A SMALL-ANIMAL HOSPITAL

by

George A. Saunders

Submitted in partial fulfillment of the requirements for the Degree of Master of Architecture on 22 August, 1951.

Author

Dean, School of Architecture and City Planning

ABSTRACT

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This problem is a case study rather than a particular building for a particular person. The building is designed to be constructed in three stages. The first stage is developed for a veterinarian beginning his private practice, the second and third stages are developed for that time when other veterinarians join the staff.

Due to the inadequacy of the written material available concerning the Small-Animal Hospital, a rough draft was written of this thesis and submitted for criticism to the fourteen Universities with Departments of Veterinary Medicine; eight of the fourteen responded. In addition, the drawings and paper were presented for criticism to the staff at a meeting with sixteen veterinarians attending at the Angell Memorial Hospital, Boston, Massachusetts.

Dedicated to

My pal and constant companion

who, having died on 2 May, 1951,

is staying behind in Boston

while we move on.

Ch. Rovingdale's Don Juan

Acknowledgements

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Dr. Louis H. LaFond, Hospital Inspector, American Animal Hospital Ass'n.

Bolt, Beranek & Newman — Consultants in Acoustics, Cambridge, Massachusetts

Entire staff Angell Memorial Hospital, Boston, Massachusetts

22 August, 1951
Cambridge, Massachusetts

Dean Pietro Belluschi
School of Architecture and Planning
Massachusetts Institute of Technology
Cambridge, 39 Massachusetts

Dear Sir:

As partial fulfillment of the requirements for the degree, Master of Architecture, I would like to submit my thesis, "A Small-Animal Hospital".

Respectfully submitted,

George A. Saunders

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Illustrations

THE NEED

The need for the veterinary hospital in any neighborhood should be established before the site is selected. The city and suburbs should be surveyed carefully for the location of existing veterinary facilities. It is well to examine an area within a radius of ten miles of the proposed location, as experience has taught that pet owners will travel five to six miles to a veterinarian.

It has been estimated that a veterinarian must have approximately 1500 dogs that are potentially his patients if his practice is to be successful.* The number of dogs in the area can be closely approximated by inquiry and research in the licensing bureaus of the towns and cities adjacent to the proposed location.

*Ellis B. Leonard - Director, Small-Animal Clinic, Cornell University

THE SITE (See Figure 1)

Site selection for a Small-Animal Hospital is more difficult than for many other ordinary buildings. Zoning ordinances must be investigated to make certain that a building of this type may be built at the desired location.

In the selection of a site for this problem, the author inquired of the zoning ordinances in Lincoln, Lexington and Concord, Massachusetts and found that each of these communities considers it a special type building. This category of buildings requires that notices be posted on the site and that a public hearing be held before the Board of Appeals, so that all interested parties may appear and state any objections to the proposed building. It is assumed that most communities in the United States require the same procedure before the right to build is granted.

Many veterinarians have found it advantageous to build in the township adjoining the corporate limits of a community. There is less interference from adjoining property owners and there is encouragement from those who want to promote this new area.

The American Animal Hospital Association suggests that the Small-Animal Hospital be located on a trunk highway serving surrounding communities. The Small-Animal Hospital tends to grow much more rapidly if such a location can be found.

Business districts and apartment areas are particularly unfavorable places to establish a Small-Animal Hospital.

Business districts are usually many miles away from the residential areas, making it inconvenient to transport the patient. Apartment house areas are not considered good risks because of the restrictions placed on people and pets.

Property may be found in the community that is adjacent to property held as right of way or land on which buildings may not be erected. If the Small-Animal Hospital can be built adjacent to such an area, neighboring parties, who at some future date may complain of the hospitals' existence, will not be allowed to build close by.

The site selected for the hospital design by the writer is an ideal one, as can be seen in Figure 1. It is situated between a road and a power line which has a 150 ft. right of way; adjacent to the power line is the Hobbs Brook Reservoir, which is public property, as the water drawn from it serves the city of Cambridge, Massachusetts, and no one can build on its shores. This gives the veterinarian the advantage of an extremely large site of land without actually purchasing or maintaining it. There are many such tracts of land in various communities and the veterinarian should be well acquainted with these possibilities.

HOSPITAL PLANNING

1. General

Studies by Goodman* and LaFond# indicate that one veterinarian can handle from 20 to 35 hospital patients, the number depending on the veterinarian and the efficiency of the hospital assistants. Their studies also reveal that the cages should not be taxed beyond 70% capacity. Therefore, it can be estimated that a hospital should have 40 to 60 cages per veterinarian.

The Small-Animal Hospital requires many rooms of varied sizes, the majority tending to be small, as in ordinary hospitals. Circulation is a prime factor in an animal hospital. Patients with infectious or contagious diseases are required to be isolated.

Boarding kennels should be isolated completely from the hospital in a separate building. This separation has more of a psychological advantage to prospective boarders than a factual one. The owner does not object too strenuously to bringing his well animal to the veterinarian to be innoculated, even though it may come in contact with sick animals in the reception room; but most owners do object strenuously to taking their animals to board and associate with sick animals, even for a short length of time. Therefore, if the boarding kennels can be planned in such a manner that boarders need not use the reception room, it will be advantageous to the veterinarian and set the owners' mind at ease.

*Goodman, L. W.-What Architects Don't Know About Animal Hospitals

#LaFond, L. H. -Veterinary Service Available to the American Pet Owner

The materials and equipment used must withstand the destruction of chewing, scratching, drooling, and the deposits of hair, urine, and feces. Wall and floor surfaces should be of such material that they can be washed. The junction of wall floor should be a type of cove base which will eliminate the sharp corner and make cleaning much simpler. Metal doors and frames are recommended wherever possible. The doors and frames absorb rough treatment from the patients' chewing and gouging by metal leashes. Solid wood doors should be used where recommended in the section headed "Noise Control". Hollow metal doors are not adequate for any phase of noise control.

Wood should be used as little as possible in the hospital, for it is capable of absorbing odors and, in time, may become objectionable unless well maintained.

The hospital should be equipped with a well designed talk-back system, rather than telephones. The talk-back system allows the veterinarian to continue working while conversing with others in the hospital.

The young veterinarian usually starts with little capital and few clients; it is conceivable the original conception of the hospital may be inadequate within a short time. Hence, it is important that the hospital be planned with future expansion as a consideration. There are areas, such as reception room, surgery and laboratory, that will be required to suffice for the expanded hospital. It appears logical therefore that the facilities

that will not need be changed for expansion be made rather generous in the original conception.

The following is a list of the rooms and facilities usually required in a Small-Animal Hospital. A description of these rooms and the equipment required in each, is incorporated later in this thesis.

Reception room
Business office
Private office
Examination room
Surgery
X-ray physio-therapy
Laboratory
Work room - laundry
Kitchen
Pharmacy
Grooming and bathing room
Wards
  a. medicinal
  b. surgery
  c. recovery
  d. isolation
  e. skin
  f. cats
  g. boarding
Storage
Utility room
Toilet and locker
Incinerator and crematory
Bedrooms and apartments for staff
Autopsy
Darkroom

Figures 2, 3, 4 and 5 show the design of a Small-Animal Hospital that has been planned for future expansion. The design is based on developing a core for the hospital that will change little or none at all. This core consists of preparation room, surgery, X-ray room, scrub-up room, laboratory and kitchen. Within this area is housed all of the expensive equipment, the major part of the sewage,

and electric lines, so that in the future, when expansion takes place, these costly items will not need be altered. As the building expands, the waiting room and office areas will change and a ward unit is to be added for each veterinarian that is to join in the operation of this hospital.

The ward unit is designed so that it will house fifty animals, having its own ventilation system and exercise runs. When an additional unit is added, no part of the main building need be disturbed.

As a third member joins the organization it is felt that one man, (attendant), can no longer take care of the maintenance and duties about the hospital. A small house or apartment should be erected on the site to house a man and his wife who at that time would take care of the maintenance of the hospital. The boarding kennels will be added at the same time.

Those persons who occupy this house should be people who are familiar with the bathing, grooming and boarding of dogs. The boarding can be taken care of by the attendants of this house, keeping the boarding completely separated from the hospital.

The third stage of the design (Figures 4 and 5) incorporates a business office, receptionist and a staff room, and a room for locker space and additional toilets.

Further expansion, if desired, could be effected by adding additional examining rooms on the south side of the reception room.

RECEPTION ROOM

The reception room is planned to seat four to five people and their animals per veterinarian. This number will decrease per veterinarian as the number of veterinarians increases. The Angell Memorial Hospital in Boston, Massachusetts has accommodations for sixteen in its waiting room and six examining rooms with veterinarians on duty in the clinic. This appears quite adequate.

The reception room should be accessible to the parking areas and the principal street so that the entrance is obvious to the clients. It is extremely important that in the original planning this room not be made too small, for in the case of future expansion, this space, with additional furniture, should be adequate to accommodate the additional patients.

The normal activities of the hospital should be able to be carried on without using the reception room for circulation. Nearly all of the veterinarians contacted have quite definite opinions on this. They insist that patients who have been treated leave through an exit, rather than return through the reception room.

Many animal hospitals use a system of stalls in the waiting room. This stall is usually 2'-6" wide and 4'-0 " deep, in which the owner and the animal sit and wait until called by the veterinarian. This system of seating was not incorporated in the design, for the reason that the

majority of the people contacted felt that they were unsightly and difficult to keep clean. Therefore, the reception room was made larger than might ordinarily be expected, using space to isolate the patients, who at times might become hostile with each other.

PRIVATE OFFICE (See Figure 6)

This room is a small space where the veterinarian can carry on private conversation, study and relaxation. The office should be isolated from the clients, but readily accessible to the business office and the examination room. The veterinarian should be able to reach this room by a secondary entrance in the building and not be forced to walk through the reception room.

The private office in the design shown in Figures 2, 3, 4 and 6 was placed on the exterior of the building, thereby making the examination room completely free of any exterior walls. By placing the private office in this position, we are helping keep outside noises from entering the examination room; also, by closing the door between office and examination room, the latter room can be made completely dark.

The office can be furnished with a desk and chair for the veterinarian and a chair or chairs for the clients. This allows the veterinarian to keep the examination room free of any additional furniture except that which is necessary for the actual examination.

EXAMINATION ROOM

The examination room is an area where veterinarian and client can discuss and examine the patient, as well as treat minor ailments. Ninety to 120 sq. ft. of floor area are usually adequate for this room. In most hospitals more than one examination room is necessary. Efficient operation requires that 1-1/2 examination rooms per veterinarian should be provided. This room should contain an examination table, supply cabinet, and sink; it may also contain chairs for the client and a writing desk for the veterinarian. However, it has been recommended that chairs be kept from this area as they invite the clients to sit and talk excessively. With a private office placed as it is, the veterinarian can invite the client into his office to discuss any matters which he feels are important.

The examination room should be made as quiet as possible to facilitate examinations. It should be easily darkened so that the eyes may be examined.

Lighting, ventilation, and noise control are extremely important factors in this room. These items are considered in the following appropriate sections also, see Figure 6.

BUSINESS OFFICE

The business office should be accessible to separate entrances from the reception room and the hospital in general. It may well adjoin the staff room. In the business office should be kept the inactive records. Space in the business office or the staff room should be available for staff members to use while completing medical records.

This room, accessible to the waiting room, may have a portion used for the reception desk and the pharmacy, where the receptionist can take care of issuing drugs and keeping the pharmacy well stocked. This eliminates one duty for the veterinarian, if the receptionist could do this small job.

THE WORK ROOM (See Figure 7)

The work room is usually provided in large hospitals. It is used for dressing wounds, taking fecal, blood, or urine samples, and other miscellaneous tasks. Much of this work in a small hospital is done in the surgery; however, this is discouraged as it risks contamination of the surgery and its equipment. This space can also be used as a scrub-up room, but that is not recommended.

This room is omitted from practically all hospitals, as there is frequently some other space that could be used instead of the work room; however, most veterinarians feel that it should be incorporated if possible, since by doing most of the work here that is liable to contaminate the rest of the hospital, contamination can be confined to this relatively small area.

PREPARATION ROOM (See Figure 8)

The preparation room is used to prepare the animal for surgery. In this room, which should be air-conditioned, the animal is shaved and given anesthetic prior to going into the surgery. This room is also used for setting broken legs and applying splints, both wooden and metal. Therefore, it should be equipped with a small band-saw vise and a work bench on which both wood and metal may be worked. It should be adjacent to the surgical ward, recovery ward and X-ray room. The wall between the preparation room and the recovery ward should be of clear glass so that the person working in the preparation room can watch the dogs in the recovery room in case they regurgitate. An attendant must be on hand to make certain the animal's head is down and that he does not choke to death. The wall between the surgery and the preparation room should be equipped with a clear glass panel also so that the veterinarian can supervise the work going on in the preparation room from the surgery.

The X-ray room, being close at hand and using portable X-ray equipment, makes it convenient to take the animal into the X-ray room or the X-ray equipment to the animal.

SURGERY (See Figure 9)

The surgery should be adequate to accommodate major operations. This requires that this room be equipped with an operating table, O_2 tank, operating lights, autoclave, instrument sterilizer and cabinets for sterile storage of linens, sutures, drapes and instruments. The surgery should be air-conditioned, and if separate units are used, temperature and humidity should be the same as that in the preparation room and recovery ward.

