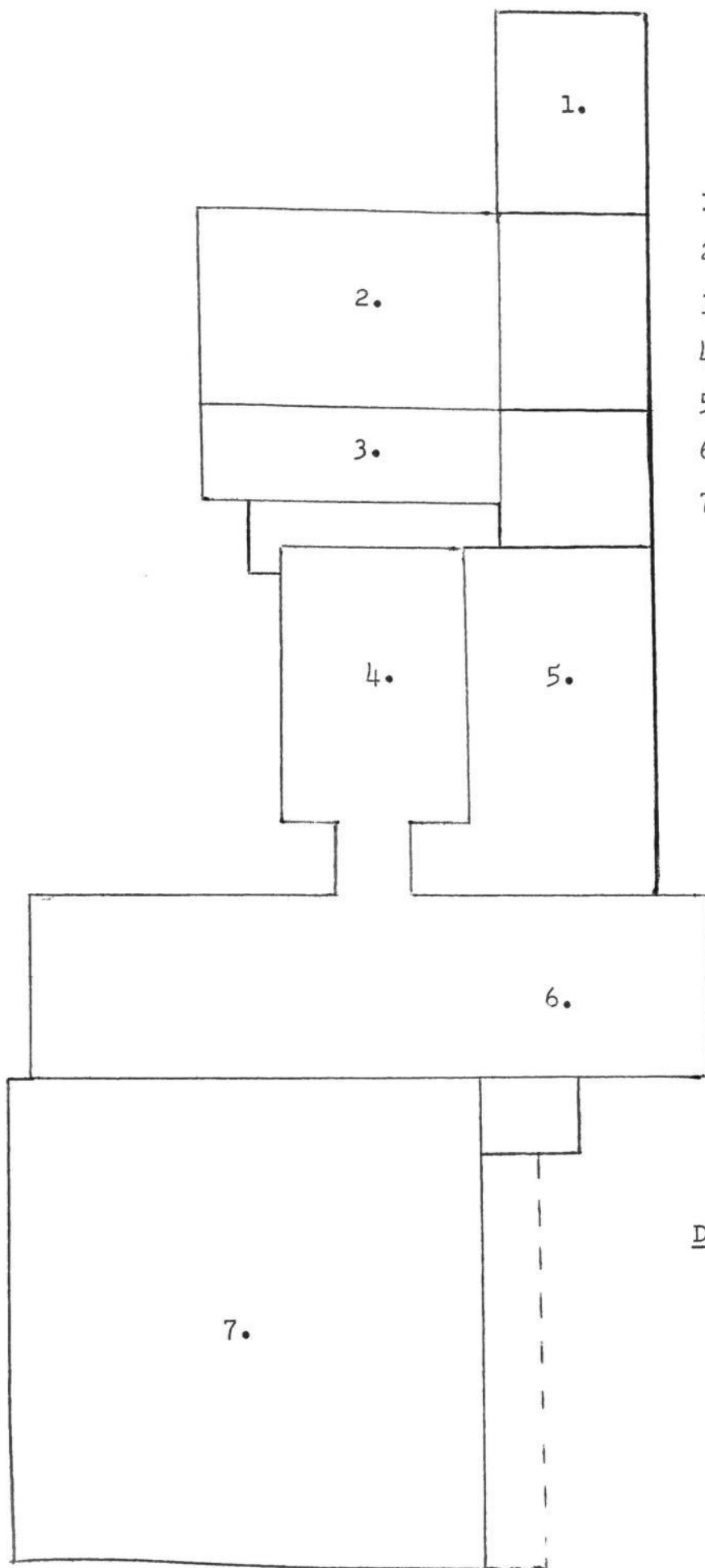
10. Preventive maintenance schedules include all equipment as revealed by the above inventory.

11. Preventive maintenance schedules be established and rigidly followed.

12. Additional supervisory emphasis be placed on the preventive maintenance program and spot checks be made to determine its effectiveness.

