

ST. MARY HOSPITAL
SURGERY SUITE

by

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A MASTER'S REPORT

submitted in partial fulfillment of the
requirements for the degree

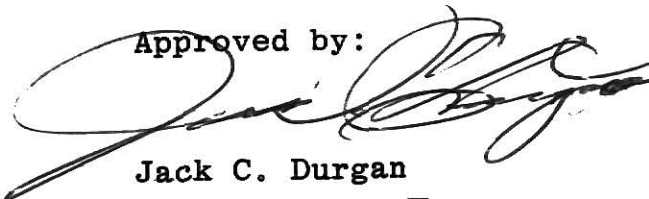
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A. BACKGROUND

INTRODUCTION

Health care facilities tend to become obsolete much faster than other types of structures due to rapid advances in medical technology, more stringent building codes, changing community needs, improved methods of patient care, federal, state, and regulatory agencies and labor intensive industry. In addition to these factors, the sharp rise in construction cost, as well as capital expenses for changes to present physical plants, have prevented facilities from periodic updating. These factors make long range planning for physical facilities critical in the health care industry.

Great changes have occurred in the field of health care in the past ten years. The emphasis has shifted from treatment of disease to keeping people healthy. The trend is to prevent disease; to keep people out of the hospital through health education programs and holistic ideology, making person responsible for their own health.

Future social, economic, and political considerations will change the character of health delivery systems considerably. Good medical care is now considered the right of all citizens, rather than the privilege of a few. In addition, more people survive to old age, so more elderly persons will be around to need medical care. These two factors demand a comprehensive health planning system coordinated on a nation wide basis.

From the standpoint of economics, prevention of illness is more economical than disability and disease. There is presently a great emphasis on ambulatory and out-patient facilities. Many hospitals, instead of adding patient beds, are remodeling and adding day surgery centers, diagnostic and treatment units, and enlarged radiology and laboratory departments. The conditions under which insurance providers will pay for services will determine somewhat the extent of outpatient units constructed. If ambulatory patients can receive benefits without being hospitalized, health care cost will be lower and outpatient clinics and day surgery centers will multiply.

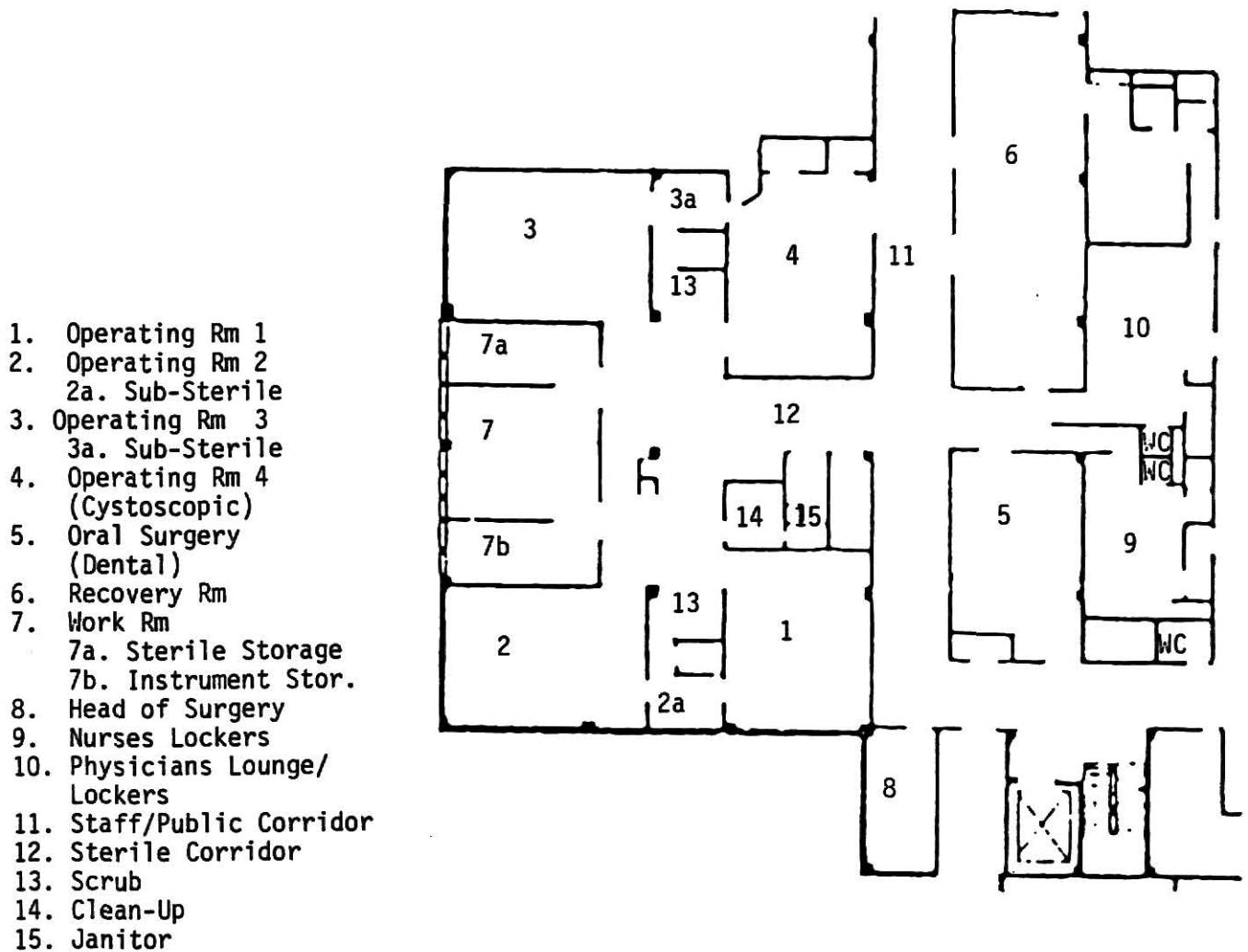
There will be an increased need for highly specialized facilities such as cancer centers, alcoholism and narcotics treatment units, burn centers, kidney and eye banks. Yet, in contrast to these highly specialized structures, the general hospital must return flexibility and be responsive to change. The speed with which new equipment, methods of practice, and other changes evolve demands flexibility.

The 1980's carry forth a mandate of strict cost containment begun in the late 1970's when costs soared as hospitals frequently competed with each other for the latest equipment and often duplicated services available at a nearby facility, thereby leading to underutilization at both facilities. Lack of regional planning (to achieve better geographical distribution and coordination of health facilities), skyrocketing construction costs, and an unreasonable length of time for design and construction (somewhat ameliorated by "fast track" systems), are some of the problems that have led to the strict Certificate of Need requirements mandated by the Comprehensive Health Planning Organization. Although the 1980's will bring enormous changes in the delivery of health care, it will continue to be one of the fastest growing categories of nonresidential building, supplying architects, and interior architects with an unlimited number of challenging projects.

This report will cover the review of the current physical facilities in surgery suite in St. Mary Hospital, Manhattan, Kansas. It will address the condition of the current physical facilities in the above area and option for their separation into three parts: 1. investigating--acquiring, digesting, and presentation of information on current physical characteristics of above area; 2. synthesis--determining, creating, and inventing solutions; 3. selection of physical arrangements. The criteria will be according to present hospital standards and codes and four different evaluation methodology (archival records, physical environmental checklist, semantic differential, and open ended interview), which will be discussed later in this report.

This report develops part-1-investigating and lays the groundwork for synthesis and evaluation to proceed after review by the committee members.

SURGERY/ANESTHESIA/RECOVERY



Location and Site

The St. Mary Hospital is located in the northwest quadrant of Manhattan and on the south central portion of the 18-acre site. It is the largest of the two acute care facilities located in Manhattan. The present physical plant was opened in June 1961 and a major expansion program was completed in 1981.

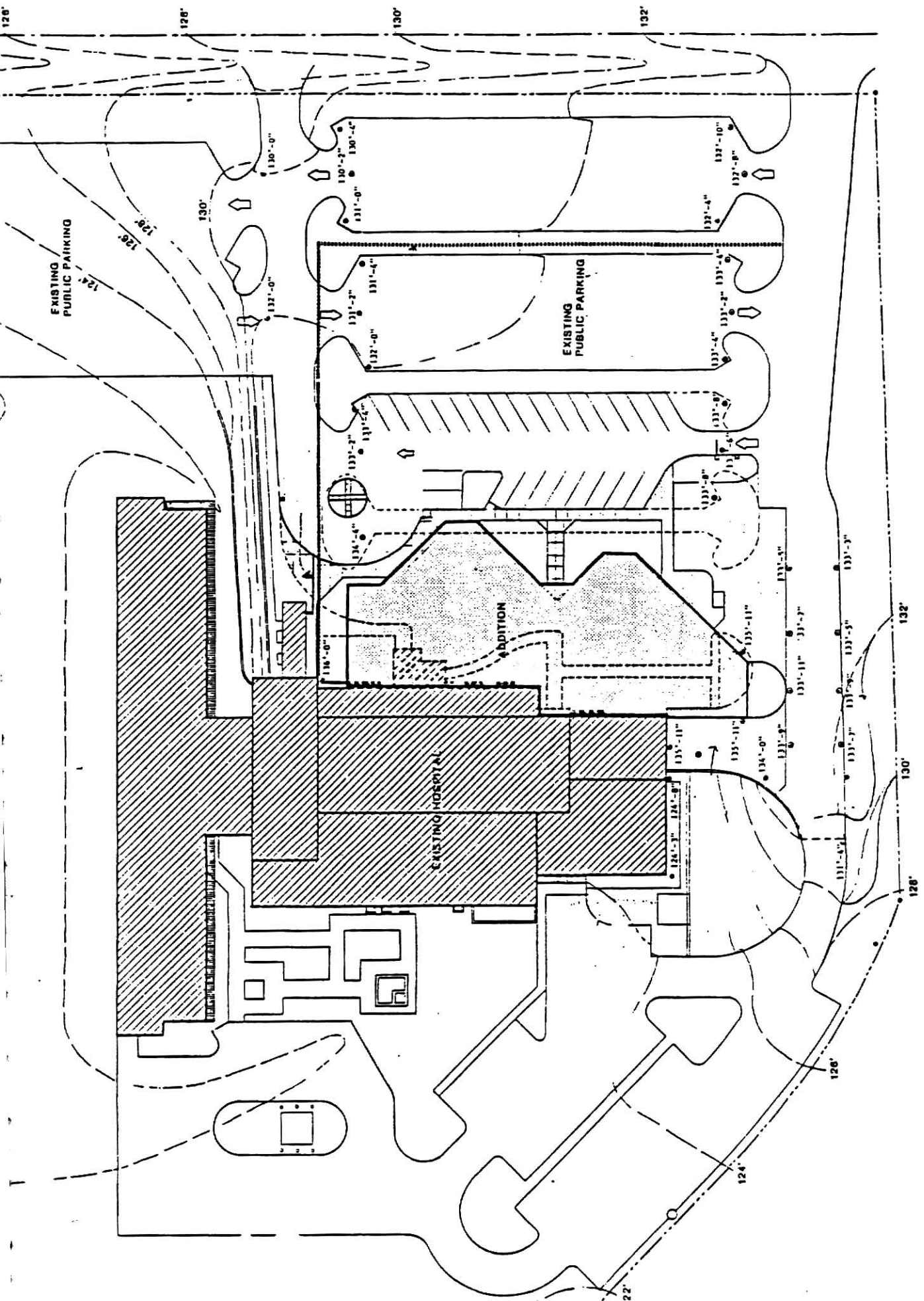
The services and emergency entrance is located on College adjacent to the property line. This entrance, as well as an entrance north of the patient room wing, serves as the employee entrance(s). The visitor/main entry to the site is off College Avenue directly east of the hospital's pedestrian main entry. A heliport is located west of the hospital building.