Adjacent to the surgery should be a scrub-up room where those concerned with the surgery may cleanse themselves properly.

"In all areas where anesthetic gases are used, special provision is necessary to guard against the explosion hazard. Spark-proof electrical equipment, conductive flooring (such as cupric oxychloride cement, conductive asphalt tile, conductive linoleum, or conductive rubber) or whole alloy or brass strip grids on four inch centers with terrazzo or tile flooring must be provided. Tile floors with zinc filings in the cement mix have also been used.

"All equipment must be grounded. The electrical equipment will include explosion-proof switches, guarded light bulbs, and enclosed motors and rheostats. All electrical outlets must be at least two feet above the floor. All operating room areas should have non-glare walls tiled to a minimum height of six feet and preferably to the ceiling."*

*Architectural Record - July '46, Page 44

DARK ROOM AND X-RAY ROOM (See Figure 10)

In a small hospital, X-ray equipment may be small and may be placed in a room which is not used to a great extent. However, in a large hospital a separate room is necessary. The X-ray room should be so located to be readily accessible to the in-patient areas and as close as possible to the preparation room and surgery. The location should be such as to permit adequate natural ventilation and freedom from dampness.

Portable X-ray aparatus is used a great deal. It requires ordinary 110-120 A.C. voltage and heavy duty outlets, which are properly grounded. In portable X-ray work the cable should not be longer than 35 ft. The space of the outlets should therefore be arranged accordingly.*

The dark room should be completely light-proof and X-ray proof. The dark room should be equipped with a developing tank, thermostatically controlled, hot and cold running water, drying racks, film storage cabinet, file cabinet, viewing box and a small desk, about 3 ft. high where the technician might sit and arrange his work. It is well to arrange the dryers to permit examination of X-ray plates from the outside of the processing room. This is desirable when a veterinarian must see a plate a s soon as it is developed without waiting for it to dry.

*Rosenfield, Isadore - "Hospitals Integrated Design", Page 84

SCRUB-UP ROOM (See Figure 11)

The scrub-up room should contain two scrub-up sinks equipped with knee operating faucets and disinfectant material nearby, operated by either foot, knee or elbow. Also, there should be a place where sterile brushes may be stored adjacent to the sinks. The sinks should be a minimum of 3'-6" on centers so that a person washing at one sink will not splash water on a person washing at another sink. The room should also have deep receptacles for washing the arms.

There should be a small window between the scrub-up room and the operating room. This is desirable for the veterinarian to observe what takes place in the operating room while he scrubs.

LABORATORY AND PHARMACY

The space allotted for the laboratory work depends upon the size of the hospital and the amount of actual laboratory work that the veterinarian plans to do. Many hospitals combine this room with the pharmacy, and sometimes it is also the work room.

As the hospital expands, it is important that the laboratory be able to expand. As the veterinarians' practice increases and additional veterinarians are added to the staff of the hospital, there will probably be more need for a larger laboratory and more active interest in basic research. From this room much of the basic information on the patients' health and well-being is brought forth. Therefore, it should be well planned and well equipped.

The pharmacy should be convenient to the examination rooms and the main hospital area. Space will be required for a small refrigerator and a safe if narcotics are to be used. The pharmacy should be placed in the care of a responsible person so that sufficient drugs and stocks are kept on hand.

THE KITCHEN

The kitchen must provide for the storage and preparation of food and the sterilization of pans and utensils. The size of this room will depend on the size of the hospital. Some hospitals do an elaborate job of cooking, while others use prepared food. Therefore, the size of the kitchen would depend largely on the type of feeding that the veterinarian intends to do. The kitchen is another of the basic rooms of the hospital that should be generous in size in the original conception, so that in case of future expansion this room will not seem inadequate. Inadequate planning in this room would require great expense for remodeling at a future date, since most of the service lines, i.e. gas, electric, sewage, etc., may have to be relocated.

WARDS (See Figure 12)

The recent trend in wards has been that the wards be kept small. A ward of ten to twelve animals is considered ideal. In a small ward the animals are less likely to be disturbed and there is less contact between patients. Much of the noise can be eliminated if the cages are arranged so that the animals cannot see one another. It is recommended that a space of at least 4'-6" to 5'-0" remain in front of the cage for access.

Cleanliness in the small animal hospital is as important as it is in a hospital for human patients. Wall surfaces should be designed so that there is a minimum of square corners, cracks and crevices. All corners should be rounded and cove bases should be used wherever possible.

The exact number of wards in a hospital can fluctuate greatly. Two general wards and an isolation ward compromise a minimum. Experience has shown that the number and types of wards are becoming greater. Some hospitals have included all of the following:

Recovery ward
Medicinal ward
Surgical ward
Skin ward
Isolation ward
Cat ward

The isolation wards are those that contain the sickest animals and it is required that this ward have the greatest refinement in temperature control.

If boarding dogs is a phase of the hospital operation, their kennel or ward should be completely isolated from the hospital or placed in a separate building some distance

from the hospital. Many veterinarians find it helpful to have a small isolation room adjacent to the boarding kennels where dogs may be placed until the veterinarian has had the opportunity to examine them before accepting them as boarders. This is a precaution taken so that a sick animal will not contaminate the entire kennel.

EXERCISE RUNS (See Figure 12)

Adjacent to all wards a place should be provided where the dogs may be allowed to exercise. In the isolation ward where the animals are confined, an area should be provided for their exercise. These runs may be used for all animals who do not have a disease of a contagous nature. The runs may be either exterior, semi-enclosed or completely enclosed. The latter two are preferred, inasmuch as they keep the animals protected from the elements. It is recommended that these runs be a minimum of four feet wide, fifteen feet long and have a fence six and one-half feet high with a wire top. If the wire top is not included a fence should be eight feet high with an 18"-45° overhang. The lower portion of this barrier should be of an opaque type material, forty-two inches high. This does not allow the animals nose to nose contact. Floors should be of concrete or other hard finished material pitched to a drain for ease of maintenance. Hot water or steam should be available to flush down these runs.

GROOMING AND BATHING ROOM (See Figure 13)

The size of this room will fluctuate considerably in accordance with the veterinarian's attitude toward this phase of practice. A veterinarian located in a high income community will probably find more pure-bred dogs among his patients. With this combination of a high income group and pure-bred dogs, it might be assumed that more elaborate facilities would be required, inasmuch as this service would be demanded. A veterinarian situated in a relatively low income community may find that just the opposite is true and this service may not be required.

The veterinarian's training does not emphasize this phase of animal care. Grooming is more a technical operation and does not require the professional skill of the veterinarian. Therefore, it may be assumed that these facilities may fluctuate from a mere token installation for the convenience of the clientele to a more elaborate one with a skilled technician in charge. This room should be adapted into the plan in such a manner that the animals using this service must not use the reception room. The animals could be taken to this room and placed in a cage and left. They can then be given the desired service and returned to the cage to await the arrival of someone to remove them from the hospital. It is important that these animals can be brought to and taken from the hospital without coming in contact with any dog that may have infectious or contagous diseases. If boarding kennels are to be a part of this establishment, the bathing and grooming room should

be in that separate building provided for the boarding kennels and runs.

Due to the nature of the work, this room is difficult to keep clean, but care in planning and use of materials may ease this maintenance problem.

Equipment in this room consists of a large deep sink, approximately four feet long, two feet wide and eighteen inches deep used for bathing. The top of the sink should be raised so that it is thirty-six inches to forty inches above the floor. A sturdy table is required for the grooming operation. Electrical outlets and electrical equipment used for grooming and clipping animals are best located on the ceiling on retractable cords. The room should be designed with a drain in the floor and a type of wall material which would allow the room to be hosed down.

An electric heater is placed over the drying cage which has a perforated metal ceiling (this is shown in Figure 13). This warm air will be allowed to blow on the animal until he has dried. The animal would then be removed and placed in a cage in the boarding kennels to wait for removal from the hospital.

CAGES

There is no one answer as far as the ideal cage is concerned. There are as many cage designs as there are veterinarians.

A few of the points most veterinarians will agree upon follow. There should be no seams, cracks or sharp corners that are difficult to clean. The materials used for the cage construction should be easily maintained, tough, hard surface, and scratch resistant. The approximate size of the cages required are:

24" wide, 24" high and 24" deep for the small breeds

36" wide, 36" high and 36" deep for the medium breeds

48" wide, 48" high and 48" deep for the large breeds

It is possible that these cages may be made a little deeper and not quite as wide to save wall space.

The manner that the above requirements are incorporated in the final cage design is a cause for disagreement. Most veterinarians favor cages where the dogs cannot see each other, reducing the animals' contacts. On the other extreme, Dr. Thomas J. Jones, Dean of the School of Veterinary Medicine, University of Georgia, states that they have used clear glass for the kennel divisions with good results.

Double decking the cages usually results in economy of space. However, this being the case allows only the front of the cage to be open for ventilation. According to Dr. W. W. Armistead, Professor of Veterinary Medicine at Texas A&M, tank-type cages (with only one or two sides

open) are unbearably hot when used in the southern states, except where complete air-conditioning is used.

Figure 12 shows a cage that has been designed for the Small-Animal Hospital in this thesis. The bottom is of a single piece stainless steel that is set in the concrete, turned up to form a wainscot. This piece of steel extends the entire length of the ward. It is shaped so that any material spilled on the floor of one cage will not run into the other but into a small trough in the front of the cage outside the gate. The divisions are made removable by a type of spring clip, so that they can be occasionally taken out for a complete cleaning. It will be noted that the side panels are kept approximately one-half inch away from the back, bottom and front and two inches from the top of the cage. This reduces the number of corners and also allows for air circulation throughout. The material for these side panels could be an opaque material such as steel, transite, or figured glass, etc., or it could be an open material such as perforated steel or expanded metal lath, etc. These perforated side panels will afford more ventilation where necessary.

ATTENDANTS QUARTERS

It is necessary that some responsible person be in or near the hospital at all times. This requires that a room with plumbing facilities nearby or a small apartment be provided for the person or persons who will be required to remain on the premises overnight.

When the hospital is small, one man is usually sufficient. His duties are usually maintenance and feeding of the animals. However, when the hospital becomes much larger and many additional duties arise, especially with the addition of boarding kennels, there should be, if at all possible, a man and his wife on the premises. It is best if these people are familiar with animals and skilled in the method of bathing and grooming dogs. They can then take charge of the separate boarding kennel and grooming area.

AIR-CONDITIONING

Complete conditioning of a hospital involves a capital investment and running expenses which may not be justified. Air-conditioning has important applications in certain hospital areas, such as surgery, recovery, isolation wards, examining room and laboratory. Final reasons may preclude the cooling of the entire room, but the needs of the average hospital can be met by the use of built-in-room coolers and a few portable units which can be wheeled about the hospital when needed. The following sequence of events has been assumed as occuring in a large proportion of intro-ward infections:

(a) ejection of relatively large protected infective particles from patients,

(b) rapid venting or settling of these particles so that those remaining air-borne are in low concentration,

(c) survival of infective particles to permit the accumulation of high concentrations on services,

(d) repeated reintroduction of infective particles into the air under the stimulus of ward activities, or by way currants of the order of 50 f.p.m. over the floor,

(e) extension of infective areas by air turbulence throughout the ward or hospital. The most important link in this probable infection chain has been demonstrated to be the reintroduction of particles into the air.

In the control of air-borne infection in the operating room, the prevention of dispersal of infectious materials into the air, control of dust, and proper ventilation

supercedes attempts to remove or kill virus organisms.

In a recent investigation conducted at the University of Pittsburgh, it was revealed that the bacterial content of conditioned operating rooms was considerably less than that of non-conditioned rooms. Unit air-conditioners have proven suitable in operating rooms when producing between eight and twelve air changes per hour of filtered and properly conditioned air without recirculation during the course of anesthesia. A separate exhaust fan system is usually necessary to confine and remove the gases and odors.

Too great a difference in temperature between the operating room and the final hospital destination of the patient, including corridors, is conducive to infection. A suggested remedy is a recovery ward in which conditions closely approximate those of an operating room and in which the patients remain for a period of time until they can be moved to their proper ward.

Odors are another problem that can usually be taken care of with the air-conditioning system. Chemical sprays, vapors, oxidizing gases and ventilation methods are unsatisfactory. The ideal deodorant would purify the air by means of odor adsorption so that the air can be recirculated subsequently. Based upon the effectiveness of activated carbon to adsorb odors, individual adsorption units have been used successfully.

HEATING

There are many heating systems which can be used today. The hot air systems are not very well suited for the animal hospital, inasmuch as there is a danger of recirculating the air. A closed system should be used; that is, the air in the room is heated by some method so that the air is not recirculated. Hot water using radiators or radiant panels in either floor or ceiling are probably to be preferred.

Radiant heat is advantageous from the standpoint of temperature differentials. A well designed system of this sort produces very uniform conditions, the air throughout the room differing at various points by only 5^{o}. This is desirable from the comfort standpoint and may also be a factor in heating economy. Since high temperatures in the upper part of the room favor exessive heat loss, this system avoids the presence of registers or free-standing radiators in the room. This is a distinct advantage for the small animal hospital, inasmuch as it is one less place to clean and harbor bacteria.

The radiant coils should not be run under the cages unless the system can be operated at a low enough temperature so that it will not be discomforting to the animals. If it is necessary to run the system at a high temperature to make up for the heat loss, the coils should be run in the ceiling.