ANNEX I

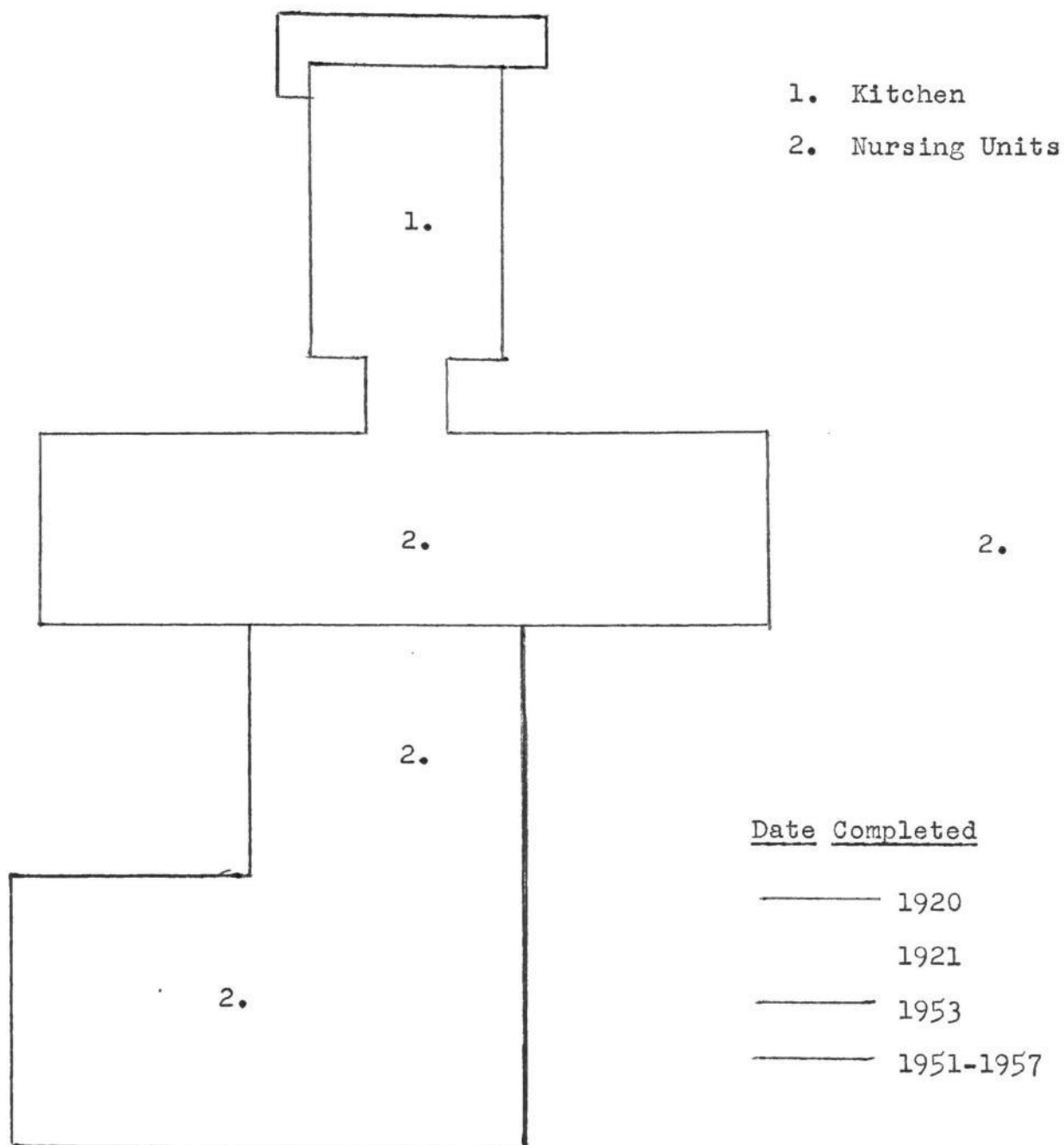
DRAWING OF PHYSICAL PLANT



1. New Boiler
2. Laundry
3. Maintenance
4. Old Boiler
5. Supply