Surrounding Area

Access to the facility is from College Avenue, a major north/south two-lane street separating the hospital/residential and commercial areas from Kansas State University. Access from the east and center sections of Manhattan is somewhat difficult requiring the traverse of several two-lane city streets, access from the west, south, and northwest is good due to the four-lane divided Kansas Highway 113 running in a north-south direction. Access to College Avenue is by Kimball Avenue and Claflin Avenue. The major physicians' office complex is located at the southwest corner of the intersection of College Avenue and Claflin Avenue less than eight blocks from the hospital.

Hospital Neighborhood

The site is bounded on the south and west by single family residences. A nursing home is located on the northwest corner of the 22-acre site originally purchased by the hospital. Approximately four acres of this original site were sold to the College Hill Nursing Home. East of College Avenue is the athletic complex for Kansas State University. The hospital controls 1187 feet of frontage on College Avenue and 430 feet on Kimball Avenue.



Parking

Parking is located east and west of the facility. Parking on the west side enters the building on the ground floor while parking east of the facility enters on the first floor. Sixty-two spaces are located west of the building; these are used primarily by staff. One hundred and sixt-five spaces are located west of the facility and are used by emergency, physicians, visitors, and outpatients.

Services

The St. Mary Hospital is licensed as a 99-bed short term acute care hospital and provides the following services:

NURSING SERVICES

Medical/Surgical/Special Care (ICU/CCU)
Surgery/Anesthesia/Recovery
Emergency/Outpatient Care

ADJUNCT SERVICES

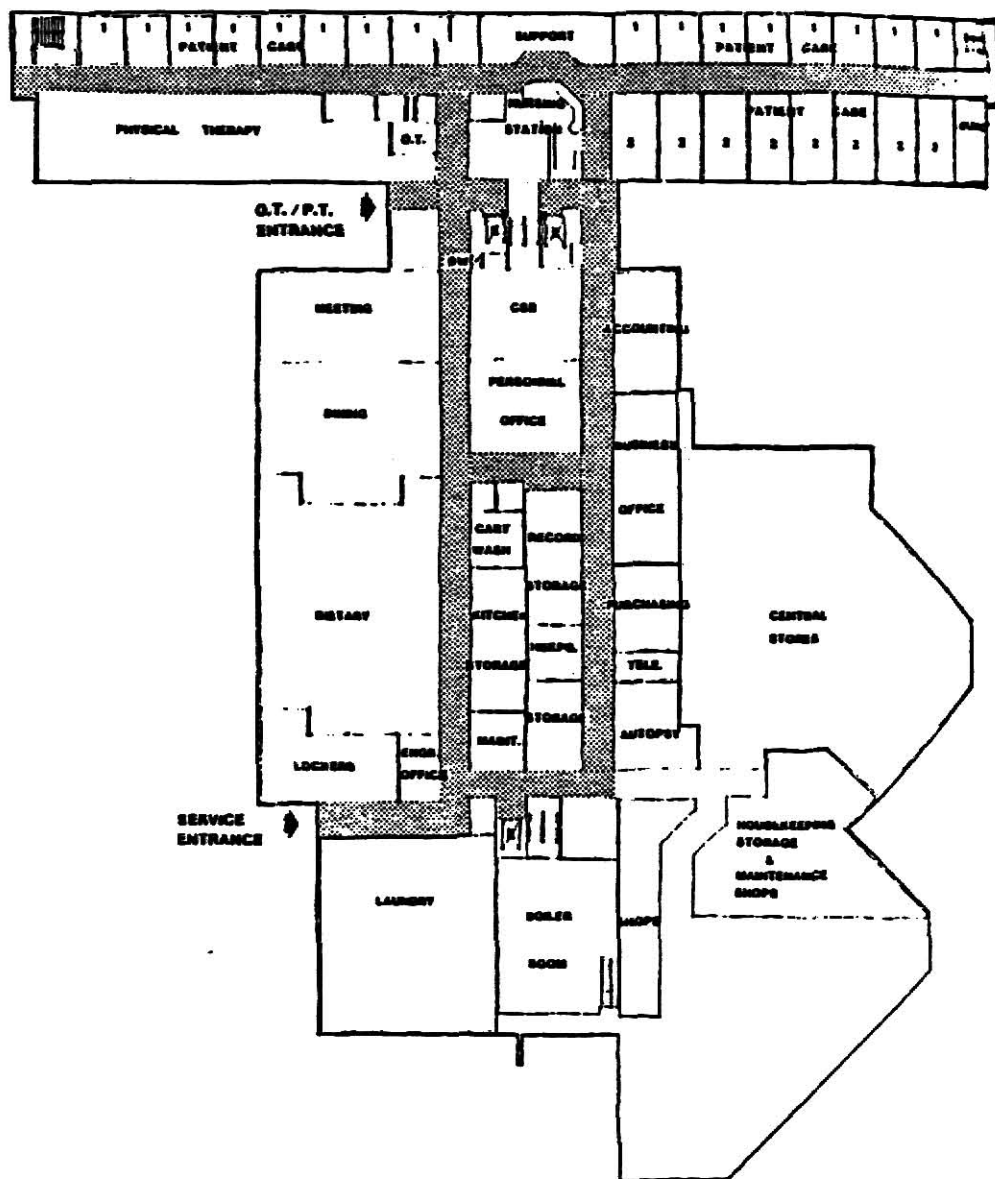
Laboratory
Radiology
Physical Therapy
Occupational Therapy
Pharmacy
Respiratory Therapy/EKG/EEG
Speech Therapy
Pastoral Care