In areas where strict temperature control is essential, electrical heating units should be used so that they may operate during period of lag in the radiant system due to the outdoor temperature changing rapidly.

NOISE CONTROL

A study was made as to the amount of sound energy that is possible for a dog to create. Figure 14 shows the results of the measurements taken in the stray ward of the Angell Memorial Hospital, Boston, Massachusetts. A Shepherd, a Doberman, and a Mongrel were used in this study. The measurements were acquired by using a sound level meter and an octave band analyizer. Each curve represents the barking of only one animal at a time.

It was assumed that no one would build within one-hundred feet of the hospital. Figure 15 shows the noise levels at one-hundred feet from the source, and a curve indicating night time country residential criteria, which has been estimated as the noise level at which people may sleep in the country with open windows without being disturbed. This curve is representative of the best knowledge and experience on this subject today.

Those portions of the curves representing the sound that the animals create, shown upon the night time country residential criteria curve, will need be taken care of by creating a type structure that will contain this energy and not allow it to escape into the countryside. This cannot be done by merely applying sound absorptive materials. It must be done with materials that will afford the required transmission loss.

The purposes of noise control in the small-animal hospital are to allow the veterinarian to be able to diagnose the patient without outside disturbances; to isolate the sounds that may emit from the wards, and so that noises created by the animals themselves will be less likely to disturb the other animals.

Noise control in buildings is achieved by means of:

1. Proper planning, to segregate sounds
2. Proper designing and detailing of structures, to block effectively the passage of sounds
3. Proper utilization of finishes and furnishings to absorb sound
4. Proper selection and installation of mechanical equipment to control noise at its source.

Segregation reduces noise by putting the source further away;

Isolation reduces noise by presenting a barrier against its passage;

Absorption reduces noise by draining off sound energy. These three techniques are based on distinctly different physical principals. A clear visualization of these differences is essential for rational acoustic designing.

Within the building, vertical relations, as well as horizontal, should be studied to achieve the best possible segregation of noisy from quiet areas and to afford a minimum privacy.

Basically, sound isolation requires massive and impervious barriers. If not impervious the wall passes sound readily. This is true of porous masonry units and absorptive blankets. The degree of isolation increases with weight, at least if other factors are constant.

Sound absorption is essentially a property of surfaces, in contrast with sound insulation which derives from the entire body of a structural element. There are many types of sound absorbing materials, from conventional perforated acoustic tiles to absorbing blankets faced with a hard perforated facing. In many cases the cost of installation in new construction can be found to be comparable with conventional non-absorbing finishes.

Noise is also caused by mechanical equipment which is permanently mounted to walls, ceilings or floors. While this in itself may not radiate much sound, the surfaces to which they are attached may readily radiate sound. Each piece of equipment should be analysed and determined how and where it is to be installed.

The treatment recommended for a small-animal hospital is as follows:

Ceilings in the reception room, business office, private office, examining room, surgery and ward areas should be treated with an absorbing material. In those rooms where a luminous ceiling is indicated, the absorptive materials are to be placed on the wall. See Figures 6, 7, 8 and 9. The material placed in this location

is as effective as that placed on the ceiling. This material may be either 3/4" or thicker, commercial perforated acoustic tile or two inch blanket of mineral or rock wool faced with a perforated hard board. This is a minimum treatment. If further study would indicate that this type surfacing could be installed for the same initial cost as a non-absorbing finish surface might be installed, then it would be advisable to acoustically treat the ceiling in the entire hospital. Additional absorption may be desired in the kennels. This absorption may be placed on the side walls.

The walls surrounding noisy areas (wards) and areas where complete sound isolation is desired (surgery, and examining rooms) should be constructed of concrete block plastered either one or two sides. Doors entering these rooms should be solid 1-3/4" wood doors rubber gasketed at head and jambs and equipped with an automatic bottom closer. Any glazing should be a minimum of 1/4" thick glass. Any ducts entering or emiting from these areas should be lined with one inch of duct liner for a minimum length of ten feet. Equipment located in rooms adjacent to the surgery or examining rooms, which might radiate sound through the floor, should be mounted on rubber-in-shear mountings.

If this equipment is attached to the water lines it should be connected with a short length of flexible rubber hose. Similarly in pipes or water closets attached to the walls of these rooms should be isolated with resilient pads or mounting.

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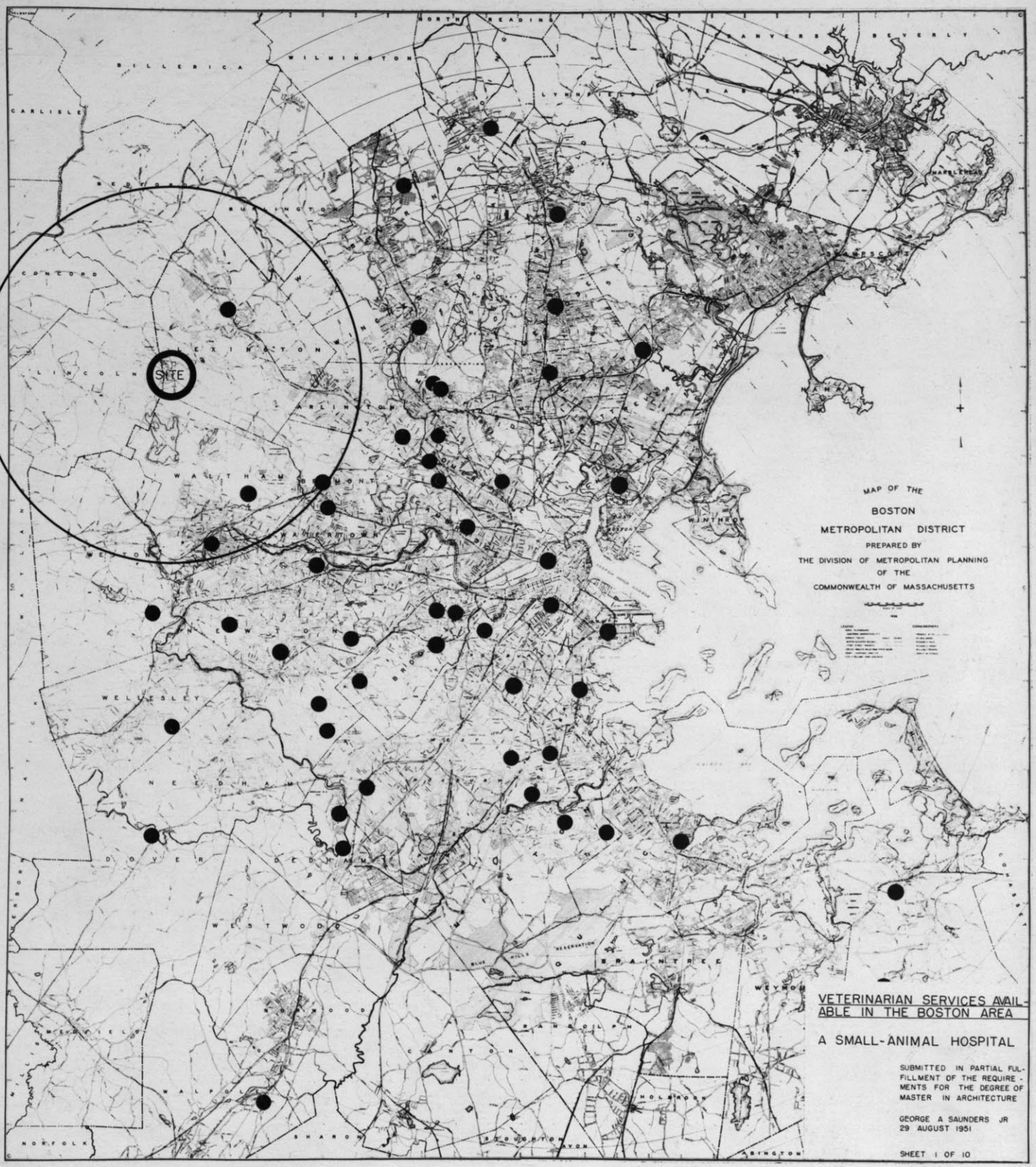
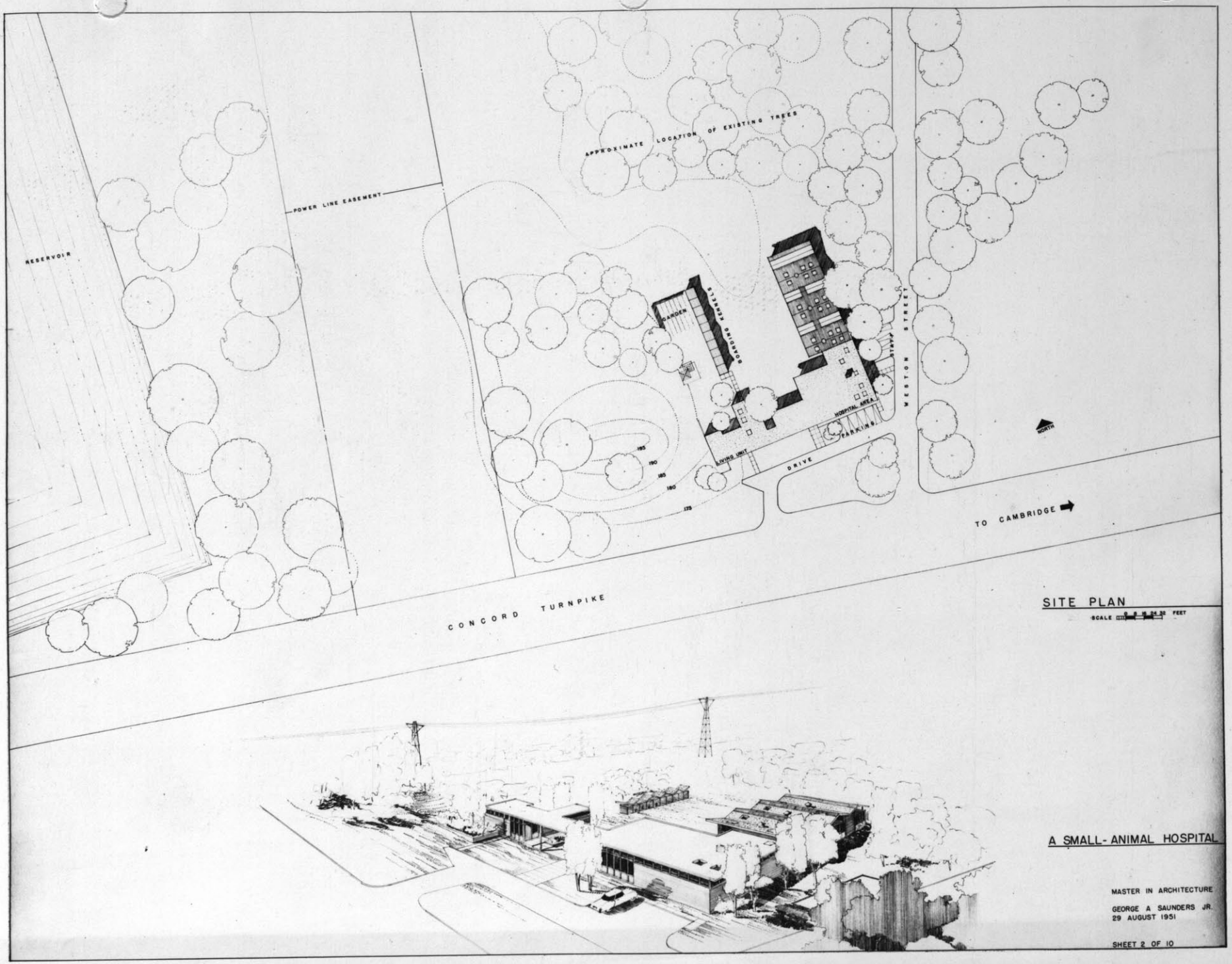
"Hospitals-Integrated Design" - Isadore Rosenfield

"Hospital Publication File" - 1951


SITE
MAP OF THE
BOSTON
METROPOLITAN DISTRICT
PREPARED BY
THE DIVISION OF METROPOLITAN PLANNING
OF THE
COMMONWEALTH OF MASSACHUSETTS
VETERINARIAN SERVICES AVAILABLE IN THE BOSTON AREA
A SMALL-ANIMAL HOSPITAL
SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER IN ARCHITECTURE
GEORGE A SAUNDERS JR
29 AUGUST 1951
SHEET 1 OF 10