6. Nursing Units
7. Administration

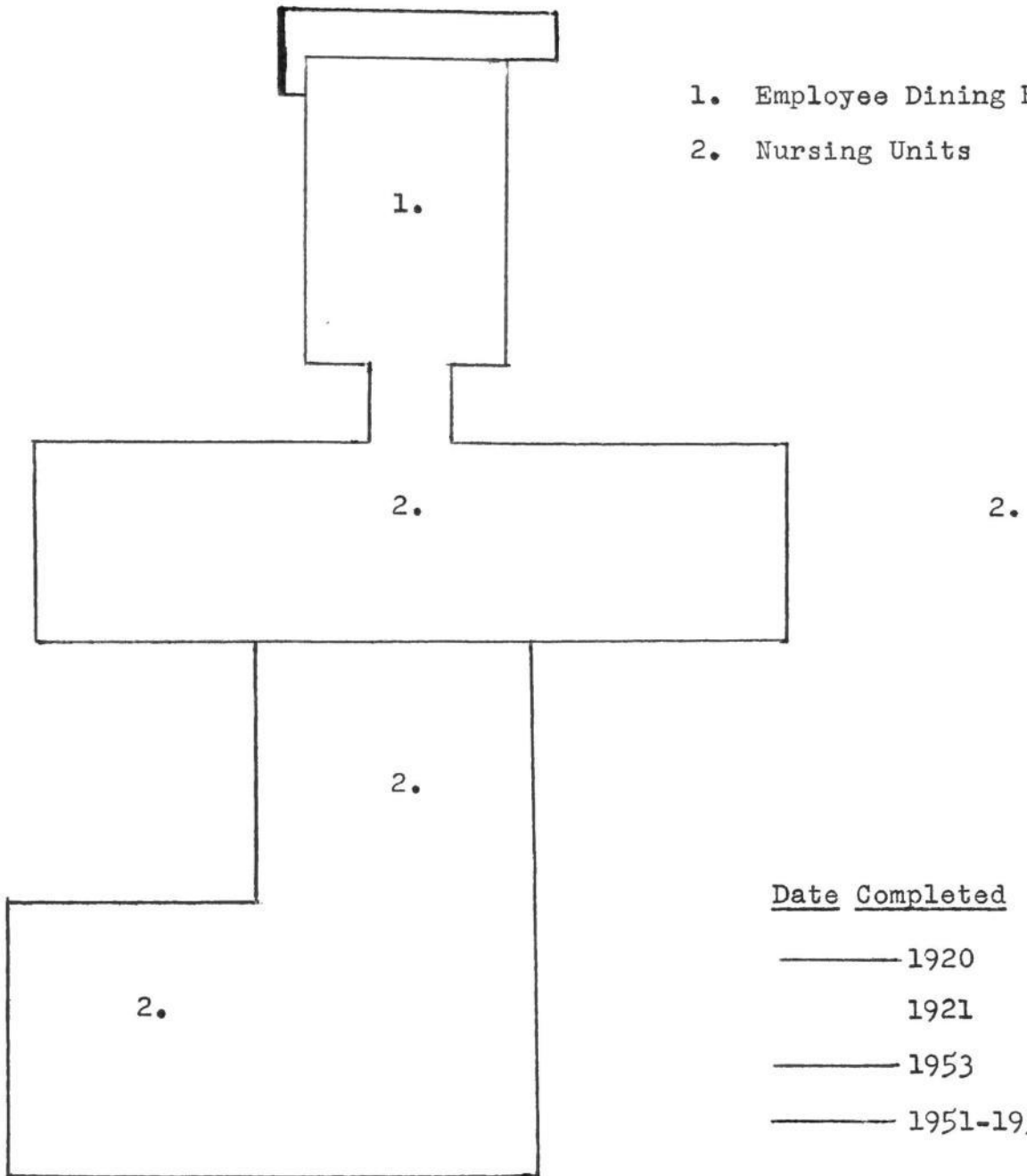
Date Completed

- 1920
- 1921
- 1953
- 1951-1957