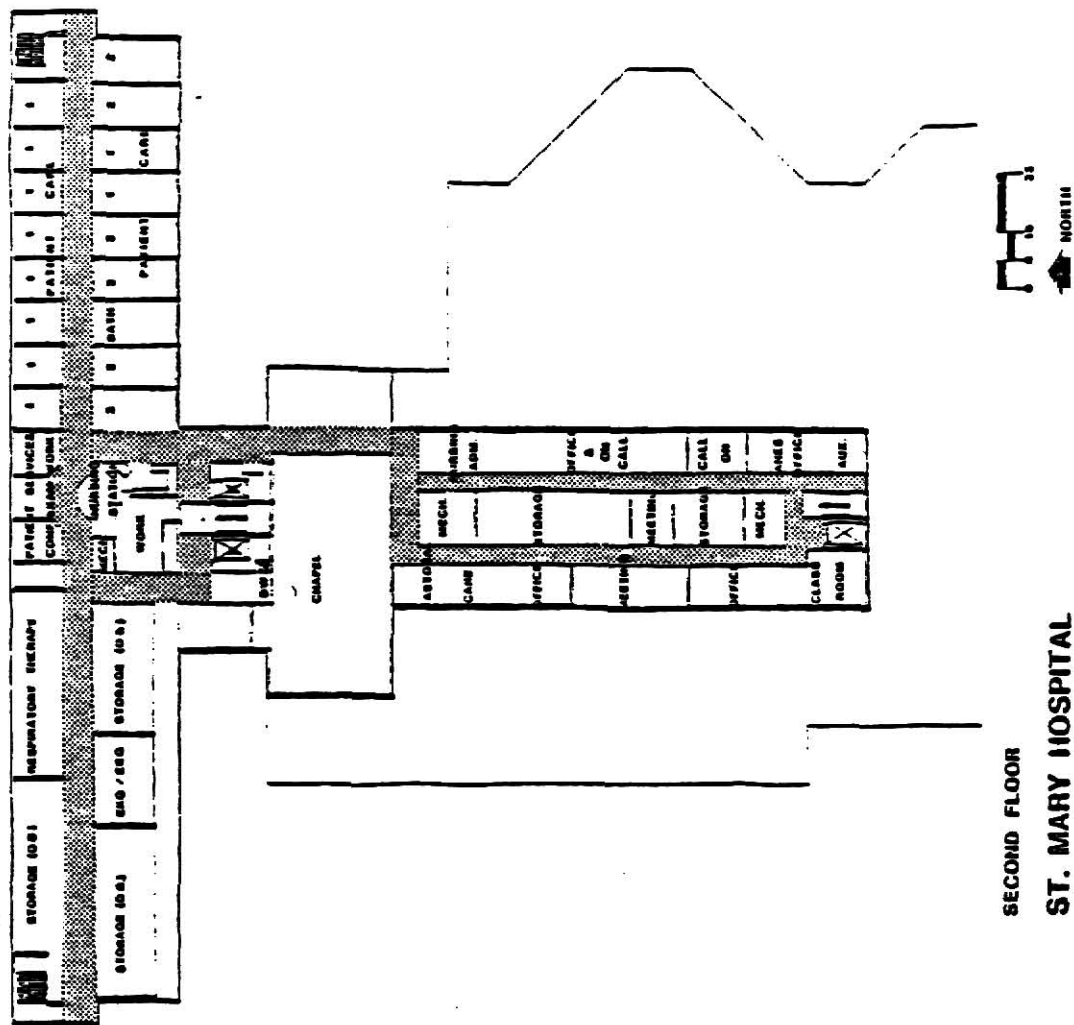
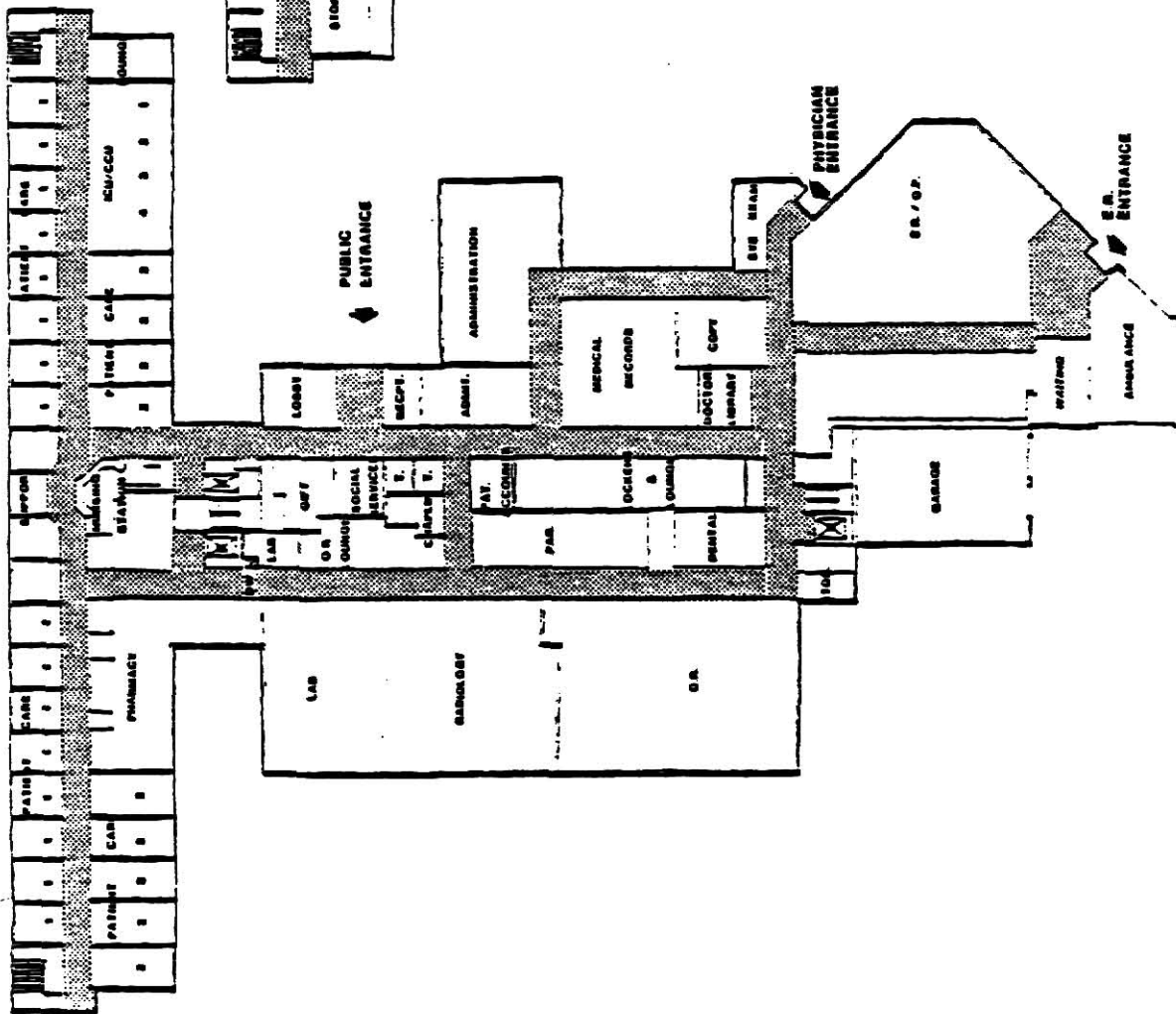
MANAGEMENT SERVICES

Management/Administration
Data Processing/Finance/Business
Medical Records
Volunteers/Auxiliary
Social Services
Community Relations

ANCILLARY SERVICES

Dietary
Laundry
Education





Central Sterile Supply
Central Supply/Material Management
Plant Operation/Maintenance/Housekeeping
Staff Facilities

Departmental Relationships

The following three floor plans depict the component parts of the St. Mary Hospital and their relationship to one another.

The patient rooms form a northern border to the facility. Support services and ancillary services are on each floor to the south of the patient wing.

The principle public entrances are on the first floor; adjacent to this area are most of the departments serving outpatients. The second floor comprises most of the support offices and the ground floor primarily private staff services (dietary, maintenance, etc.). This lower level has an outpatient entry for physical therapy and for general staff entrance.

The east facade of the service core was changed in profile with the 1980 construction. The patient wing and the west facade are relatively unchanged since completion in 1981.

EXISTING CONDITION

Interior Space Sub-Division

1958 Building

Interior partitions are typically of 4" steel stud and plaster construction. Fire rated partitions extend to underside of concrete slab. Other partitions stop at ceiling line.

Vertical chase enclosure are concrete block as partitions in service areas on ground and basement floors.

Hollow metal door frames with 1-3/4" solid core wood veneer faced doors are used typically, with hollow metal doors at service and fire-rated openings.

Ceilings are typically plaster with suspended acoustical tile in corridors and office areas.

1978 Building

Interior partitions are of 3-5/8" steel stud and two layers of 1/2" gypsum wallboard construction. Partitions extend to underside of concrete slab. Concrete block partitions are used at ambulance garage and ground floor.

Hollow metal door frames with 1-3/4" solid core wood veneer face doors are used. There are hollow metal doors at fire rated openings.

Ceilings are of lay-in acoustical tile except in emergency treatment areas where seamless ceiling is required. These areas have gypsum wallboard ceilings.

Interior Finishes

Floors

Flooring is terrazzo except in offices and surgery suite. Offices and waiting rooms have direct glue-down carpeting. Base at VAT and carpeted floors is 4" covered vinyl base. Ceramic tile flooring and base is provided at shower and other wet areas. Conductive flooring is used at surgery suite. Quarry tile flooring is used at kitchen and dishwashing area.

Wall Finishes

Wall finish in corridors is generally paint with 5' high ceramic tile wainscot. Vinyl wall covering is in use in some public spaces and offices; ceramic tile is used at surgery and high abuse areas.

Ceilings

Ceilings are spray finish plaster in patient rooms. Lay-in acoustical ceiling in corridors, offices and Dietary. Plaster ceiling in surgery and wet areas.

Vertical Transportation

1958 Building and 1978 Building

Elevators

Vertical transport for the public is provided by a hospital size hydraulic elevator located on public corridor south of the nursing station.

A staff and patient elevator is located on staff corridor west of public elevator. This elevator is also used for some materials distribution.

Staff and materials distribution elevator is located near south end of 1958 construction adjacent the emergency department addition and near service departments.

Stairs

Stairs are located between public and staff elevators south of nursing station and adjacent materials supply elevator for circulation.

Exit stairs are located at ends of patient wing.

Chutes/Dumbwaiter

Trash and soiled linen chutes are located in the surgery department.

A dumbwaiter is located adjacent the staff elevator for movement of supplies between floors.

Supplies

Materials are delivered throughout the hospital using wire carts to stock cabinets in user departments. An exchange system is utilized to some departments where supply utilization is heavy.

Mechanical Systems

Sterilization

The hospital is served by three new sterilizers in CSR--an ethylene oxide gas sterilizer, a medium pressure high vacuum sterilizer. The hospital also has older sterilizers in other areas as follows:

In the surgical area, they have two instrument sterilizers and two flash sterilizers.

In the lab area, they have one formula sterilizer and one flash sterilizer.

The hospital also has an old cylindrical sterilizer located in the garage entrance which is used for sterilizing various contaminated laboratory equipment and products before delivery to land fill. This sterilizer is also operated on medium pressure steam.

Medical Air

The hospital has a centrally piped duplex compressor system which serves a relatively small number of outlets in ICU, emergency, and a few other areas. No problems with capacity or service.

Oxygen System

The hospital has a properly located bulk liquid oxygen tank with a standby manifold system. There have been no problems in distribution or capacity.

Nitrous Oxide

The hospital has a locally piped two-tank system with a manual switchover.

Nitrogen System

The hospital utilizes liquid nitrogen on a localized tank basis.

Hydronic Fire Protection System

The hospital has a main 6" fire protection feed into the building which goes to a major sprinkler system which covers the 1980 ER portion of the hospital. Only 15 sprinkler heads, which come directly off the domestic water system in five rooms (zones), serve the entire pre-1980 construction. This pre-1980 construction also has no stairwell standpipe systems. All sprinkler heads are monitored by flow switches and tied to the 11-zone Simplex fire alarm panel.

Electrical Systems

Clock System

The hospital has a Simplex clock system with a synchronizer and a new generator. The system resets itself twice each day. It is about two years old and is in good operating condition.

Nurse Call Station

A Dukane audio-visual nurse call system presently serves all three floors and is less than two years old.

Fire Alarm System

A Standard Electric coded supervised fire alarm system with 11 zones serves the hospital. Smoke detectors, heat detectors, pull stations, hood systems, and water flow switches are connected to the various 11 zones. The alarms go directly to the fire department.

Paging System

All paging is done by way of the in-house Bell telephone system through an interface with a Dukane amplifier. Personnel carry General Electric pagers. The whole system is tied in to serve the Memorial Hospital General Electric pagers as well.

Staff Register System

There are three annunciators serving the front entryway, the emergency entry, and the doctors entry. Each has 80 names.