A SMALL-ANIMAL HOSPITAL

MASTER IN ARCHITECTURE

GEORGE A SAUNDERS JR.
29 AUGUST 1951

SHEET 2 OF 10

FIG 1

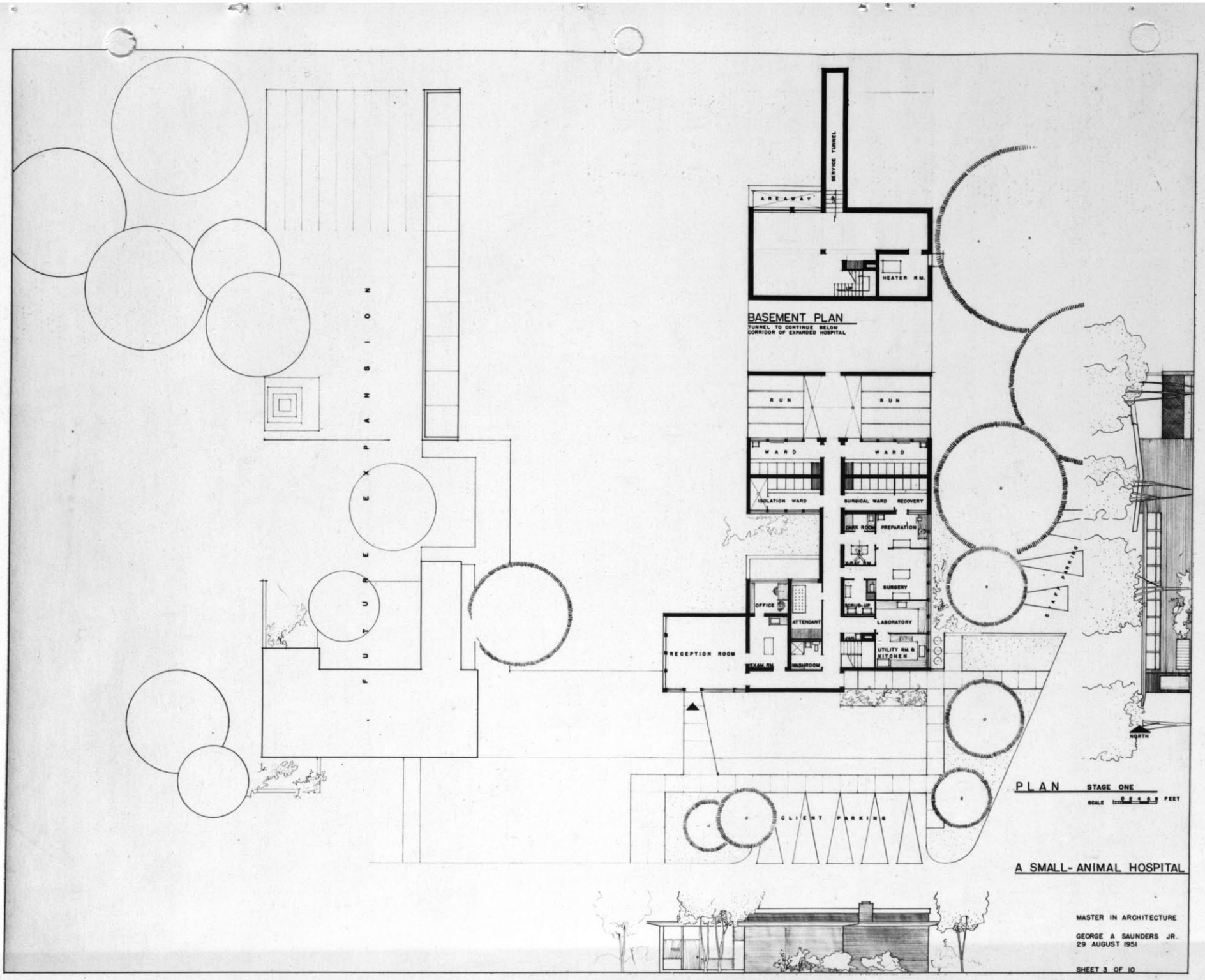

SERVICE TUNNEL
AREAWAY
HEATER RM.
BASEMENT PLAN
TUNNEL TO CONTINUE BELOW CORRIDOR OF EXPANDED HOSPITAL
RUN
RUN
WARD
WARD
ISOLATION WARD
SURGICAL WARD
RECOVERY
DARK ROOM
PREPARATION
SURGERY
SCRUB-UP
LABORATORY
OFFICE
ATTENDANT
RECEPTION ROOM
EXAM. RM.
WASHROOM
UTILITY RM. & KITCHEN
FUTURE EXPANSION
STAFF PARKING
CLIENT PARKING
NORTH
PLAN STAGE ONE
SCALE 0 2 4 8 FEET
A SMALL-ANIMAL HOSPITAL
MASTER IN ARCHITECTURE
GEORGE A SAUNDERS JR.
29 AUGUST 1951
SHEET 3 OF 10

FIG. 2

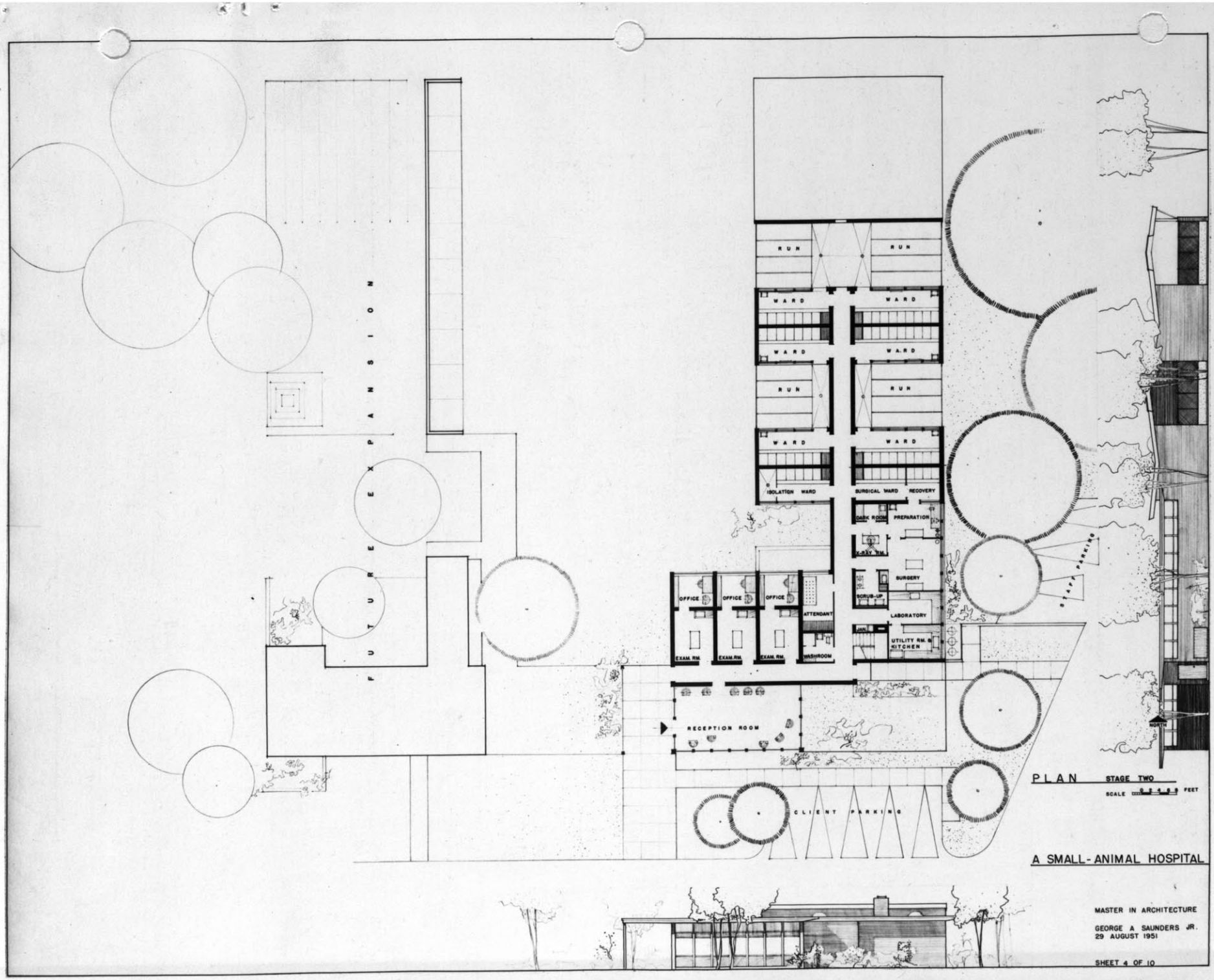
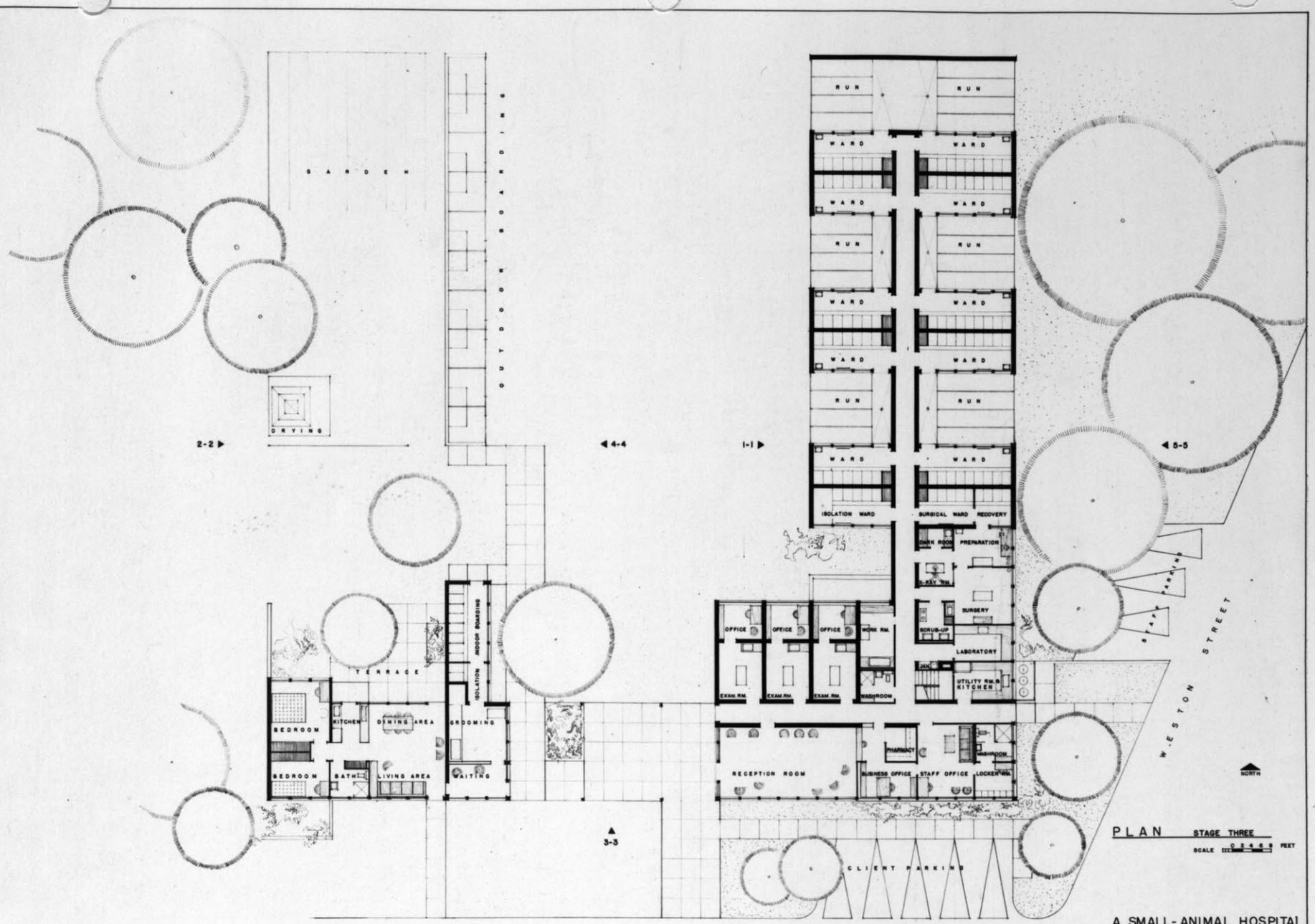

FUTURE EXPANSION
RUN
WARD
ISOLATION WARD
SURGICAL WARD
RECOVERY
DARK ROOM
PREPARATION
X-RAY RM.
SURGERY
SCRUB-UP
LABORATORY
UTILITY RM. & KITCHEN
OFFICE
EXAM. RM.
ATTENDANT
WASHROOM
RECEPTION ROOM
CLIENT PARKING
STAFF PARKING
NORTH
PLAN STAGE TWO
SCALE 0 2 4 8 8 FEET
A SMALL-ANIMAL HOSPITAL
MASTER IN ARCHITECTURE
GEORGE A SAUNDERS JR.
29 AUGUST 1951
SHEET 4 OF 10