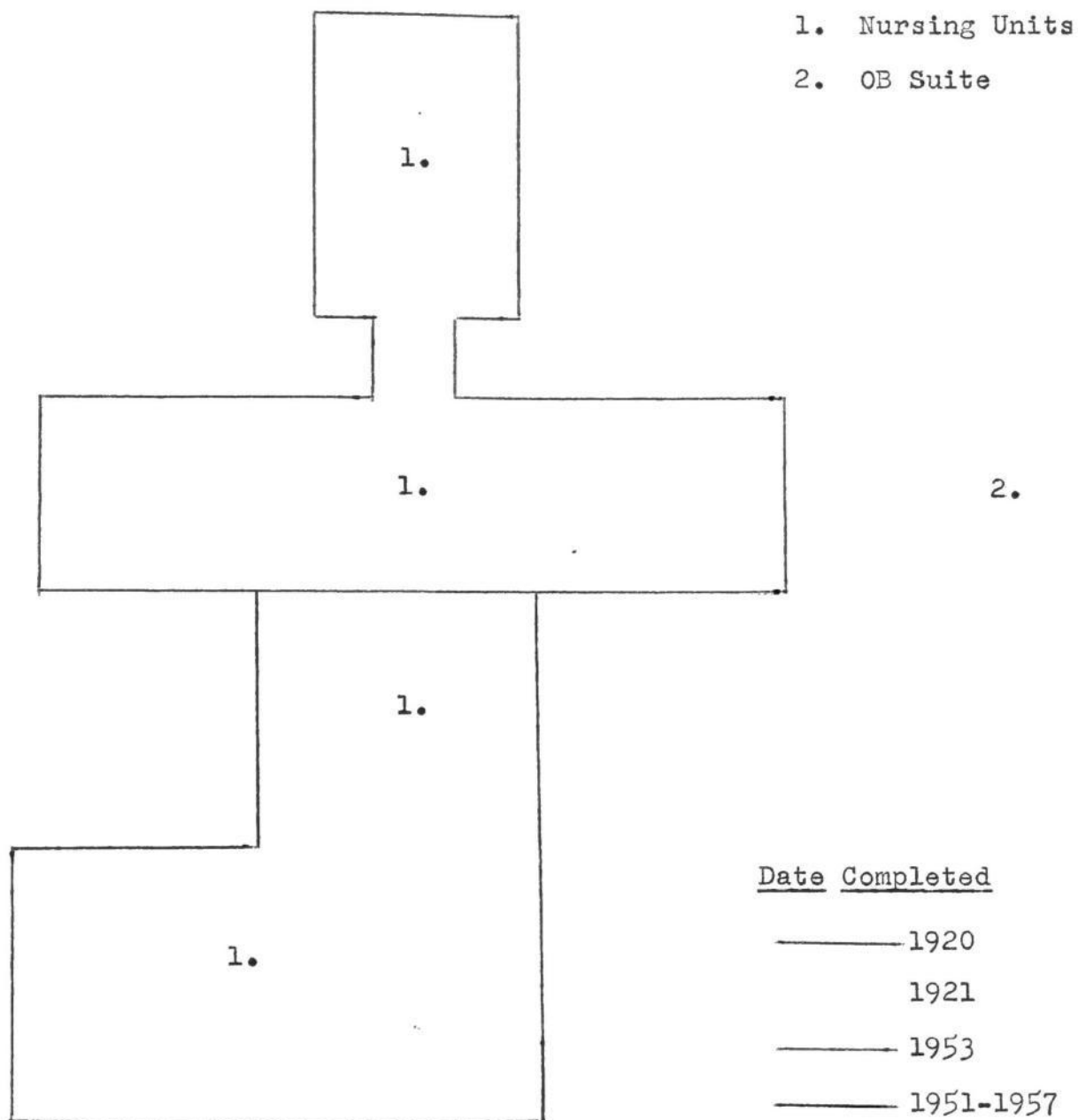


SECOND FLOOR PLAN

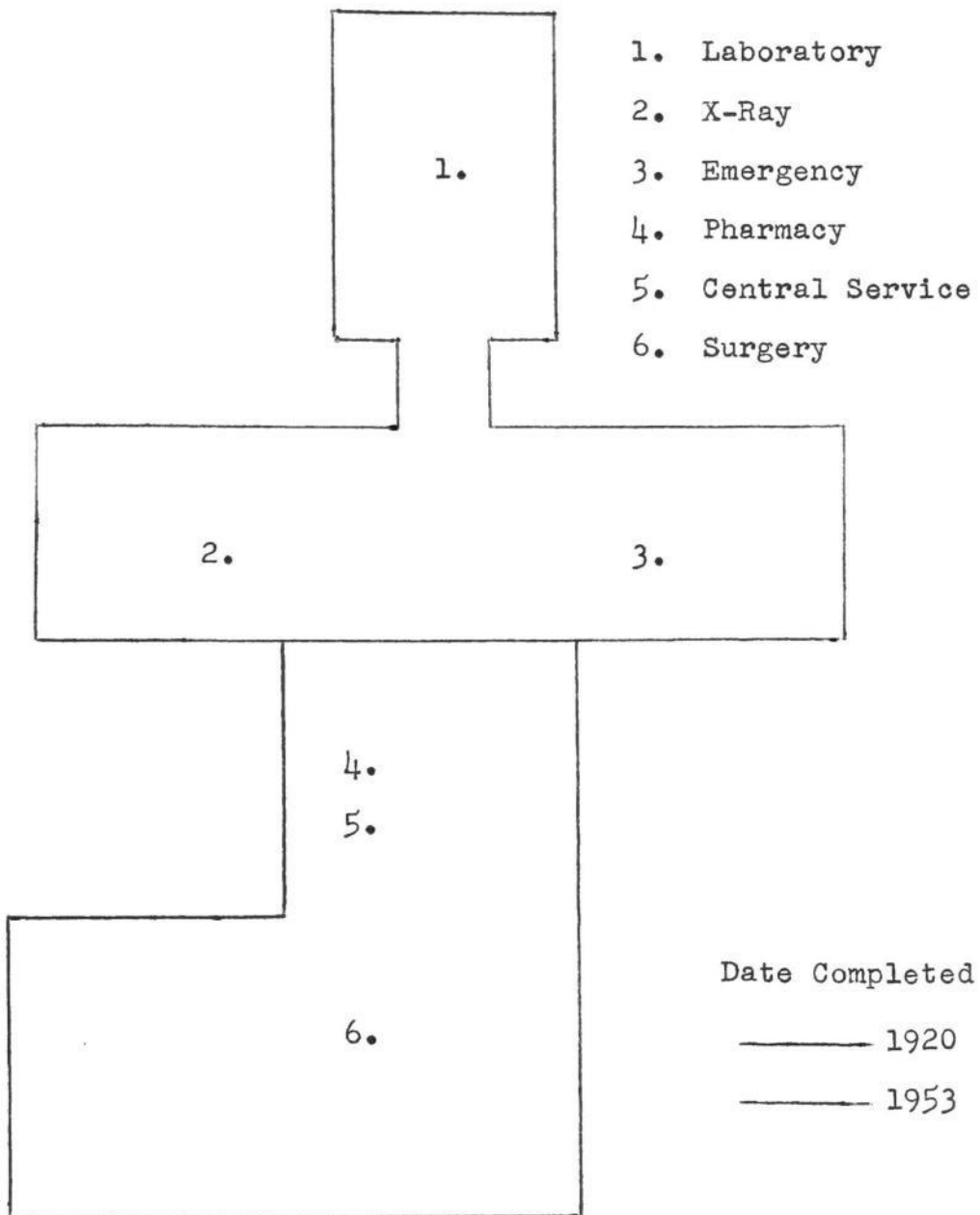
- 1. Employee Dining Room
- 2. Nursing Units