Lighting System

The hospital corridors still generally use incandescent lighting; however, 75% of the remainder of the building is on fluorescent with an on-going plan to convert the entire hospital to fluorescent lighting.

B. AN OPERATING SUITE

GENERAL CONSIDERATIONS

The surgical center has to create proper working conditions for the medical staff and a good atmosphere for the patient. Problems in planning and design increase as the facility increases in size.

Most surgeons who have had years of experience will have personal preferences, will favor arrangements in accordance with their past activities and with their concepts of aseptic practice. Operating room nurses should be given the opportunity to express their opinions as they have through precept and experience had much to do with the place where they spend all of their working day or night (Chvala, C., 1976).

Unfortunately, personnel changes take place so that often the surgeon or nurse involved in the planning process is not the ultimate user of the facility. The result is frequently a great handicap for the successor who has his own preferences.

Even with relatively "fast track" design and construction, the time between the start of planning or renovation and occupancy will be several years. During this time new procedures will come into being undreamed of at the time of original consideration. New equipment will become accepted, and older procedures abandoned. New surgical specialists will develop and new allocations of care will be devised.

This suggests a need for flexible planning (Goodwin, P., 1978) as well as renovation of existing operating centers, after a few years of its original operation date. This is far easier to write about than to accomplish. Changes in plans are very costly, and yet they must be accommodated. Architects or Interior Designers will want to know the exact specifications for fixed equipment so that they can estimate costs, yet to choose equipment which may be innovative today may be superannuated in five years when it will be installed.

In the surgical suite the patients sensibilities need be given lower priority with exception of the holding areas or ambulatory surgical facilities (Beck, W. 1982).

Before the surgical center is arranged, it has to be fixed in location by its relationships to other departments. The planning has to be done within the context of the entire hospital.

In this set-up, some affinities among departments have higher values. Important links for the surgery are: surgery-recovery-intensive care, emergency-surgery, and surgery-x-ray. This analysis builds a case for horizontal propinquity with surgery at the center of these major medical services.

The control of staff movement, patients, objects and to some extent, air, along broadly planned routes could be regarded as the correct principle in control of infections. Planning should be aimed at influencing the conduct and attention of the staff by careful adaption of architectural means. The design may assist the surgical team in carrying out aseptic routines or make them more difficult.

Separating different traffic and zoning the surgical suite probably helps to reduce the human errors of the staff and deviations from the aseptic routine.

The arrangement of spaces and equipment to conform to a zoning system, is to be based on requirements of functions and governed by traffic flow. For a plan to be effective the following must be known:

- the traffic routes of staff, patients and supplies;
- the technique adopted for asepsis;
- the methods of hygienic environment control.

When the activities of the surgical center nursing staff were analyzed (Blumberg, M., 1961), most proved not to be simple repetitive tasks. The largest single item, still not accounting for more than 10 per cent of nursing time, was the handling of instruments, sutures and sponges during operations. Of the total work load in the surgical center, only six to nine per cent have been found to be directly connected with the surgical wound.

Tasks of major importance included transporting the patient to the operating theatre, adjusting the position of the patient,

preparing the surgical field and assisting the surgeon with the operation (Pütsep, E., 1973).

For evaluating traffic generally, the following factors are of consequence: type and number of personnel passing between any two positions, the volume of transported material and the nature of the transport. However, to reduce these factors in a surgical center to a basic mathematical value seems to be unpractical.

The main traffic routes today can be identified as follows:

Patients: regular ward or intensive care unit or emergency unit--holding area--anesthetic room--operating room--anesthetic room--postanesthetic recovery room--regular ward or intensive therapy unit.

Surgical Staff: entrance--changing area--scrubbing area--operating room--rest room and/or changing area--exit.

Anesthetic staff: entrance--changing area--anesthetic room--operating room--anesthetic room--post-anesthetic recovery room--rest room and/or changing area--exit.

Other Staff: entrance--changing area--working areas--rest room and/or changing area--exit.

Sterile equipment and supplies: instrument center--operating room storage--point of use.

Used equipment and supplies: point of use--disposal area--laundry or destruction unit or laboratories or sterile service, alternatively: point of use--operating room storage--sterile service.

Some of these routes will be converted into corridors, some into goods serving channels, some into audiovisual cable or telephone lines. Thus many of the corrections will be realized in the form of configurations of building hardware, which has a lifetime of several decades and is expensive to change.

To simplify the planning process and later on to guide the staff, the surgical suite could be divided into aseptic zones, classified in accordance with the hygiene policy adapted by the

individual hospital, which will be discussed later in this report.

For a long time, the number of operating rooms required in a general hospital or surgical suite has been determined by general estimates. Rosenfield (1971) has suggested one operating unit per 50 acute general hospital beds. Berry and Kohn (1972) have recommended two operating rooms for every 50 beds.

Cowan (1963) suggests that the number of surgical center could be more exactly calculated when the number of theatres is related to the following factors.

The number of surgical and equivalent beds.

The percentage rate of bed occupancy.

The average stay for patients in surgical and equivalent departments.

The length of the daily operating period.

The hygienic standard, which may be equated with the time needed for theatre resting and cleaning.

The number of theatres required = $\frac{\text{Total number of operations per year}}{\text{Number of operations that should be performed in one theatre per year}}$

The number of operations = $\frac{\text{number of surgical beds} \times 365 \times \text{percentage of bed occupancy}}{\text{average length of patient stay} \times 100}$

In order to arrive at a correct number of operating theatres required, all factors in the formula for the number of operations as well as the factor determining the number of normal operating hours should be carefully considered.

As it has been assumed tentatively that operation load per theatre may be an important factor in surgical wound sepsis, it has been proposed (Walker & Douglas, 1964) that, if possible, not more than three major operations per day should be performed in one theatre. A working day of three major surgical operations would probably maintain good working conditions for one team.

SPATIAL REQUIREMENTS

Of the errors which became evident during this study, poor space planning in shape of underdimensioned rooms is one of the most prominent. Allowances have to be made for the ever-in-motion character of man, his natural patterns of flow and motion as well as for his psychological and social interactions with others and his psycho-physiological requirements.

The space planning must provide due allowance to a simultaneous traffic pattern for the circulation of the functioning different members of the staff of the surgical center, ensuring that unnecessary movement and mutual hindrance is avoided.

Operating Rooms:

The operating room should provide an environment of maximum comfort for both surgeons and patients with reduced risk of infection to exposed tissues during surgical procedures. The suite should not provide for activities that can be performed outside it.

Federal requirements (1978) specify minimum dimension of 18 linear feet and minimum square footage of 360 sq. ft. for general operating rooms, exclusive of fixed and movable cabinets and shelves. Provide an emergency communications system connecting with the surgical suite control station. Provide at least two x-ray film illuminators in each room. Storage space for splints and traction equipment shall be provided for rooms equipped for orthopedic surgery.

The actual team for routine operative procedures varies usually between four and seven persons. The team consists of a surgeon, and anaesthetist, two assistants who help with ligatures, retractors etc., a scrub nurse who prepares sets and passes instruments as required, an anaesthetist nurse and a circulating nurse. They are assisted by radiographers, technicians and porters as well as sterilising staff and disposal staff, who often will be regarded as members of the team.

Usually the surgeon stands closer to the site of the operation: on the right side of the patient facing the patient's head. For operations on the right side of the body: appendectomy, operations on the right breast, liver, right arm, right leg the surgeon stands on the right side of the patient, facing the patient's head. For operations on the abdominal cavity above the navel the surgeon usually stands on the patient's right side. For operations on the skull, perineum etc. the surgeon stands or sits at the end of the operating table, the assistants on both sides of the surgeon. In other cases the only assistant usually stands opposite the surgeon.

In cardiovascular surgery implanting a heart requires the assistance of an over all staff of about twenty or more, including doctors nurses, technicians and engineers.

The main item of suite furniture is the operating table. Usually operating tables on wheels are used to move patients between anaesthetic room and theatre. There are operating tables that can be detached from their pedestals which are permanently fixed to the floor. The pedestal may accommodate pipes for hydraulic power, to maneuver the table top, and gas and electricity supplies. When released from the pedestal the table top, complete with patient, fits on to a wheeled trolley for transfer between anaesthetic room and theatre. For the same pedestal there are different table tops for general, orthopedic and gynaecological surgery.

The introduction of contour fitting tables mark an interest in rethinking design. As an aid in surgery for rare detached retina conditions suspended tables have been designed.

A traumatological operating table has been designed with three independent pillars, liftable and movable in several directions, which support the body of the patient. The table has also a system of pulling for the simultaneous treatment of injured limbs.

All operating tables should be so constructed as to allow the convenient insertion of X-ray cassettes.

There should not be any knobs on the table to stick into the surgeon.

When the normal position of the operating table and the head of the patient is considered it should be decided in relation to the anaesthetist's position, which should be nearest the anaesthetic room.

A surgical center will require one table per theatre plus reserve table depending on the number and frequency of operations.

An inventory of mobile apparatus used in connection with operations would include anaesthetic apparatus with anaesthetic tables, X-ray machines, electro-cardiographs, diathermy machines, electrical suction pumps and acoustic pulse monitors. An increased use of respirators and measuring devices for physiological and isotope investigations, etc. may be expected.

Furnishings and equipment should wherever possible be fixed and wall hung, easily cleaned and decontaminated. Anaesthetic apparatus, operating tables, pumps, X-ray apparatus, operating lamps etc. should be provided with simple covers. Attention is directed also to the need to see that undersurfaces, wheels etc. are easily accessible for cleaning.

A suitable size for an operating room for most forms of surgery at the present time will be in the region of 400 sq. ft. Variations in theatre size according to the number of staff and amount of material required for different types of operations in general surgery is not to be recommended if one seeks the natural flexibility of use.

Theatres for special branches of surgery such as neurosurgery, thoracic surgery, eye surgery, orthopaedics and ear, nose and throat surgery are so specialized in their equipment that a certain segregation ought to be maintained. For transplantation surgery twin theatre suite is needed.

For some procedures such as heart transplants, a size of 550 sq. ft., or better, 600 sq. ft. is considered desirable (Harvey Agnew 1979). Rooms for cystoscopy and endoscopy generally can

be a little smaller than 400 sq. ft., depending upon the arrangement provided for the sterilization and storage of special instruments in an adjoining workroom.