FIG 3



PLAN STAGE THREE

SCALE 0 2 4 6 8 FEET

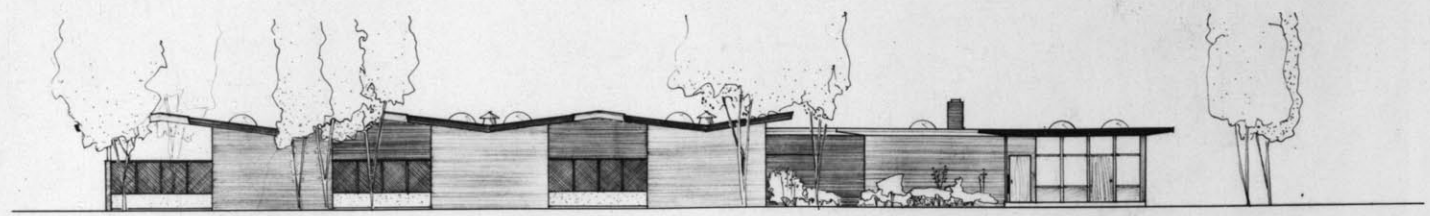
A SMALL-ANIMAL HOSPITAL

MASTER IN ARCHITECTURE

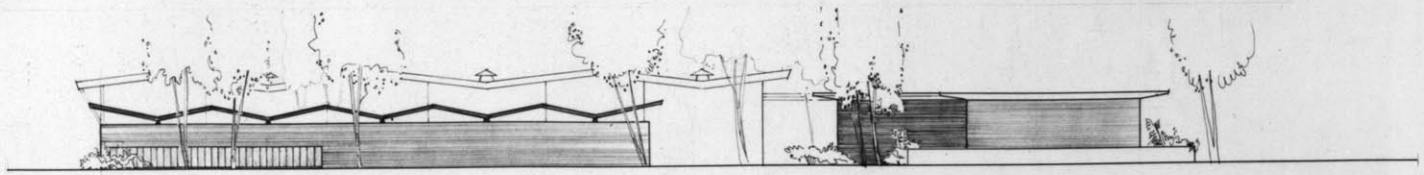
GEORGE A SAUNDERS JR
29 AUGUST 1951

SHEET 5 OF 10

FIG. 4



ELEVATION 1-1



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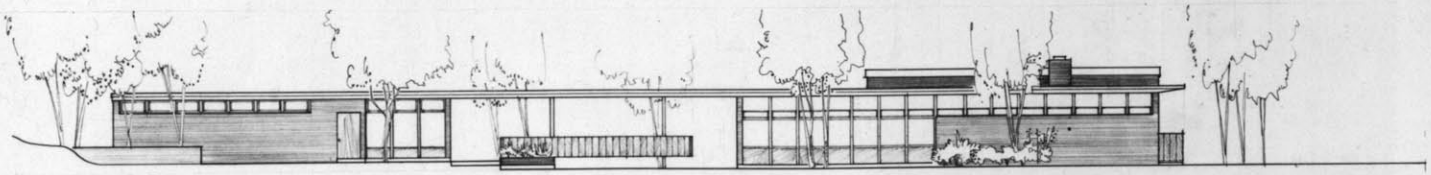
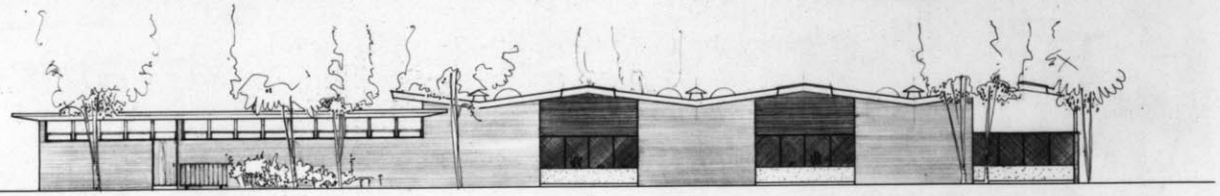


ELEVATION 3-3

ELEVATION 4-4



ELEVATION 5-5

ELEVATIONS - STAGE THREE

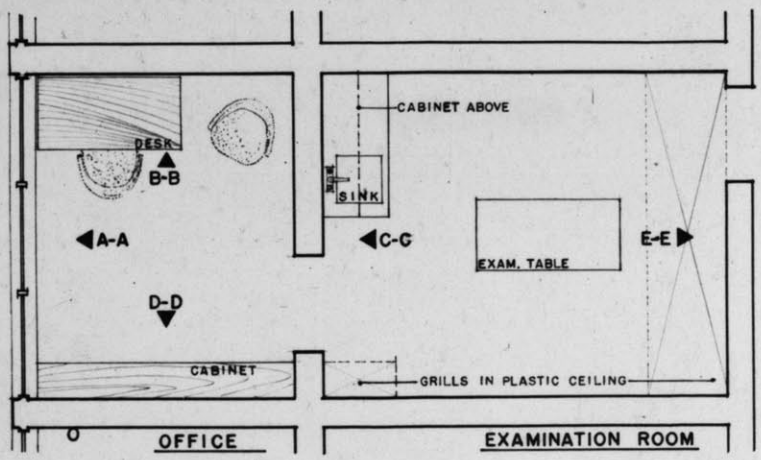
SCALE 0 3 6 9 FEET

A SMALL-ANIMAL HOSPITAL
MASTER IN ARCHITECTURE

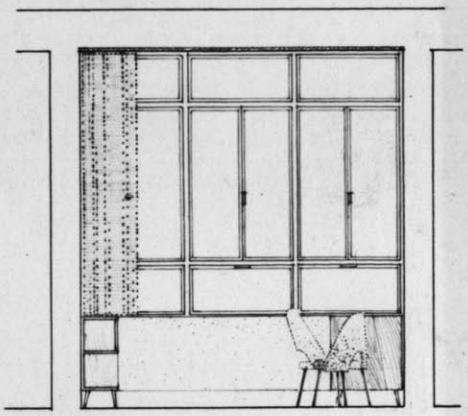
GEORGE A SAUNDERS
29 AUGUST 1951

SHEET 6 OF 10

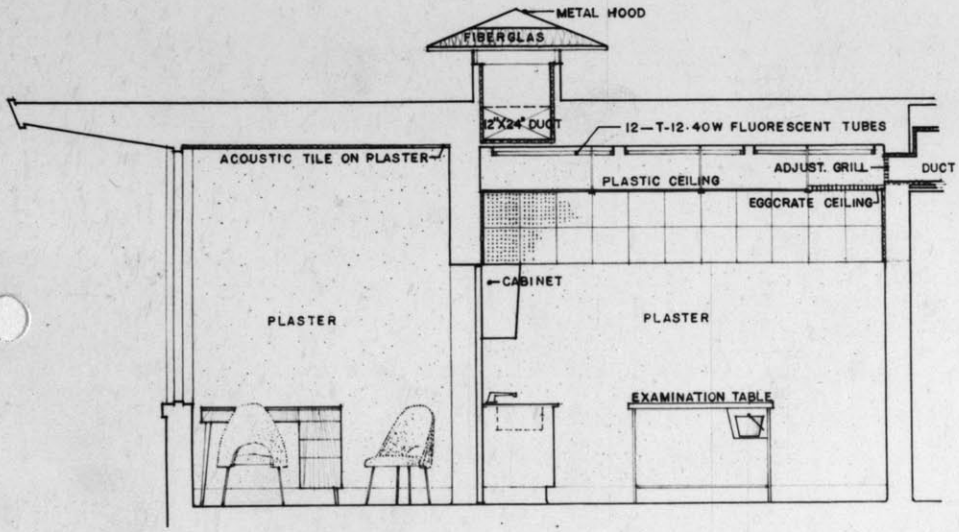
FIG. 5



PLAN



ELEVATION A-A



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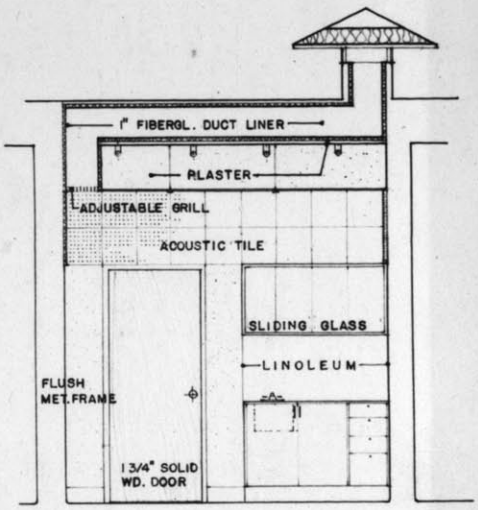

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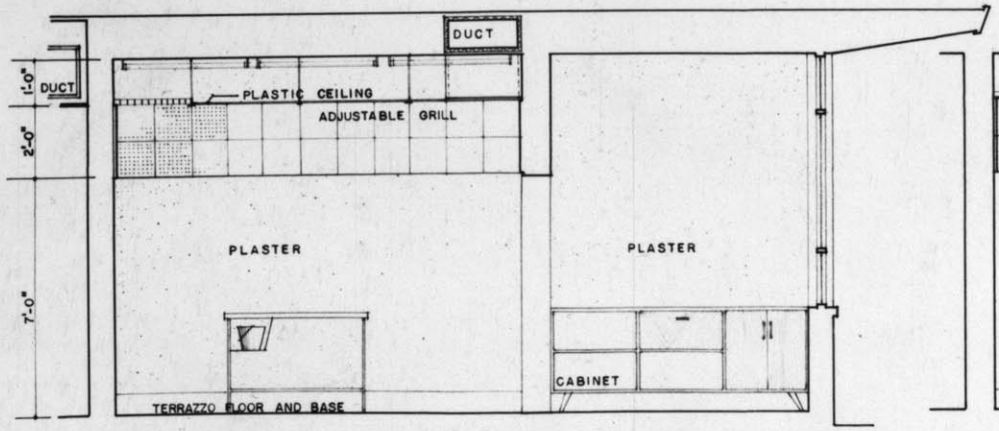

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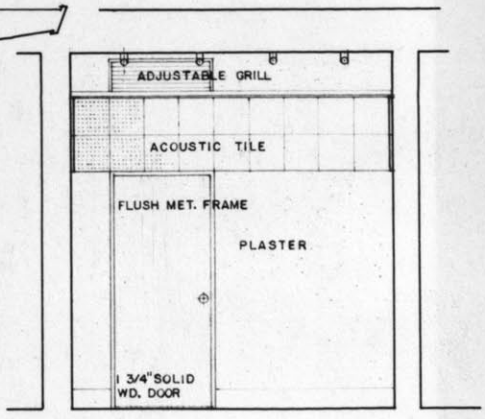
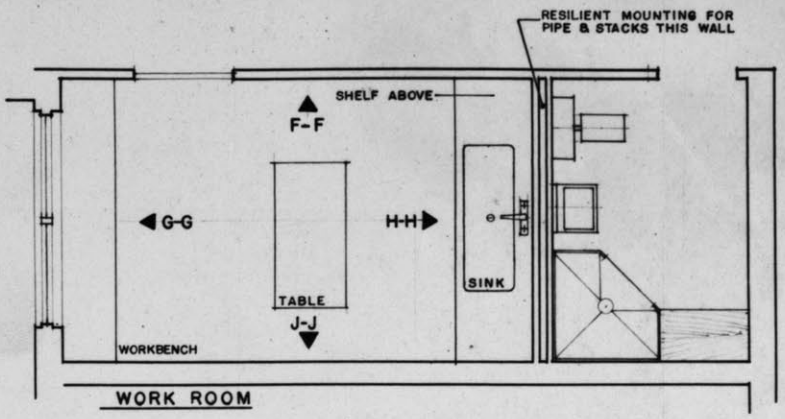