THIRD FLOOR PLAN



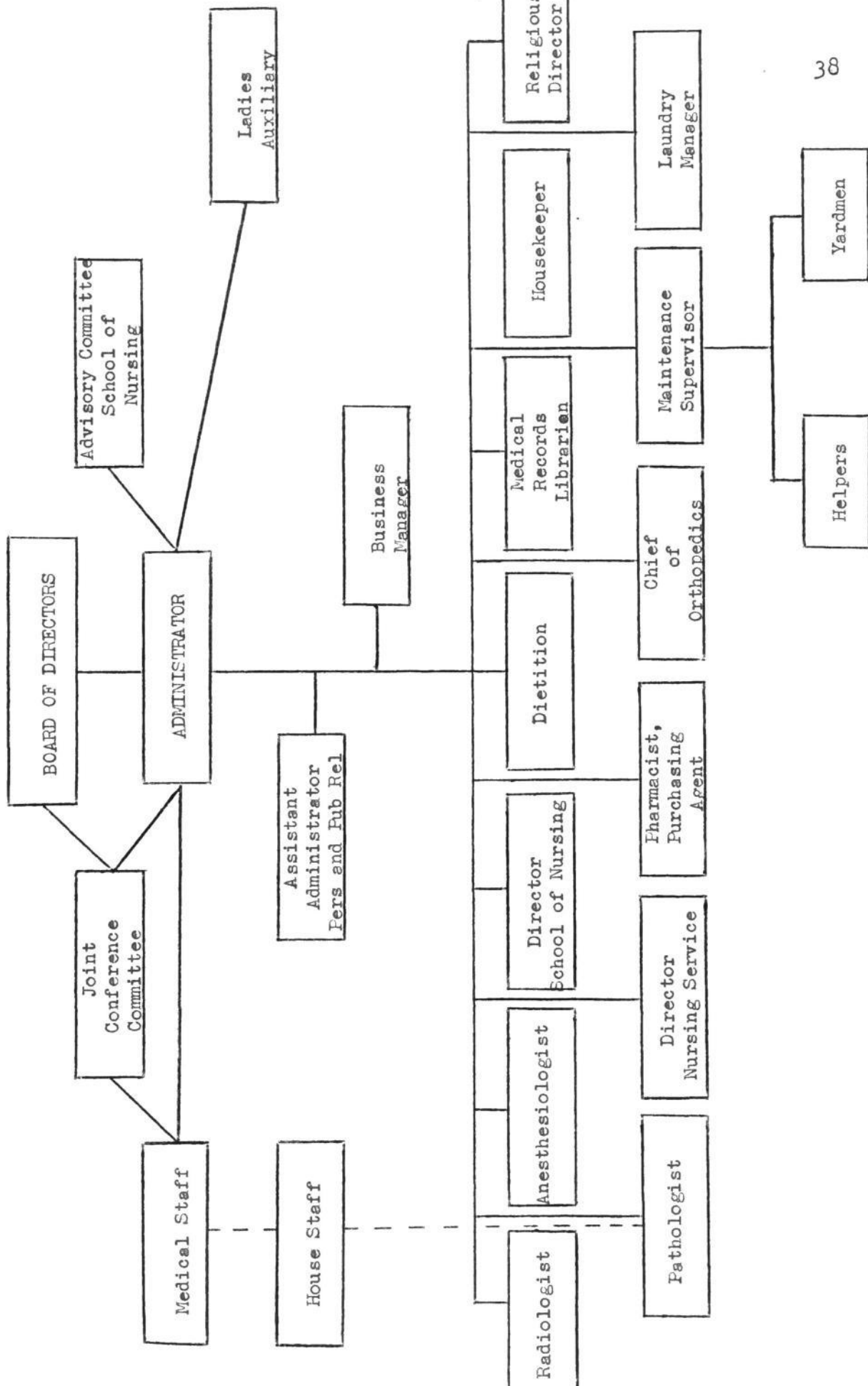
FOURTH FLOOR PLAN



FIFTH FLOOR PLAN

ANNEX II

HOSPITAL ORGANIZATIONAL CHART



ANNEX III

PRESENT AND PROPOSED WORK ORDER

REQUEST FOR MAINTENANCE

To Maintenance Department

Date _____

From _____

Location of Trouble:

Description of Job:

Date Repaired: _____

PRESENT WORK ORDER FORM

ANNEX IV

PRESENT JOB DESCRIPTION FOR MAINTENANCE ENGINEER

JOB DESCRIPTION

Plans installations and repairs and supervises workers engaged in maintenance of buildings, grounds, and utilities systems; Assists in planning, scheduling, and supervising maintenance and repair work, such as plumbing, masonry, carpentry, painting, electrical work, refrigeration and elevator repair, and gardening. Sketches plans, reads and interprets blueprints and manufacturers' specifications, and orders equipment and materials for major installations and repairs. Assigns maintenance crews and laborers to specific jobs and spot checks work to be certain all workmanship meets standards and that safety and building regulations are not violated. Computes costs of jobs for budgetary purposes. Maintains records of all maintenance and frequently substitutes for one of the maintenance crew during emergencies.

MAINTENANCE ENGINEER

PRESENT

JOB DESCRIPTION

MAINTENANCE ENGINEER

ANNEX V

PROPOSED JOB DESCRIPTIONS FOR MAINTENANCE DEPARTMENT

MAINTENANCE ENGINEER

JOB SUMMARY

Administers and directs program involving maintenance of buildings and grounds, equipment, and distribution lines for steam, hot water, plumbing, electricity, refrigeration, and sanitation. Advises Administrator relative to structural changes or additions. Establishes preventive maintenance schedules. Computes costs; schedules, supervises, and inspects repairs and maintenance. Orders equipment and supplies. Directs safety programs.

PERFORMANCE REQUIREMENTS

Responsibility for: Safe and efficient operation of physical plant of hospital and its utilities. Conformance with local building codes. Close cooperation with all departments. Accurate cost computation and maintenance of records. Care of machinery and equipment. Work of subordinates.

Physical Demands: Large proportion of time spent actively inspecting facilities and maintenance work. May occasionally perform actual repairs in emergency situations.

Special Demands: Willingness to assume responsibility. Ability to supervise others, and to make emergency decisions. Ability to comprehend a variety of technical subjects in the engineering and maintenance field.

Ability to work under general supervision.

QUALIFICATIONS

Education: College graduate in engineering or high school graduate with appropriate experience as indicated below.