Ervin Putsep (1969) recommends that the free ceiling, with or without a suspended ceiling, should preferably be 10 feet and not less than 9 feet to maintain a good volumetric proportion with people and equipment in space.

Consistency of construction should extend to an identical shape and the very same placing of doors, outlets for electricity, medical gases, compressed air and other equipment in all theatres. Left and right handed theatres as can be found in twin theatre suites should therefore be discouraged.

Special Theatres Endoscopy Room:

The three major groups of endoscopy are genito-urinary, rectal, and pulmonary. All of them are functionally well served in a room with an area of about 300 sq. ft. including all the characteristics of a surgical room. As large amounts of sterile water are used for irrigation purposes, a floor drain should be provided.

Federal requirements (1978) specify minimum square footage of 250, exclusive of fixed and movable cabinets and shelves. Provide an emergency communications system connecting with the surgical suite control station. Facilities for the disposal of liquid wastes shall be provided.

Plaster Room:

A patient requiring a plaster support can sometimes not be moved from the operating table and must therefore be plastered in the theatre. Whenever the need can be foreseen, plastering, and especially the removal of plaster with attendant dust, should be performed in a special plaster room.

The plaster room, usually requiring its own anaesthetic room, should have an area of about 400 sq. ft. and be placed peripherally in the surgical center.

The design of the plaster room should take into account the contamination risk inherent in removing plasters and of the special equipment required: orthopaedic tables, X-ray apparatus, suspension frames, slop sinks with plaster traps, etc.

The splint and plaster store should for preference be located between the orthopaedic theatre and plaster room.

The possible replacement of plaster by plastic materials would evidently result in modifications to the present routine.

Changing Area:

Staff and service personnel as well as patients should enter at the same point, which should be so located as to discourage unauthorized entry. It is essential to prevent the eventual supplies entrance being used by the staff as a back door to the department.

Each changing area, near the entrance to the surgical center, should comprise two divisions: cloakrooms for removing and donning street clothes and rooms for changing to and from theatre clothing.

Cloakrooms' equipment should include fixed hangers, hat and shoe racks and personnel lockers.

In this area should be found bulletin and notice boards to display operating suite lists, rosters and particulars of additional classes.

An adequate number of toilets--to be used before entering the changing rooms--should be provided near to the cloakroom.

To avoid contamination of operating suite clothes, the changing rooms should be divided into clean and less clean areas. All ordinary clothing should be removed in the less clean area before putting on theatre clothes. In the clean dressing area, theatre clothes and caps--stored in protective containers--are donned, and from there one enters an area of a higher hygienic standard.

The changing rooms for female and male staff respectively may be further divided to suit different groups of staff, e.g. groups of six to twelve persons in a unit equipped with its own wash-basins and showers. The showers should be large enough for people to undress and dry themselves within the compartment. Showers other than those in the changing rooms should not be necessary.

The changing room should be provided with a telephone and intercom.

When the staff, students and visitors on completing their operating suite work return to the less clean part of the changing area they have to place their used protective clothes in hampers. These are placed in vacuum-driven disposal chutes or kept in the theatre disposal room and, on the completion of the operating session, are removed from the surgical center.

Adjacent to the changing rooms and on the theatre corridor side there should be a passage provided with wall hung foot-manoeuvred emergency toilets and wash basins.

Scrubbing and Gowning Area:

All those taking a direct part in the operation have to disinfect their hands and arms followed by an immediate powdering or oiling of the hands. Sterile towels are used for drying.

Sterile gowns, caps for completely covering the hair and even the beard, masks and gloves, if used, should be donned in the scrub-up room. If it is likely that the gown may become wet with blood or other fluid, a surgeon should wear a sterilized plastic apron.

The assistance of a second person is needed in donning the operating gowns currently used. If the ties and tapes on an operating gown were eliminated members of the operation team would not have to wait for assistance. An area of 30 to 36 sq. ft. is required for donning the gown.

The scrub room should be adjacent to the theatre, but physically separated from it as the aerial spread of contamination from the scrub areas to the operating room has been documented. (I. W. Harding, 1966).

Before an operation two or three persons will wash simultaneously. The scrub room should be planned so that washing and gowning activities may proceed simultaneously without detrimental either activity. Automatic dispensers for sterile nail brushes can be used.

Space is to be reserved for a storage trolley (sterile gowns, caps, masks, aprons, gloves).

A scrub and gowning room to serve one theatre equipped with three wash-places requires an area of about 100 sq. ft.

Staff Lounge and Refreshment Room:

The staff lounge and refreshment room ought to be comfortably furnished and well ventilated for the benefit of nonsmokers. A pantry with a refrigerator should be available.

It is unlikely that more than half the staff of the surgical center will be free at the same time, so the room is to be designed to hold this proportion of the staff plus some visitors.

Offices

Surgeons and some others of the medical staff need individual offices within the center for dictation, writing and typing of records, discussions, study and rest. These offices may be split into cubicles of about 5-8 sq. ft.

The operation suite supervisor responsible for the surgical center is accommodated in a centrally located office with an area of about 100 sq. ft. This ought to be adequate to contain desks, table, charts, bulletin boards, shelves, and filing

cabinets. It is essential that another room outside the surgical center be provided where the supervisor can interview staff in private and talk with sales representatives and other visitors.

Offices for clerks adjacent the surgical center for typing medical records should be furnished with desks, shelves, chairs, filing cabinets, telephones and intercom. The size is about 100 sq. ft. per room.

Anaesthetic Room

An anaesthetic room, also called a preparation room, is a space for the transfer of the patient to the operating table and for the commencement of anaesthesia, intubation, the introduction of sterile parenteral solutions, the introduction of instruments for preoperative tests, etc. In this room anaesthetic is also terminated. Here the patient should be prepared and shaved or depilated with a depilatory cream, as this should be done as near the time of operation as possible.

To wheel the anaesthetised patient on the operating table and anaesthetic equipment from the anaesthetic room to the theatre requires the services of two or three persons for approximately half a minute. This time lag in started anaesthesia is considered by some anaesthetists as a theoretically possible point of danger.

In spite of that, the practice of anaesthetising the patient in the operating theatre itself, though sometimes advocated, should be considered unacceptable. (The Design of O.R. Suites, 1964).

There are strong psychological reasons why anaesthesia and preoperative procedures should not be commenced in the theatre even if patients are premedicated. The anaesthetic room should be both visually and acoustically well screened from the rest of the surgical center, so that the patient is not in any way disturbed and all stimuli which are unpleasant to the patient are eliminated. The fact that heavy premedication and general

anaesthesia do not prevent the patient from hearing conversations which take place in his presence or various noises while he is asleep and have been well established. (Cheek, D. B., 1960).

Particularly during the stage of beginning anaesthesia noises are greatly exaggerated. Even low voices and minor sounds appear loud. Great care must therefore be taken to insure that the anaesthetic room is a really quiet place while anaesthesia is being started.

Anaesthetic rooms need no windows: large areas of a single color outside a window might be reflected by the ceiling, interfering with color values in the room; furthermore, variations in daylight from hour to hour interfere with the judgement of a patient's color. The glare from windows may tire the eyes of the anaesthetist. For the sake of consistency of quality and intensity, artificial light is to be considered to be more satisfactory.

The anaesthetic room should not serve as a natural passage to and from the operating theatre.

In the anaesthetic room anaesthesia is terminated by suction of the patient's respiratory passages. The anaesthetic room also serves as an exit bay for the patient after the operation. The transfer of the patient from the operating table to the transport vehicle which can remain in the anaesthetic room during the operation, may be undertaken in the anaesthetic room.

Anaesthetists and other medical staff require to move around the table when commencing anaesthesia in order to put patients into the required position.

To facilitate the transfer of patient, provision should be made for the easy movement of both transport vehicle and table or top of the operating table into the anaesthetic room where they will be placed side by side. The employment of various lifting devices, whether fixed or mobile, can be advantageous to patients as well as staff. Though, as a rule, slow in operation they may be of value in the operating theatre where male staff to lift the patient is not available.

Space is required also for writing desk, medicine cabinets, storage racks (for example screens which separate the patient's head from the surgical field, for table fitting, diathermy plates), work bench and anaesthetic apparatus, suction-pumps, one or two wash basins.

Theatres are usually equipped with one or two X-ray viewing cabinets. Bacteriological surveys (Helliwell P., 1964), have shown that the highest degree of contamination in the theatre itself occurs around the shelf where the patient's X-ray films and notes are laid out. Films should therefore be taken in and out of the viewing cabinets from an adjacent room, which could be the anaesthetic room.

The average dimensions 15 x 12 = 180 sq. ft. can be recommended for the well ventilated anaesthetic room in the present situation as they cover very properly the needs of the majority of the anaesthetists. For complicated thoracic and neurosurgical procedures an increase in area up to 225 sq. ft. is likely to be required. Larger anaesthetic rooms are needed even for teaching and demonstration purposes.

In connection with open heart surgery hypothermy is practised. For this purpose the blood of the anaesthetised patient is cooled or the patient is put in a bath-tub filled with iced water. When the patient's temperature, taken in the oesophagus and rectum, is as low as 33°C, the patient is dried and transferred to the operating table. For this additional arrangements and space are needed.

Preoperative Area

A break in the aseptic barrier surrounding the surgical center occurs when the patient arrives from the grossly contaminated ward, so the risk of transferring contamination is to be reduced to a minimum.

The patient on the way from the ward to the surgical center should be provided with freshly de-contaminated bedding. If this is not done, clothing and blankets brought from the ward

should be discarded in the holding area, where collection facilities should be provided. Even the ward staff should not proceed beyond that point.

The reception room in the holding area should be equipped with a writing desk, telephone, intersom, wash basin and temporary seats for the porters. The recommended floor area is about 80 sq. ft. (Putsep E., 1969).

For patients with diagnosed staphylococcal sepsis a separate holding room should be provided, as they may heavily contaminate the environment within a few hours of admission (Turner C. C., 1965). Even patients with respiratory tract infections may heavily contaminate the surroundings (Rountree P., 1965).

A separate reception and resuscitation area to which patients will be taken before undergoing emergency surgery is a necessity.