ELEVATION E-E

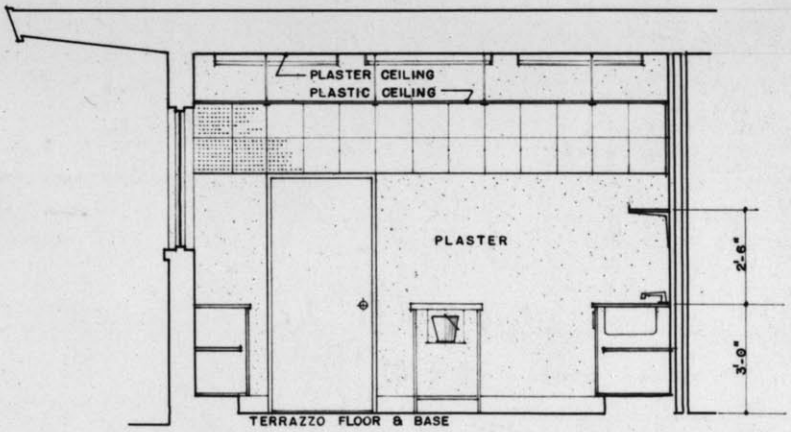
OFFICE & EXAMINATION ROOMS

SCALE 0 1 2 3 FEET

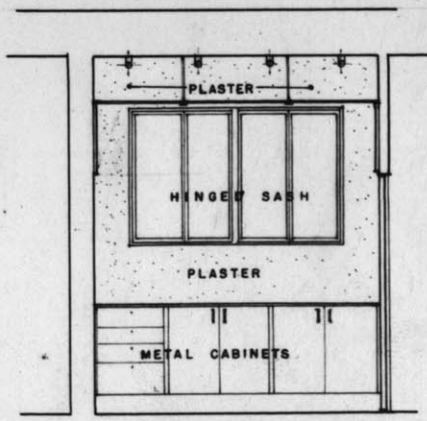
FIG. 6



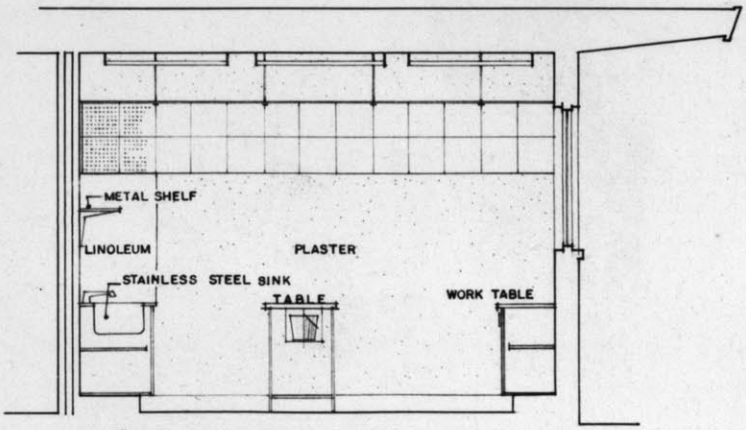
PLAN



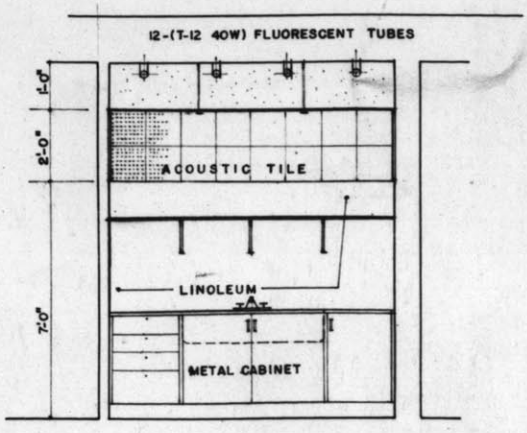
ELEVATION F-F



ELEVATION G-G



ELEVATION H-H

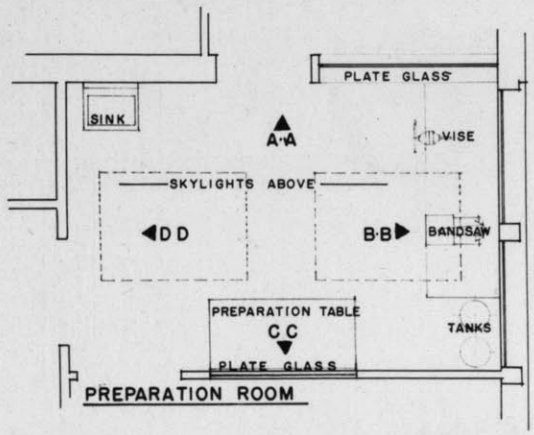


ELEVATION J-J

WORK ROOM

SCALE 0 1 2 3 FEET

FIG. 7



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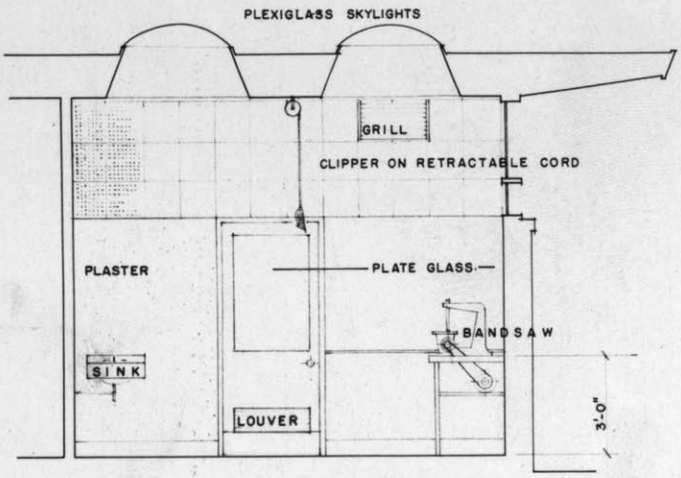

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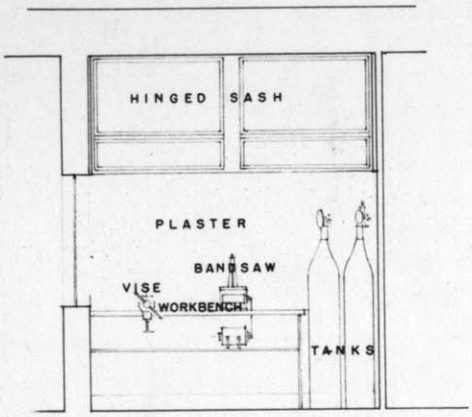

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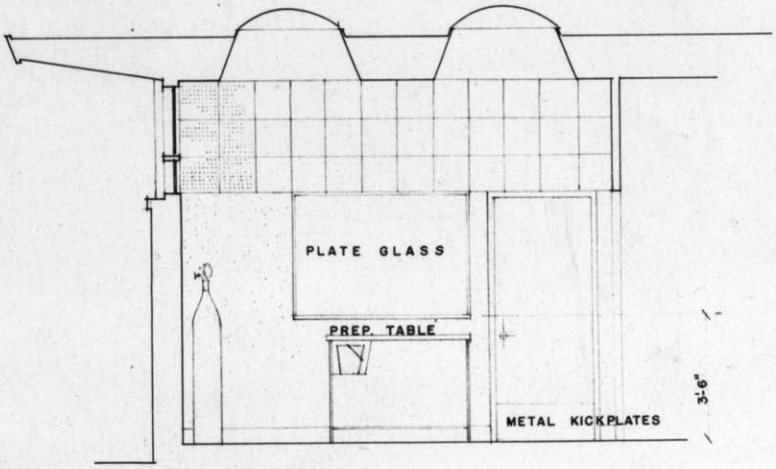
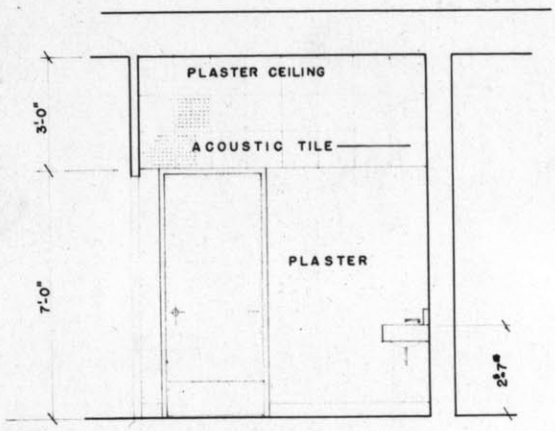