Experience: For non college graduate five to ten years of progressive experience in maintenance work is required.

Job Knowledge: Must be familiar with building maintenance techniques, equipment and operation of power plants, plumbing and heating systems, sanitation, refrigeration, electrical systems and fire and safety regulations. Should be familiar with ordering procedures, cost computations, government and local inspection procedures and building and sanitation codes.

WORKING ENVIRONMENT

Performs duties in an office and at the work site about equally.

JOB RELATIONSHIPS

Source of Workers: Maintenance personnel.

Promotion from: No formal line of promotion.

Promotion to: No formal line of promotion.

Supervised by: Administrator.

Workers Supervised: All maintenance personnel.

WORK PERFORMED

Supervises workers engaged in maintaining buildings and grounds and repairing and operating equipment, machinery, and distribution lines. Periodically inspects all of these and estimates cost of repairs. Approves all work orders and schedules all work. Supervises emergency and major repairs and may perform actual work in emergencies. Computes costs and keeps cost and equipment maintenance records.

Orders or approves orders for equipment and supplies.

Performs administrative duties, such as interviewing and making final selection of workers, making periodic cost reports, and acting as a liaison between maintenance and other departments in the hospital.

ADMINISTRATIVE ASSISTANT TO THE
MAINTENANCE ENGINEER

JOB SUMMARY

Carries through to completion specific work projects assigned by the maintenance engineer as well as routine administrative duties of the department. Responsible for operation of the tool and spare parts stockroom including computation of stock levels and periodic preparation of replenishment orders.

PERFORMANCE REQUIREMENTS

Responsibility for: Completion of work assignments and accuracy of assembled data.

Physical Demands: Sits and walks intermittently throughout working day. Handles office equipment and materials.

Special Demands: Ability to accept responsibility for accuracy of computations. Ability to meet and deal effectively with people from other hospital departments in the absence of the maintenance engineer.

QUALIFICATIONS

Education: High school graduate is required.

Experience: Some experience in hospital maintenance or a related field is desirable but not essential. Previous experience in office work would also be of value.

WORKING ENVIRONMENT

Works primarily in the office of the maintenance engineer. Makes infrequent trips to the work sites.

JOB RELATIONSHIPS

Source of Workers: High school graduates.

Promotion from: No formal line of promotion.

Promotion to: No formal line of promotion.

Supervised by: Maintenance engineer.

Workers Supervised: None.

WORK PERFORMED

Picks up work orders at the designated place and assists administratively in approving and scheduling the work. Upon completion of work computes cost from hours expended, rate of pay and materials used. Compiles periodic reports as required. Maintains individual equipment maintenance records. Performs all required typing and filing and answers telephone. Maintains tool and stockroom including computation of stock levels and reordering. Completes other projects as assigned by the maintenance engineer.

ELECTRICAL REPAIRMAN

JOB SUMMARY

Installs, tests, and repairs electric light and power distribution circuits, equipment, and appliances. Works from blueprints, wiring diagrams, and written and oral instructions. Cleans and makes minor repairs to motors and electrical fixtures. Performs related duties.

PERFORMANCE REQUIREMENTS

Responsibility for: Installation and maintenance of electrical system and equipment according to standard practice of trade and safety regulations set up by State and local governments. Care of tools and judicious use of materials. Training of apprentice electrician.

Physical Demands: Stands and walks most of the working day. Climbs, lifts, carries, reaches for, handles and manipulates tools and materials. Color discrimination to distinguish wiring.

Special Demands: Willingness to work for the best interests of the institution, and with due consideration for patients in vicinity. Ability to work under emergency conditions and exercise initiative and judgment in determining causes of failure of electrical equipment and circuits, and in effecting their repair.

QUALIFICATIONS

Education: High school or trade school graduate preferred. Should have training in blueprint reading, electricity and electrical installations, machine shop work, mathematics, and physics, or equivalent experience as stated below.

Experience: One year of independent experience in a similar position or four years apprenticeship is considered minimal. Vocational courses may shorten this period.

Job Knowledge: Must be thoroughly familiar with tools and methods of trade, high tension safety practices, be able to read blueprints and wiring diagrams, and have a knowledge of electrical sections of public building and safety codes.

WORKING ENVIRONMENT

Works both indoors and outdoors. Is exposed to hazards of electrical shocks and burns as well as falls from ladders and scaffolding.

JOB RELATIONSHIPS

Source of Workers: Electricians.

Promotion from: Apprentice Electrician.

Promotion to: No formal line of promotion.

Supervised by: Maintenance Engineer.

Workers Supervised: Apprentice Electrician.

WORK PERFORMED

Inspects and tests electrical lighting, signal, communication, and power circuits and equipment. Isolates defects in wiring, switches, motors, and other electrical equipment, using testing instruments such as ammeter, ohmmeter, voltmeter, testing lamp, or growler. Examines and tests such elements of systems as distribution panel, controls, circuit fixtures, and motors to locate obvious faults, such as blown fuses, short circuits, broken wires, loose connections, and worn motor brushes.

Repairs such defects as above including repair or replacement of circuits and replacement of any electrical or mechanical parts.

Installs new wiring and electrical machinery including accessories.

Performs related work and may from time to time be required to work outside the electrical field for short periods of time and in the event of emergency.