It is bacteriologically improper to allow the patient's bed, which comes from the ward, to enter the operating theatre. It is considered satisfactory if the ward bed is kept in a holding area. The patient is transported within the center on a stretcher bed belonging to the surgical center. The patient can remain in this stretcher bed during the immediate postanesthetic period and even during his stay in the intensive care unit.

In order to reduce the bacteriological flora on wheels, it has been recommended (Putsep, E. 1968) that heavy apparatus and vehicles carrying patients during transfer to the theatre should pass over foam rubber or plastic mats saturated with detergent germicides placed on the floor or in matwells in the corridor floor at the surgical center entrance.

Experiments with shallow floor baths to act as decontaminants for wheels and even footwear show that the floor soon becomes moist and slippery.

The immediate preoperative ward is generally criticized by Essex-Lopresti, 1963, who feels that clinically there can be little benefit in placing the patient under care of specially

trained nursing staff before operation. The prime need then is for tranquillity. This, Essex-Lopresti feels, is less likely to be achieved in a ward where other patients are being prepared for the theatre and where attendants arrive at frequent intervals to collect patients.

Recovery

The patient is kept in this area until his natural reflexes have returned, his blood pressure and respiration are stable and there is no more danger from the possible hazards of asphyxia, vomiting and shock and other complications requiring resuscitation.

The length of stay of each patient in the recovery area will vary according to the practice adopted by the individual hospitals, but will generally not exceed 45 minutes. The medical procedures in the postanesthetic recovery room may include intravenous drips and respiratory care. When the surgeon or anaesthetist has given permission, the patient is returned to the ward, or if necessary, transferred to an intensive care unit.

Federal requirements (1978) specify that recovery rooms shall contain a drug distribution station, handwashing facilities, charting facilities, clinical sink, and storage space for additional supplies and equipment. Design shall provide space for necessary equipment with additional space of at least 3'-0" each side of each patient bed.

The postanesthetic unit is to be kept open round the clock and should be placed within the surgical center and on the same level as the operating theatres. It is also essential that the unit be placed adjacent to an intensive care unit.

The number of beds in the unit depends on the turnover and organization of the surgical center. Even if the hospital has fully developed intensive care one ought to allow from 1.3 to 1.8 beds per operating theatre for postanesthetic recovery. (Putsep E., 1969).

A postanesthetic unit may contain the following spaces:

- open recovery room
- isolation rooms
- room for maximum care (cases of breathing and tetanus insufficiency)
- room for hyperbaric oxygen
- nurses' station
- disposal room
- stores for instruments, medicine, catheters, infusion fluids, and linen
- apparatus, oxygen tent, etc.
- changing facilities
- waiting room for relatives

Owen B. Hardy and Lawrence P. Lammers (1977) suggest a maximum of eight surgical patients on stretchers for a surgery suite with four operating rooms. Provide head-to-wall orientation of stretchers, with gases, suction, emergency call, and blood pressure cuff, wall mounted for each patient. Provide 14" shelf along head wall 30" in height, as a continuous work counter. He also suggests nurses charting and work area, medications preparation alcove, clean supply area and solid supply area, which will be discussed later in this report.

The rather quick turnover of patients in a postanesthetic unit requires the provision of large circulation areas within the unit.

For supervision of postanesthetic beds a nurses' station rather than a separate room is to be preferred. A large postanesthetic unit might require several nurses' stations. The nurses' station should include space for medicine cupboards and a wash basin. The unit must be connected to the hospital intercom system.

Patients after anaesthesia are particularly susceptible to respiratory infection. There are obvious risks of postoperative infections in the open wards, not at least in connection with thoracic surgery, therefore an adequate proportion of isolation should be provided (Wiklund E., 1965). 150 sq. ft. should be

allowed for isolation rooms, each equipped with a wash basin. These isolation rooms are to be used also in connection with infectious cases.

A separate disposal room is needed, with trapped slop-sinks, together with arrangements for the decontamination of bedpans (or destroyer for disposable bedpans and urine bottles) cleaning materials, sink, wash-basin and incinerator. For a disposal room an allowance of 100 sq. ft. floor area should be made.

Storage spaces should be provided close to the nurses' station.

The observation of the patient's color and breathing is of special importance in the postanaesthetic unit; therefore attention should be paid both to the color of the lighting and to the color of the room. Light fittings should be placed where they will not disturb the patient.

E. Putsep (1969) recommends with regard to the character of the room, sound absorbent floor and ceiling materials and a wall finish with a reflection factor of about 50 per cent should be chosen.

Storages:

Storage facilities within a surgical center should generally be divided so that the bulk stores are complemented by a sufficient number of suitably located storage trolleys.

A central storage space is needed for dressings manufactured and sterilized either in the factory or the hospital sterilization center and for sterile linen produced in the central laundry. The room should provide working space also for the preparation for special dressings.

Space for trolleys will be needed for caps, gowns, masks, gloves, etc. in the scrub room; for dressings in the anaesthetic room, and sterile linen, etc. in the theatre store.

Medicine and serums should be stored in a separate room. Cupboards for medicine in or near the theatres and anaesthetic room will be required. Medicine trolleys could be used.

Central storage for blood, sterile parenteral solutions etc. is required for reserves against urgent calls for blood and for bottles of made-up and crosstested blood for particular patients. Sterile parenteral solutions may usually be stored at room temperature. A rotating cupboard maintaining a temperature of $+4 - +2^{\circ}\text{C}$ is needed for blood as well as a working space, where anaesthetist can perform his own crosstest. Other blood supplies may be stored in bottles in a portable refrigerated trolley.

Supplies of sterile water can be located adjacent to the store for blood. At present the most satisfactory method is to sterilize water in the bottle for use in the theatre. One and two litre bottles are used. Several bottles may be stored for convenience in a heated cupboard.

Anaesthetists' storage space is required for replacement materials, infrequently used medical-gas tubes, apparatus, and respirators.

Storage space for splints etc. is best placed adjacent to the plaster room.

Storage space for apparatus and bulky equipment can suitably be divided into units of 100 sq. ft. each to serve 2-3 operating theatres.

A room of about 50 sq. ft. adjacent to the theatre should be provided for the storage of sterile instrument sets or trolley tops, together with emergency sets from the instrument center, syringes, operation linen and dressings in sets, surgical sutures, tissue adhesives, medicine and sterile water bottles. In this room even trolley-laying with sterile equipment may be done.

Used, but decontaminated instruments may also be stored in this room before transport to the instrument center.

Patients transferred from the casualty department to the surgical center for operation may require clean beds after surgery. A space of 30 sq. ft. for each bed is needed.

Alternatively stretcher-beds could be used requiring less space.

A space of about 50 sq. ft. is required for mortuary trolley parking.

FLOORS

The criteria for the selection of floor materials and finishes are clear-cut, for the basic needs are obvious: to be easily cleanable; non-absorbent; non-harboring of bacteria; to have the right degree of conductivity; to have a high resistance to breakdown (Austin P., 1965); resistant to the action of floor-cleaning solutions; to have long life; and to not be consive to slipperiness.

Terrazzo does not satisfy all the requirements, because of its porosity, hardness, noisiness and tendancy to craze, and the time it takes to repair (Putsep, E., 1973). Rubber flooring is satisfactory for comfort, but does not as a rule take kindly to heavy loads and will show marks from the operating table wheels.

One factor considered vital for many years but now being reconsidered is conductivity with the increasing use of nonexplosive anaesthetics. Some hospitals have already discontinued the use of explosive anaesthetics, and a number are designing a portion, if not all of the operating theatres with nonconductive floor coverings (Agnew, H.G., 1969), in rooms where inflammable anaesthetics are administered or stored risks of explosions caused by electro-static discharge necessitates, as a precaution the use of conductive floor finishes.

Ceramic and other hard tiles are quite durable and can be made adequately conductive, but they are bounded by cement depressions which can harbor bacteria. Wet vacuuming is infinitely more satisfactory than the swishing around of mobile incubator in the form of a bacteria laden damp mop normally kept in a warm cleaner's closet, but some fluid is usually left in the crevices.

A completely seamless and impervious floor with a hard surface would be ideal. A product meeting most objectives is a new conductive terrazzo made with a plastic matrix. It is much more resilient than the old-style terrazzo, has a harder surface, and the bonding between the epoxy matrix and the aggregates seems to be more permanent under continued usage. The many potentially-dangerous joints and cracks are virtually eliminated, and the

product is less absorbant than the former type of terrazzo. The floor can be trowelled in and made as a monolithic unit without divider strips (Agnew, G. Harvey, 1969).

Walls & Ceilings

It has been traditionally recommended that wall materials in theatres should be hard, robust, impervious, jointless, non-absorbant, easily cleaned and decontaminated, and should have relatively nonreflecting surfaces. As yet, no materials exist which can satisfy all these requirements.

Construction of the walls is often not given adequate thought. One of the greatest problems that Goodrich has found in the design of operating rooms is that many have been constructed with dry wall plaster. There is a need for a smooth wall to four feet from floor level; without a grout which can either flake or collect dirt. Painted soft surfaces cannot withstand the trauma of the wheeled equipment in the operating rooms to which the walls will be subjected, therefore, a hard surface of some type should be chosen. Chair rails useful in corridors have no place in the operating room, so the hard surface should rise to at least 40 inches (Beck, W.C. and Meyer, H.R., 1982).

The U.S. Public Health Service General Standards of Construction states that "wall bases in any areas used for surgical and obstetrical procedures shall be integral with either the wall or the floor surface material and shall be without voids that can harbor harmful bacteria." Walls must be washable and "ceiling shall be washable in operating suites..."

A recent alternative which is becoming widely recommended is an epoxy resin which can be sprayed on to form a continuous, seamless, impervious coating which can be washed as required. A promising product available is epoxy mixed with fiber glass, (Agnew, G.H., 1969), which can be sprayed on.

It should be a requirement that in the operating room a great deal of attention should be paid to auditory effects. W. Beck and R. Meyer (1982) noticed that hard reflective, often epoxy

painted walls, contribute to reverberation time and therefore to noise. When they were studying the potential of movable walls in the operating rooms they found this to be a great problem. Putsep (1973) has stated that the reverberation time in the empty operating room should be reduced to below one second.