ELEVATION C-C

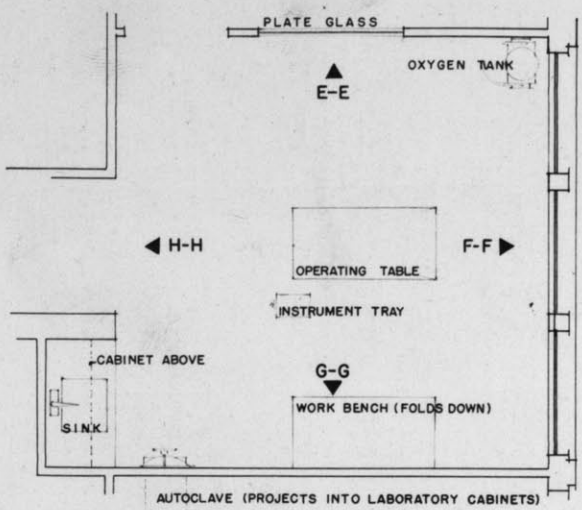


ELEVATION D-D

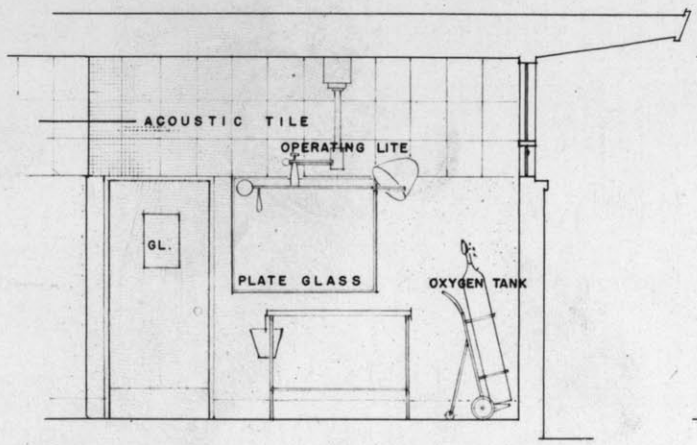
PREPARATION ROOM

SCALE 0 1 2 3 FEET

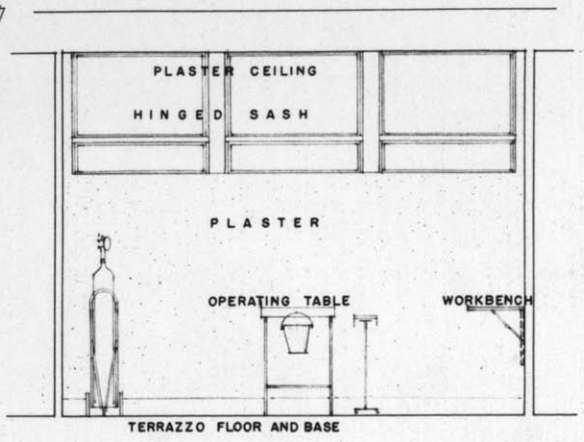
FIG. 8



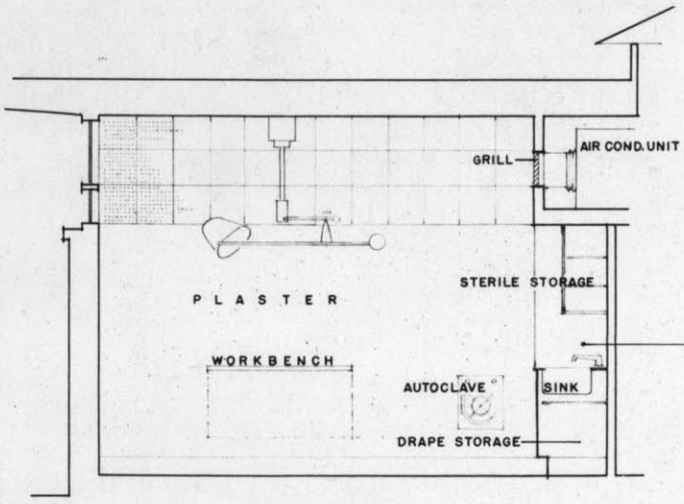
PLAN——SURGERY



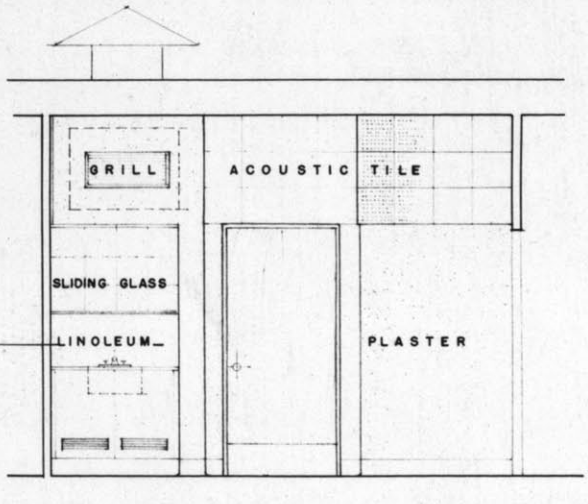
ELEVATION E-E



ELEVATION F-F



ELEVATION G-G

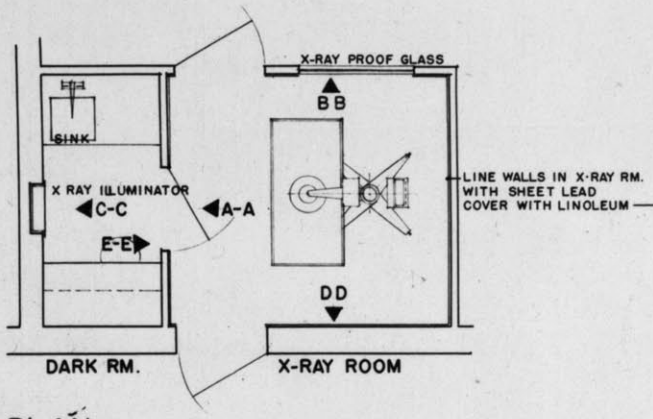


ELEVATION H-H

SURGERY

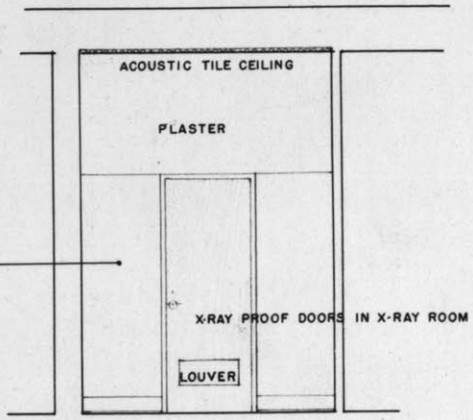
SCALE 0 1 2 3 FEET

FIG. 9

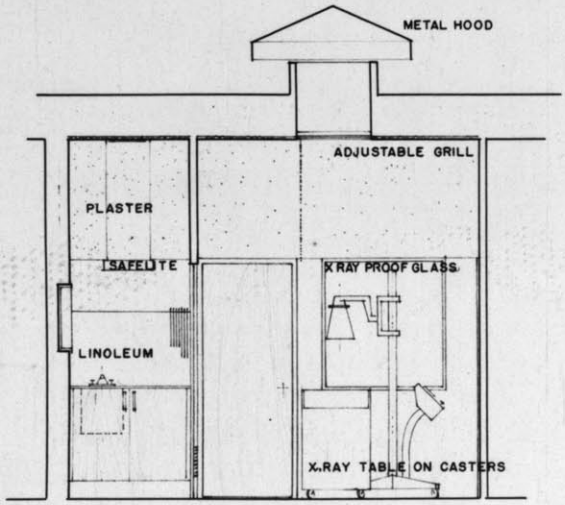


PLAN

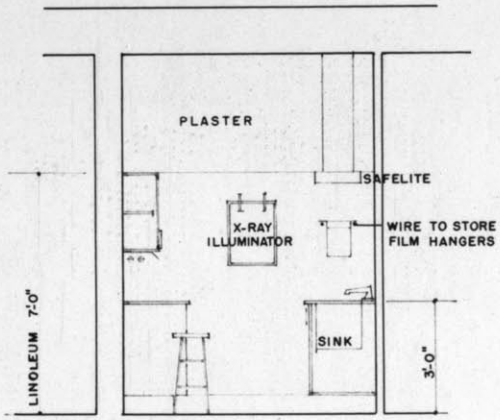
LINE WALLS IN X-RAY RM. WITH SHEET LEAD COVER WITH LINOLEUM



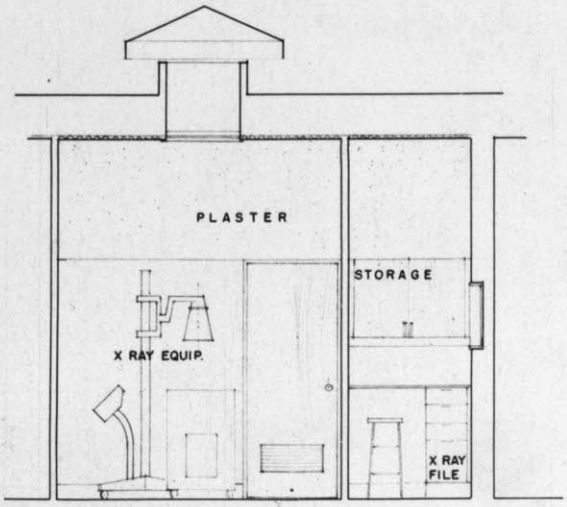
ELEVATION A-A



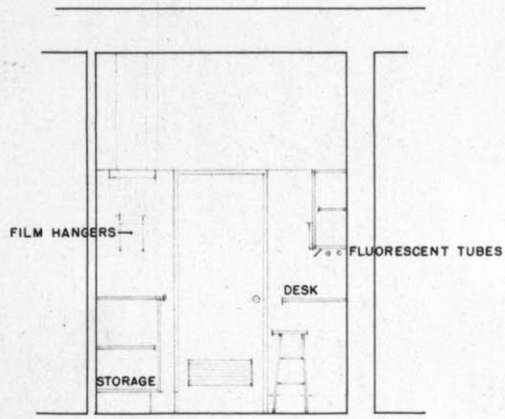
ELEVATION B-B



ELEVATION C-C



ELEVATION D-D

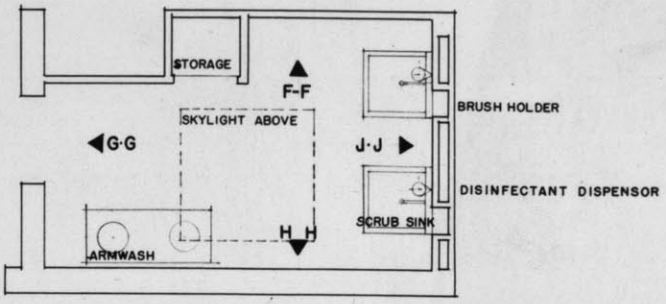


ELEVATION E-E