CARPENTER - PAINTER - PLASTERERJOB SUMMARY

Paints walls, woodwork, furniture, and fixtures, including filling, and mixing and thinning paint.

Patches existing plaster surfaces and minor new construction. Lays and patches tile in bathrooms, laboratories, and operating rooms.

Performs minor repairs to floors, molding, furniture, and wooden equipment. Repairs and installs locks, door checks, and windows.

PERFORMANCE REQUIREMENTS

Responsibility for: Painting and repair of floors, walls, wooden equipment, fixtures, and furniture, and for care of all tools and equipment. Judicious use of equipment and supplies.

Physical Demands: Stands, walks and climbs ladder major part of working day. Lifts, reaches for, handles, and manipulates tools and materials.

Special Demands: Willingness to work for best interests of the institution, and to perform duties with due consideration for patients in vicinity.

QUALIFICATIONS

Education: High school or trade school graduate is preferred. Must be able to speak, write, make calculations, and follow directions.

Experience: At least three years' experience in these related fields is essential.

Job Knowledge: Must be familiar with repair of plaster and tile surfaces, wooden structures and equipment, and with the techniques of painting.

JOB RELATIONSHIPS

Source of Workers: Experienced handymen.

Promotion from: No formal line of promotion.

Promotion to: No formal line of promotion.

Supervised by: Maintenance Engineer.

Workers Supervised: None.

WORK PERFORMED

Does all types of painting, including brush, roller, and sprayer. Mixes and thins paint, prepares surfaces for painting, including removal of old paint, filling and smoothing surfaces.

Performs minor plaster and carpenter repairs as stated in the Job Summary.

Performs related work and may from time to time be required to work outside his field for short periods of time and in the event of an emergency.

REFRIGERATION - HEATING - PLUMBING

REPAIRMAN

JOB SUMMARY

Installs, operates, and maintains refrigerating equipment for preserving food, making ice, cooling water, and conditioning air. Overhauls, repairs, and inspects such equipment and accessory units.

Operates and maintains boiler and steam systems and gas, water, air, oxygen, and waste disposal systems.

Performs related duties.

PERFORMANCE REQUIREMENTS

Responsibility for: Installation and mechanical condition of refrigeration machinery, air conditioning units, water coolers and small refrigerators. Functioning of hospital's steam, sewage, water, gas, and air systems. Care of tools and equipment and judicious use of supplies.

Physical Demands: Stands and walks most of the working day. Reaches for, handles, and manipulates tools and equipment. Lifts and carries heavy equipment. Color discrimination when working with electrical wiring.

Special Demands: Ability to work under emergency conditions and to effect repairs with due consideration for patients in the vicinity. Considerable initiative and judgment involved in planning installation, repairing and detecting malfunctioning of equipment.

QUALIFICATIONS

Education: High school or trade school graduate, including courses in chemistry, physics, electricity, blueprint reading and shop arithmetic. Specialized course in theory of refrigeration. Course or experience in boiler operation.

Experience: Approximately two years experience in refrigeration and two years in heating and plumbing or an equivalent combination. Local or State licence if required.

Job Knowledge: Must be thoroughly familiar with theory and operation of all types of refrigeration equipment. Must be familiar with boiler plant operation and plumbing installation and maintenance.

WORKING ENVIRONMENT

Works primarily indoors but may be required to install or repair outside plumbing at infrequent intervals. Exposed to noise, dirt, oil, dust, refrigerant fumes, and falls.

JOB RELATIONSHIPS

Source of Workers: Refrigeration Servicemen.

Promotion from: No formal line of promotion. May be promoted from apprentice position.

Promotion to: No formal line of promotion.

Supervised by: Maintenance engineer.

Workers supervised: Apprentice.

WORK PERFORMED

Inspects and operates refrigerating equipment.

Reads thermometers and guages and records readings.

Maintains and repairs system to include detection of malfunction, replacement of mechanical parts, replacement of electrical parts, replacement of refrigerant, lubrication, fitting of necessary plumbing and soldering of joints. Periodically examines installations.

Operates, maintains boilers, pumps, and heating appliances, including inspection and lubrication.