The corners in the suite must be rounded. Protective guards against damage by the corners of moving equipment are not always effective. Such guards should be made of a very heavy material. Viewing cabinets, switches, plugs, cupboards and door frames should be flush with the wall surfaces to make cleaning routines easier.

Putsep (1969) suggests screening against outside electrical interference for some theatres. He also suggests permanent radiation screening in an operating room with X-ray equipment (2 mm thick of lead or equivalent material).

The operating rooms should have a ceiling of a near white color with a reflectance as high as possible; the walls should be of nonglossy surfaces of any light color with reflectances of about 60%; floors should have low reflectances from 10 to 30%; gowns and surgical draping materials should have a reflectance lower than 30% if at all possible; and all instruments and plastic materials employed should preferably be colored and with a matte finish, to reduce reflected glare. Green is by no means obligatory. (Beck, W.C. and Goldhammer, R.D., 1971)

Lighting

Inadequate room illumination can be dangerous. Tubing and wiring are still frequently found on the floor; these can trip people. The connection can be broken when kicked with potential tragic result to the patient. The greater use of monitoring and other equipment with dials and gauges also necessitates better general illumination.

Warwick Smith (1960) argues that 100 foot-candles is required for general illumination and William Beck (1980) believes that there should be a nontask capability for an overall potential of

200 fc (2200 Lux) at table level at all points within the operating room. Furthermore, he argues that this light should be dimmable, either through electronic means or by switching. The light should be provided from fluorescent fixtures, flush mounted on the ceiling. This light source must be integrated into the competition for ceiling space, i.e., ventilation, X-ray (both fixed and portable), hangers for equipment, monitors, television mirrors, and other services.

Accurate color reflection is of vital importance in surgery for the distinction of tissues and particularly for the detection of cyanosis, shock, or other abnormal coloring or appearance. Modern lighting has done much to improve color rendition, and some recent developments provided a white light rated as approaching perfection (Harvey Agnew, 1969).

Beck (1982) argues that luminance ratios should be no greater than 5:1 within view of the surgeon and his team. The surgical task lighting system should provide at least 27 kilolux (2500 fc) at the center of a field at least 10 inches in diameter, with at least one fifth this much at the periphery of the pattern. The source should be so arranged that a minimum shadow will be created by the surgeon and his team at the depth of the wound. The depth of focus should be at least 15 centimeters.

The surgical task source should have sufficient flexibility so that it can have a central beam directionally oriented in any angle to within 10^0 of the horizontal, and should remain in that position unless physically changed. The measurements should be made so that they can be confirmed at a distance of 42 in. from the plane of the lowest element of the source. Secondary (often called satellite) lamping should be available for multiple incisions, while the major site is under full illumination.

Putsep (1973) argues that it would be realistic to require an all round intensity of no more than 40,000 Lux from an operating lamp placed one meter above the working plane, giving an intensity of 8,000 Lux at the bottom of an incision about 13 cm deep and 5 cm wide.

Laufman has made two very useful suggestions for the lighting of this room. The first is that there be three intensity zones. The operative field must have its full complement of light as suggested by the Illuminating Engineering Society's Committee. That is a minimum capability of 2,000 fc at the central point in the field and 500 fc at the periphery of the 10 in. field. Laufman further agrees to the secondary range, which will produce about 100 fL from the rest of the draped field level. The amount of incident light required to produce this effect will vary with the reflectance of the drapes (which will usually be 35 to 40%). The rest of the room may be served by wall washing light which will again result in a reflectance so that the ratio of the zones is maintained at a ratio no greater than 5 to 1.

Laufman's second suggestion is that a separate light be provided by a recessed luminaire in the ceiling directing a beam into the tent created by the surgical drapes. Some have carried this concept even further and suggested that this light source be activated by servometers with a gimballed mounting so that the light may be manipulated electrically. It can, however, also be manipulated by a wand, so that the anaesthetist is afforded ample good vision.

The surgical lighting may have to be augmented by fiberoptic lamping. Usually this is worn on the head of the surgeon. Fixtures do exist which either stand independently or are flexibly mounted on the operating table. If rapid restrike and good color rendition becomes available from "High Intensity Discharge Lamps" (Beck, 1982) it is, in Beck's opinion, probable that the entire methodology of surgical illumination will need restructure with sources such as were used in France many years ago.

Color

The color of the operating room walls should have an ample matte reflectance, preferably about 60%. If a higher reflectance is chosen, it must have some texture (permitting cleanability) so as not to create glare. The color need not be lettuce green.

The same color need not be used throughout. (W.Beck, 1982). He also would suggest that one wall, within the sight of all the surgical team display some scene--possibly a photomural of a washable vinyl to provide a point of visual rest for the psychological tension.

Generally with high levels of illumination, luminous and warm colors (pink, orange, yellow) in the surroundings, the body tends to direct its attention outward, increasing its activation in general. With softer surroundings, lower brightness and cooler hues (turquoise, green, blue, grey) there is less distraction and good inward orientation is furthered (Birren Fabber).

There is a risk of vision disability when looking into a wound by contrast with the towels and drapes surrounding it. Dark green has been usual to minimize contrast glare. Canada Green has been particularly recommended (Fair, J., 1968).

Grey-green, grey-blue, neutral beige, yellow and pale yellow, all with reflection factor of 25-35 per cent, have equally been recommended, usually in combination with a white ceiling (Putsep, E., 1969).

C. PROGRAMMING

Methodology/An Evaluation Model

Evaluation of a hospital should be continual, relatively rapid, and done in the context of administrative mechanisms that facilitate change. A major goal becomes rapid identification of problem areas, rather than the development of knowledge about basic relationships among variables. Evaluation of this sort does not necessarily conform to canons of scientific research, and need not do so to be useful to the organization. Evaluation in this context is "sense-making" (McClintock, 1979).

Some measures are more "culturally powerful" than others (Becker, 1978). Administrators find figures about measures of patients' perceived comfort. The more valued measures are generally "hard" rather than "soft"; that is, they typically refer to something that can be directly obtained in some fashion, and which is not dependent on the respondent providing responses (Beck et. al., 1982).

A number of different "hard" measures have been used. Some of these include: nurse travel time and travel distance (Trites et. al., 1970, Lippert, 1971); individual interaction patterns between staff and, staff and patients (Becker & Poe, 1980); time to complete different tasks and intensity of equipment and space use (Rawlinson, 1978); average cost and length of stay (Beckman, 1974).

Behavioral Mapping and Archival Records are the two most common examples of "hard" measures. They are "hard" since they are not dependent on self-reports of feelings and attitudes. Only Archival Records will be used for this report.

In the study by Trites et. al. (1969) another measure of the effect of corridor designs (radial, single, and double loaded) on nurses' activities was the use of records on staff absenteeism and accidents. They found significant differences among the nursing units designs. There were relatively few absences on radial units, next fewest on double corridor units, and the most on single corridor units.

Other types of archival data includes formal complaints and requests for transfer, and length of patient stay. These data are economical to collect since they are routinely recorded as part of the hospital operating procedures. Example:

Physical Environment Checklist, Semantic Differential, and Open Ended Interview are among "soft" measures which will be used for this report. Sommer (1972 & 1980) has used Physical Environment Checklist in a wide variety of settings, and Becker & Poe (1980) adopted it to the study of design changes in a small general hospital. It can vary greatly in detail and length, but typically it lists areas of the physical setting (e.g., lounge, patient room) and specific aspects of the setting (e.g., lighting, noise, temperature), as well as specific behaviors of interest (e.g., cooperation, friendliness of staff), (see table 1). This information directs attention to the specific aspect of the environment that is important to the individual, and guards against the possibility that characteristics individuals especially value are inadvertently eliminated when correcting other problems.

This information is valuable in establishing priorities for decision making. It is very easy to develop the items, and it is quick and easy to complete and score.

The Semantic Differential will be used in evaluation of physical setting, by primary users of the space (doctors and nurses in operating rooms) because of its ease of construction, administration and scoring (Sanoff, 1977). Adjective scales will be developed that represent concepts considered as relevant characteristics or objectives of whatever is being evaluated (see table 2). For example, an operating room may be evaluated on "comfortable-uncomfortable," "ordering-chaotic" scales. It is useful to know, however, not only whether a room or environmental characteristic is pleasant or unpleasant to the individual, but also whether this is a dimension that is important to the individual. Again, such information helps set priorities and future course of action.

In open ended interviews, fifteen patients and ten nurses will be interviewed and simply asked to comment about the physical condition of the hospital, including the size of the rooms,

lighting, bathrooms, and so on. The questions will later be coded into categories particularly in an study like this, where the main intent is to get a feel for the kinds of problems and concerns of different users, these kind of open ended questions are useful. This kind of instrument is useful and economical to use in a small-scale survey dealing with a specific building and aimed at a finite population. It does not require a heavy commitment of research funds or considerable technical research experience.

Based on the above mentioned instruments (Checklist, Semantic Differential, Open Ended Interview, and Archival Records) and observation and photography, table three and four (Performance Characteristic Rating table and Activity Table) will be developed.

These few instruments by no means exhaust the range of methods that can be used to evaluate subjective responses to the environment.

Table 1
PHYSICAL ENVIRONMENT CHECKLIST

	Excellent	Satisfactory	Needs Improvement	What Needs Improvement
A. Corridor				
B. Waiting area				
C. Patient room				
D. Nursing Sta.				
E. Bathrooms				
F. Cast room				

Note: Rating of importance for each area, and more specific elements within area (e.g., color of walls, artificial light, equipment noise) can easily be added to this form.

Table 2
SEMANTIC DIFFERENTIAL EVALUATION
OF DIFFERENT LIGHTING ARRANGEMENTS*

Evaluative dimension

Friendly-----	Hostile
Pleasant-----	Unpleasant
Like-----	Dislike
Harmony-----	Discord
Satisfactory-----	Frustrating
Beautiful-----	Ugly
Sociable-----	Unsociable
Relaxed-----	Tense
Interesting-----	Monotonous

Perceptual Clarity Dimension

Clear-----	Hazy
Bright-----	Dim
Distinct-----	Vague
Focused-----	Unfocused
Radiant-----	Dull

Spaciousness

Large-----	Small
Long-----	Short
Spacious-----	Cramped

* From Flynn, J., et.al., J. IES, 87, 1973

PERFORMANCE CHARACTERISTICS

Performance Characteristics of Environmental Attributes are an attempt to include therapeutic and interior architectural concerns in one set of statements to be used as the communication mechanism between mental health professionals and architects and/or interior architects. Eight characteristics will be used for the purpose of this report, which these become criteria for redesigning the space. These questions will be answered by the primary users of that space.