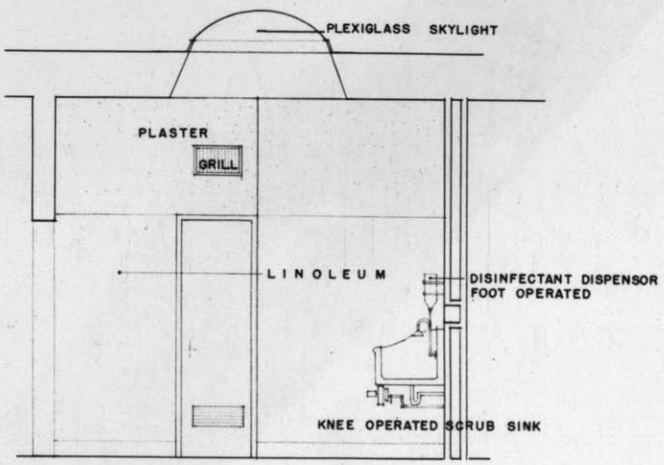
DARK ROOM & X-RAY ROOM

SCALE 0 1 2 3 FEET

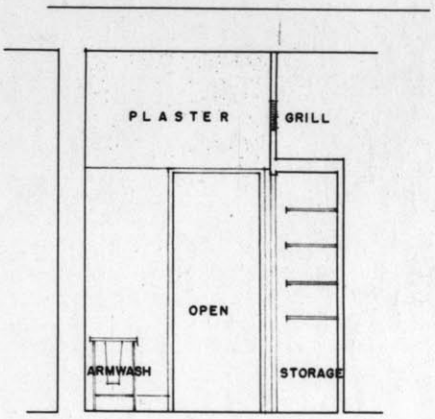
FIG. 10



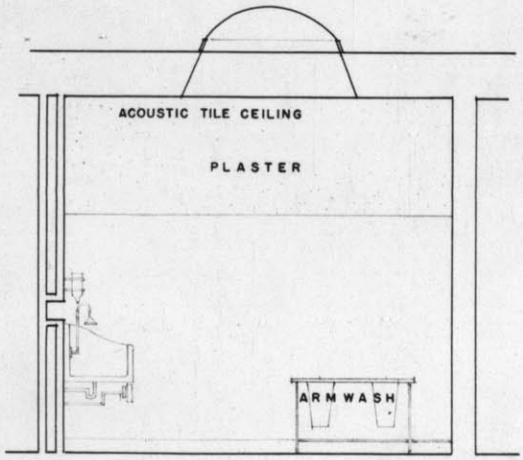
PLAN



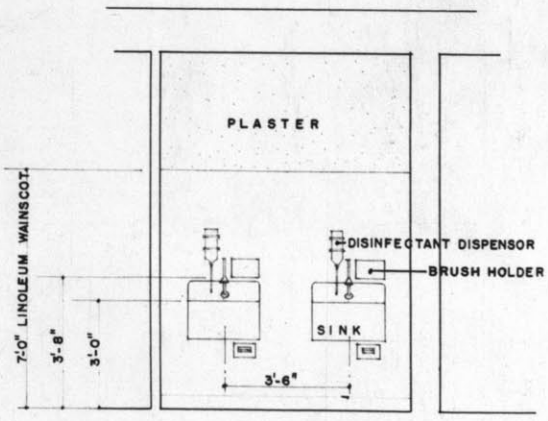
ELEVATION F-F



ELEVATION G-G



ELEVATION H-H

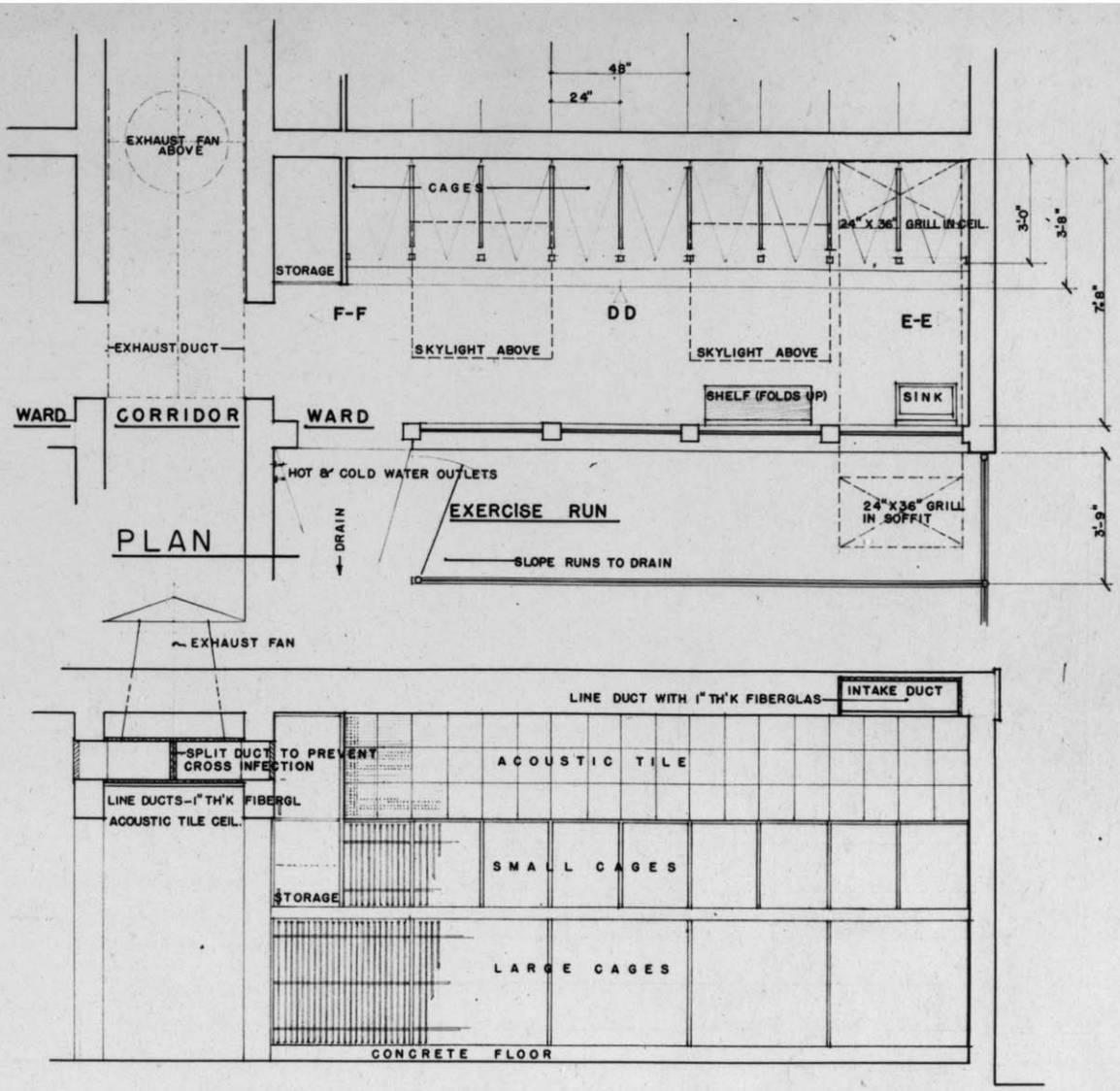


ELEVATION J-J

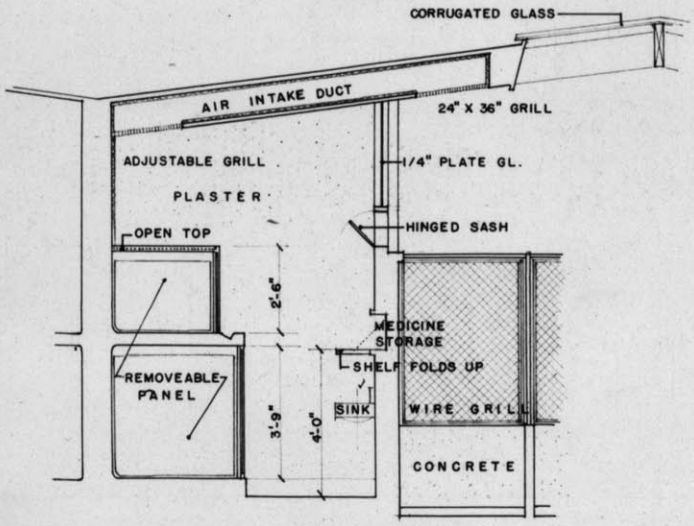
S C R U B – U P R O O M

SCALE 0 1 2 3 FEET

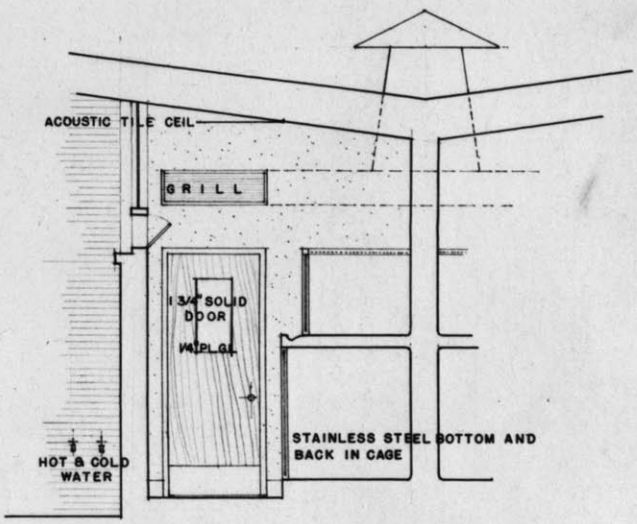
FIG. 11



ELEVATION D-D



ELEVATION EE

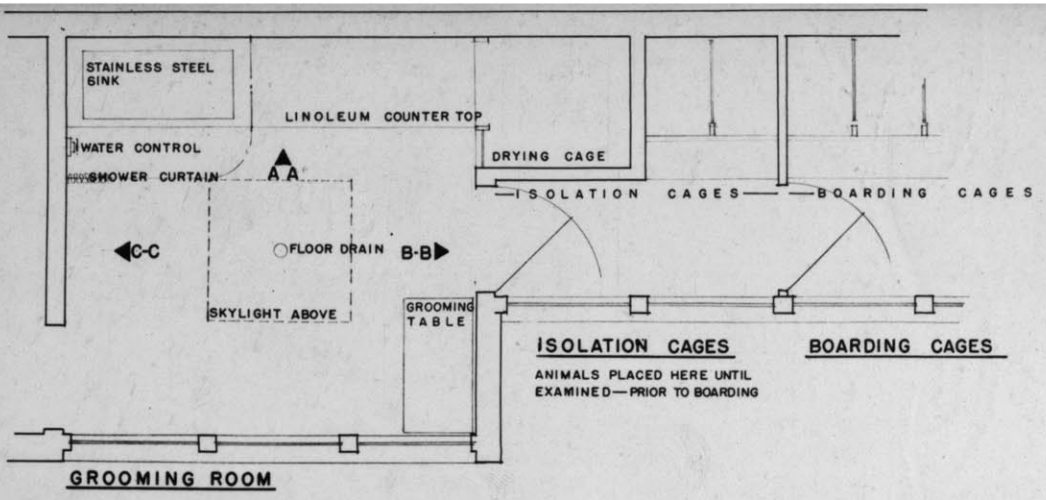


ELEVATION F-F

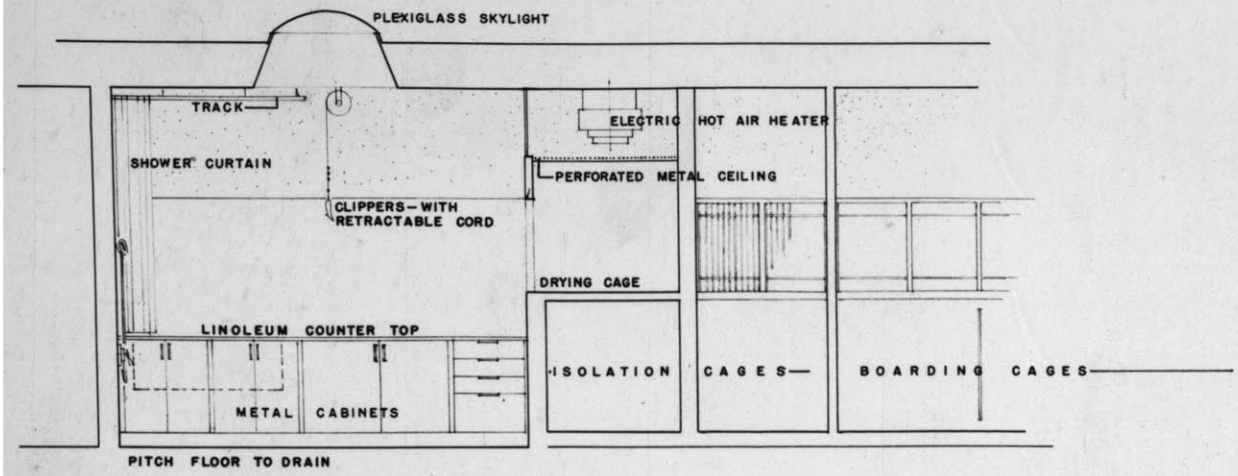
WARD ROOMS

SCALE 0 1 2 3 FEET

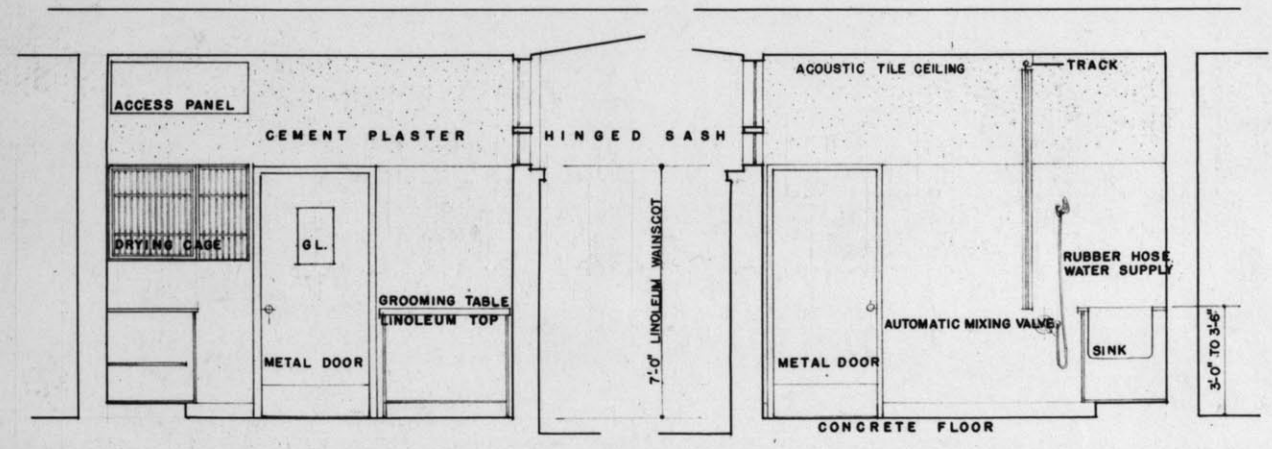
FIG. 12



PLAN



ELEVATION A-A



ELEVATION B-B

ELEVATION C-C

GROOMING .ROOM

SCALE 0 1 2 3 FEET

FIG. 13

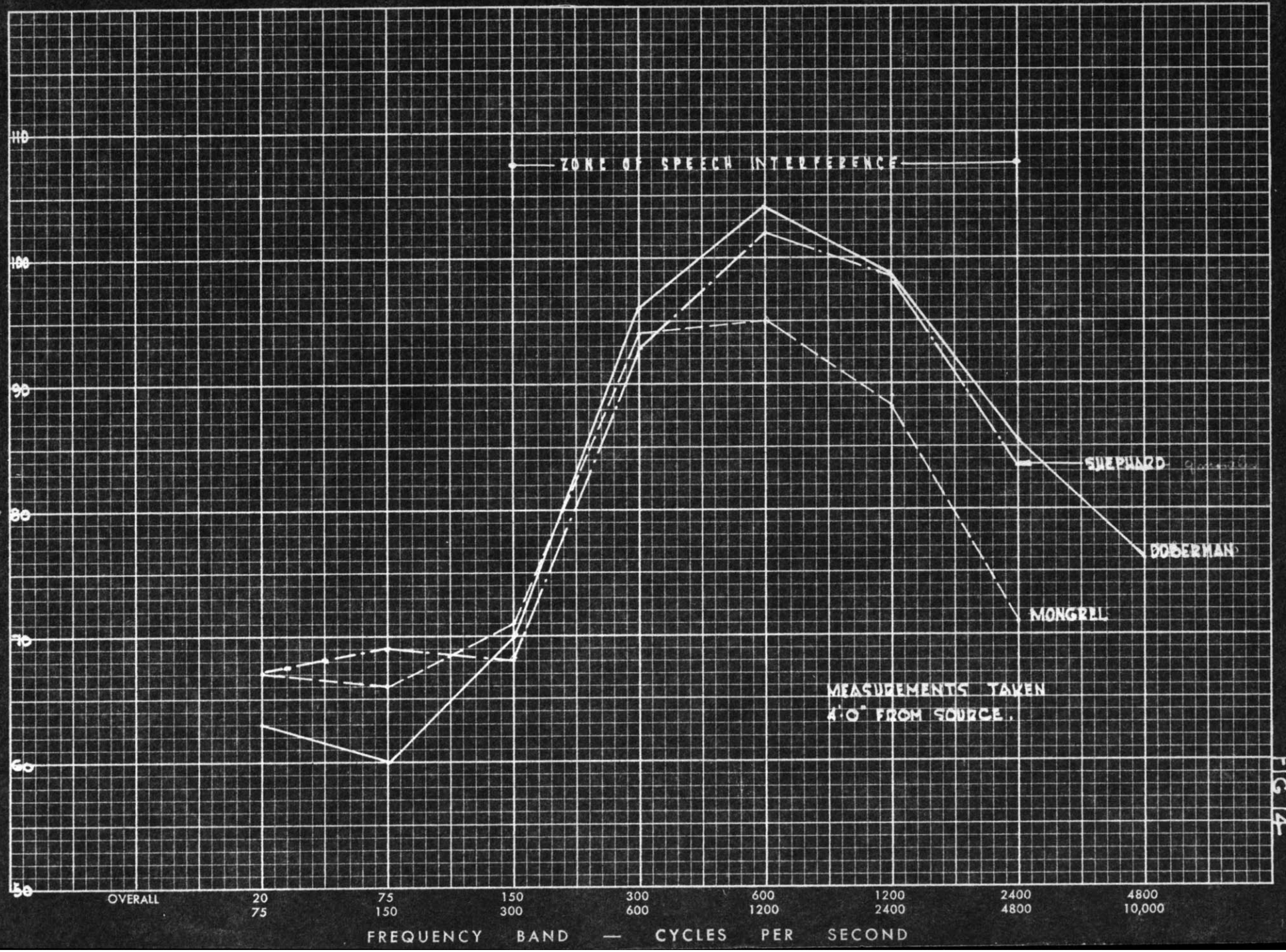


FIG 14

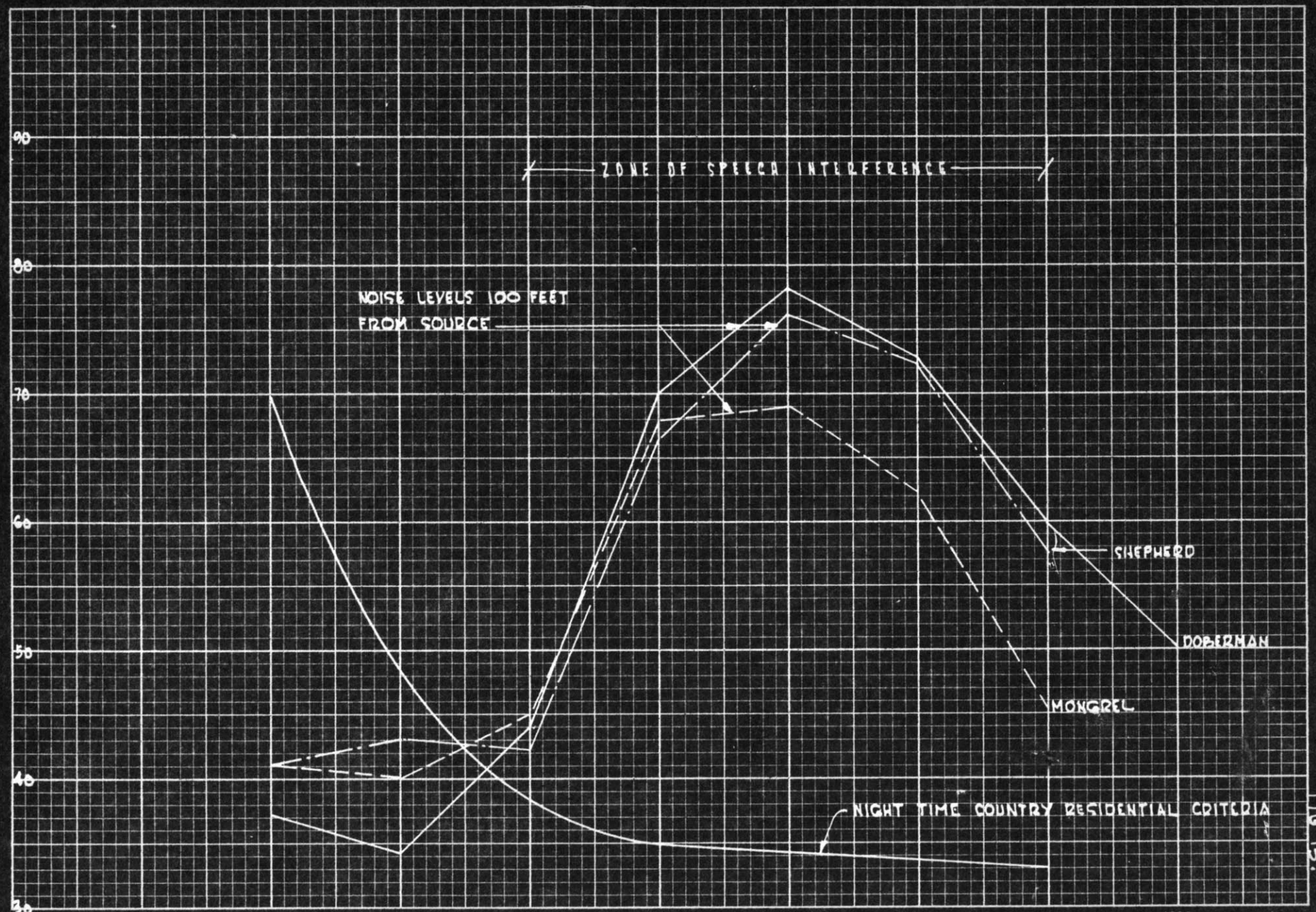


FIG 15.