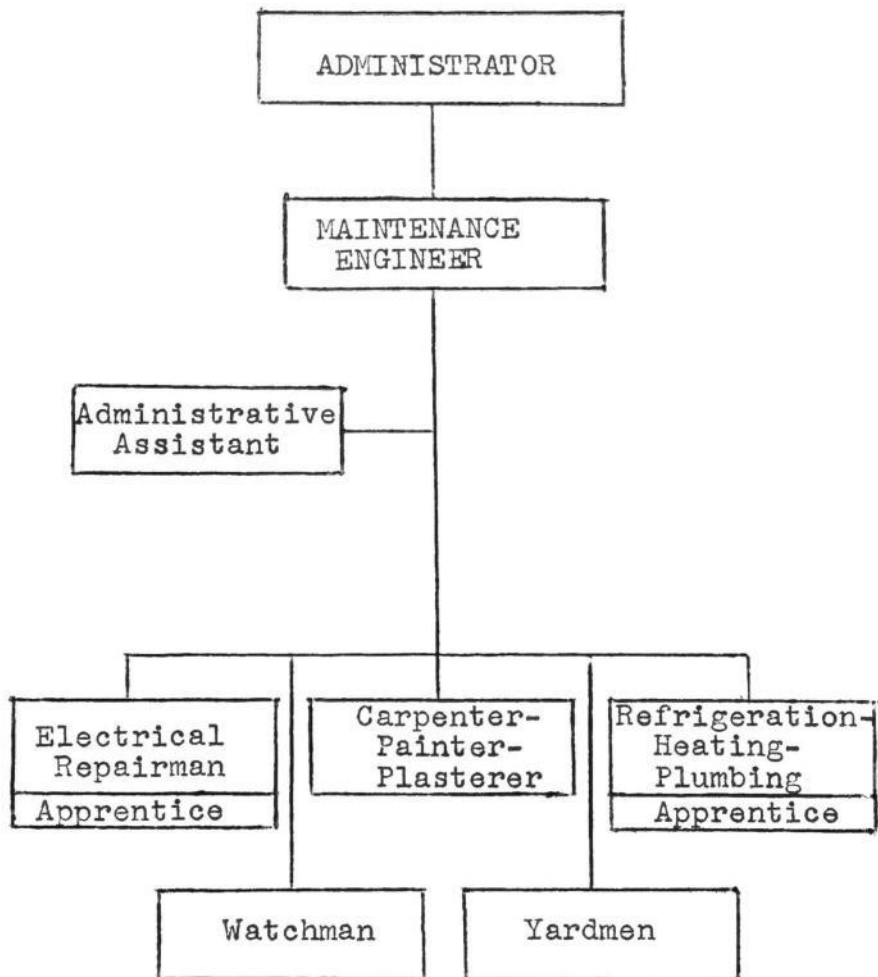
Maintains and repairs gas, water, air, oxygen, and waste disposal systems to include pipe cutting, threading, bending, and installation, and the installation of required fitting.

Performs related functions.

May from time to time be required to work outside this field for short periods of time and in the event of an emergency.

ANNEX VI

PROPOSED DEPARTMENTAL ORGANIZATIONAL CHART



PROPOSED
ORGANIZATIONAL CHART
MAINTENANCE DEPARTMENT

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AUTOBIOGRAPHICAL SKETCH OF THE AUTHOR

I, Robert Alvin Watson, was born at Laurens, Iowa, on December 5, 1928. I received the bulk of my grade school and high school education at the Sutherland Consolidated School, Sutherland, Iowa, and graduated from there in May, 1946.

During the fall quarter of 1947 I entered Iowa State College, Ames, Iowa, majoring in Dairy Industry with a minor in Military Science (ROTC). In June, 1951, I received a Bachelor of Science degree and was concurrently commissioned a second lieutenant in the United States Air Force. Since a majority of my undergraduate study was in science, chemistry, bacteriology, etc., I was commissioned directly into the Air Force Medical Service Corps.

My initial duty station was Tinker Air Force Base, Oklahoma, where I reported on August 1, 1951. While assigned there, I attended the Medical Service Officers Orientation Course and the Medical Service Corps Officers Basic Course at Gunter Air Force Base, Alabama. Upon return to Tinker I was assigned as Hospital Adjutant and Group (detachment) Commander of the 2792nd Medical Group.

I then requested and received assignment to the Armed Services Medical Procurement Agency, Brooklyn, New York, assigned initially as Procurement Control and

Production Officer, Industrial Mobilization Division, and subsequently as Assistant Agency Inspector General. While assigned to the Agency from May 1952 to February 1955, I completed the Army Quartermaster Procurement School, Fort Lee, Virginia, and the Army Inspector General School, OTIG, Washington, D.C.

In February, 1955, I was transferred to the 6611th USAF Hospital, APO 858, N.Y., N.Y. (Narsarssuak Air Base, Greenland), and served as Executive Officer of this small facility for two years.

I returned to the zone of interior in March 1957, and was assigned to the Air Reserve Center in Tampa, Florida, where my primary duty was to establish a 250-bed Reserve hospital including recruitment, assignment, and training of Reserve personnel. This job was not yet complete when I was assigned to the Hospital Administration Course, Army Medical Service School, Fort Sam Houston, Texas, in September, 1957.

ABSTRACT OF THE STUDY

The problem reported upon in this study was to evaluate the administration of the maintenance department of Hillcrest Memorial Hospital, Waco, Texas, and to recommend changes designed to result in optimum efficiency through balanced staffing, adequate records, revised organization, and a sound preventive maintenance program.

Due to the complete absence of written records in the maintenance department, the methods used were necessarily limited to interviews and observations. The Administrator, the Assistant Administrator, the Business Manager, the Director of Nursing Service, the Purchasing Agent, the Maintenance Engineer and all maintenance employees were interviewed frequently and a major portion of the two weeks allowed for the study was spent in actually observing the operation of the department.

The Discussion portion contains a detailed examination of the deficiencies noted and elucidates means of correcting them. This section is divided into four headings entitled, Records, Personnel, Organization, and Preventive Maintenance.

The general conclusion drawn is that in the evolution of this hospital from sixty-five beds to what will soon be over three hundred, no effort has been made to formalize

the administration of the maintenance department and place it on a businesslike basis. Specific conclusions are listed to pin-point these deficiencies and specific actions designed to remedy them are recommended.