ACCESSIBILITY

The extent to which a setting constitutes a barrier-free environment.

- a. Degree of object manipulation
- b. Proximity to needed services

Example:

Improperly design stairways and doorways can make some areas inaccessible.

Objects that require excessive muscular strength decrease accessibility.

The provision of signs, special lighting, and texture cues to warn a person of dead-end corridors and approaching staircases would significantly increase accessibility and reduce general ambiguity.

ADAPTABILITY--Flexibility

Ease of a setting to be arranged to accomodate new of different pattern of behavior.

Capacity of setting to successfully adapt to unforeseen change (M. Brill, 1970).

Flexibility (According to W. Pena):

- a. Growth through expansion-Expansibility
- b. Change in function through the conversion
- c. Multi function spaces-Versatility

Multi-use is related to how utilization could be improved (C. Rawlison, 1978).

- a. More intensive use of a space for the same activity by the same group if users.
- b. Shared use of a space by different group of users but for the same activity.

- c. Alternative uses of a space either by the same or different groups of users but for different activities at different times.

Example: Satisfaction in rearranging setting to provide a different view.

AESTHETIC

Appeal of a setting from the users' point of view. It is well documented that architects' and designers' aesthetic criteria often differ substantially from those of the user (Altman, 1973; Goodman, 1971).

Designers normally apply aesthetic principles such as rhythm, balance, mass-void relations, novelty, and so forth, to the geometry or configuration of a building or an interior, whereas users' judgements are more simplistic and varied and they depend on their prior experience in their preference for new settings.

COMFORT

Environment conditions that contribute to subjective feelings of comfort and ease in task performance.

The ability of a setting to pass human engineering standard tests which define a "comfort zone" for users engaged in activities (m. Brill, 1970).

- a. Sensory (adequate supply and control of):
 - 1. Thermal qualities
 - 2. Acoustic qualities
 - 3. Illumination
 - 4. Air quality
- b. Physical:
 - 1. Equilibrium
 - 2. Anthropometric-shape, size, surface, position.

Example: Daily tasks require three times as much lighting for average older person compared to average 20-year-old.

LEGIBILITY

The degree to which a given setting possesses spatial organization and incorporates the components of identity and structure (Lynch, 1960).

The extent to which a setting is perceptually understandable and facilitates orientation, predictability and direction finding.

Primarily visual cues to orient in space are:

- a. color
- b. texture
- c. signage

Quantity of elements in setting to provide information about the activity the setting serves.

PRIVACY

The degree environment features permit a person to control unwanted acoustical and visual stimuli from others and to others (P. Windley, R. Scheidt, 1980).

The degree to which a person will be asked to share the setting with others (M. Brill, 1970).

Westin (1970) classifies privacy phenomena into four states: solitude, intimacy, anonymity, and reserve.

Pastalan (1970) regards privacy as manifestation of territoriality.

Almost all researchers agree that attainment of privacy is essential to provided emotional relief.

SOCIALITY

The extent the features on an environment facilitates or inhibits social contacts among people.

The degree an environment provides opportunities for people to socialize.

Examples:

Rivlin (1970) found among institutionalized patients that social interaction increased as the number of bed decreased.

Increased social activity was found to be related to better health of the residents and a greater number of available social space (P. Windley, R. Scheidt, 1980).

Sommer (1970) found that social interaction increased in the lounge of a care facility when the elderly residents were seated around several small square tables rather than in straight rows against the wall.

TERRITORIALITY

The extent an environment facilitates personalization and conveys individual ownership of space. The jurisdiction a person actually has over space he uses (P. Windley, R. Scheidt, 1980).

Example:

Territorial defense occurred less often among patients with private rooms (DeLong, 1967).

Most researchers agree that defensive behavior would probably decline with the provision of private space and room to display personal effects, and also with reduction in the size and increase in the number of social interaction spaces.

The following tables designate functions, equipment which may have a bearing on the space assignment, and the numbers of people involved in the function, if those numbers offset the space assignment.

Room Designation	Activity- criteria for space assignment	Interior components
Operating Room 1	<p>Mostly eye operating (approx. 65%), some small orthopedic surgery.</p> <p>Federal requirements specify minimum dimension of 18 linear feet and minimum square footage of 360.</p> <p>Present area: 336 sq. ft.</p> <p>Consultant recommends 400 sq. ft.</p>	<p>Phaco Emulsifier, mayo stand, preparation table, medicine cart, instrument table, operating table, linen hamper, gas machine, kick bucket, stool</p>
Operating Room 2	<p>Major orthopedic cases (approx. 75%), ortheroscopy.</p> <p>Federal requirements specify minimum dimension of 18 linear feet and minimum square footage of 360.</p> <p>Present area: 368 sq. ft.</p>	<p>T.V. Monitor, mayo stand, preparation table, medicine cart, instrument table, operating table, line hamper, gas machine, kick bucket, stool</p>
Operating Room 3	<p>Hip nailing, general surgery, larger vascular, major abdominal, orthrosocopy, and majority of truma patients.</p> <p>Federal requirements specify minimum dimension of 18 linear feet and minimum square footage of 360.</p> <p>Present area: 368 sq. ft.</p> <p>consultant recommends 420 sq. ft .</p>	<p>Image intensifier, fracture extension, mayo stand, preparation table, medicine cart, instrument table, operating table, operating table, linen hamper, gas machine, kick bucket, stool.</p>

Operating room 4	<p>Urology (95%); Kidney stones. Special operating room equipped with fixed X-ray equipment</p>	<p>Special operating room table (cysto table), built in X-ray, mayo stand preparation table, instrument cart, instrument table, operating table, linen hamper, gas machine, kick bucket, stool.</p>
Recovery room	<p>For post anesthesia recovery of maximum of 8 surgical patients on stretchers 36" W. x 86" L. Provide head to wall orientation of stretchers, with gas suction, emergency call, and blood pressure cuff, wall mounted for each patient. Provide 14" shelf along head wall 30" H., as continuous work counter.</p> <p>Nurses charting and work area : Space for charting, forms execution and communications. Provide 8 linear feet of 24" wide sit down counter, pull out drawers underneath; one two drawer file cabinets, 15"x24"; 2 straight chairs. Space for pneumatic tube station. Centrally located to open area.</p> <p>Medications Preparation alcove: Space for two nurses preparing medications at self contained medicine work station, 20"D.x 48"W., x 80" H. Recommended 40 sq. ft.</p> <p>Clean Supply Area: For storing clean supplies used in recovery. Space for two supply carts, each 25" W.x53" L.; one linen cart 25" W. x 50" L.; one wrist blade controlled lavatory and miscellaneous clean items and equipment, such as heat lamps, etc.</p>	<p>IV stands, stretchers carts, sink, counter, shelves, cabinets</p> <p>Charting space, counter, file cabinets, chairs, pneumatic tube station.</p> <p>work station,</p> <p>supply carts, linen cart, lavatory.</p>

Room Designation	Activity-criteria for space assignment	Interior component
	<p>Soiled supply area: for temporary holding of soiled supplies awaiting pick-up by decontamination. Accomodate pick-up flow from corridor side only. Space for flushing rim clinical sink, 22" x 25"; mop service basin, 24"x24"; two wire carts for soiled pick-up each 25"W. x 25" L. x 58" H.; and miscellaneous janitor equipment. Wall-mounted shelves 12" W. x 60" L.</p>	<p>sink, basin, carts, shelves.</p>
Oral surgery	<p>Dental 40%, lazor treatment 10%, endoscopy 50% & gastroscopy Works as extension of emergency department at night. Present occupancy rate 30% Present area: 339 sq.ft.</p>	<p>Dental chair, operating table, IV stand, linen hamper, sink, counter.</p>
Administrative control center	<p>Space for one clerk working at 24" W. x 48" L. desk. containing communications console; two filing cabinets, 15"x24"; operating room status board; and operating room scheduling board. Pneumatic tube station. present area: 390 sq. ft.</p>	<p>desk, filing cabinets</p>
Scrub Alcove	<p>Located between each two operating rooms. Space for four scrub sinks, each 22" x 28", knee operated, and four persons scrubbing simultaneously. Recommended area 8"x10" present area: 56 sq.ft.</p>	

Lounge	Space for peaks of five physicians and six nurses. provide 15 sq. ft. each.	pantry, table, dining chairs, lounge chair counter, sink.
Doctors charting & Dictating area	Two open cubicles with built in 20" counter. One straight chair, 17" x 19". 4' x 5'	work area, chair
Doctors' lockers	Space for 40 lockers (10 additional above present staff of 30 surgeons, for visitors and growth) each locker 12" x 16" x 72". Space for 4 doctors simultaneously removing soiled scrub &/or coats & shoe cover & donning scrub dresses & clean shoe cover. Space for one shower, 3'x3', one urinal, one water closet; and one lavatory. One mobile exchange cart, holding clean scrub dresses & shoe covers. To avoid contamination of operating suite clothes, the changing rooms should be divided into clean and less clean areas. All ordinary clothing should be removed in the less clean area before putting on theatre clothes.	Lockers, 2 linen hampers (31"x31") chairs, cart (25"x53") 4 benches 16"x60" bulletin board, Telephone, intercom.
Large equipment storage	Space for various apparatus and large equipments, e.g., four gas machines (2"x3"), defibrillator (2"x3"), Divide into units of 80 sq.ft., each to serve two operating rooms.	shelves
Clean supply receiving rm (delivery from supply area below)	Space to accommodate rail dip section and maximum of two carts each, 25"x53". Estimate 150 sf.	

PROBLEM STATEMENT - OBJECTIVE

Of the errors which became evident during this study, poor space planning in shape of underdimensioned rooms is one of the most prominent. The following list presents both problem statements and design objectives. These have been listed according to priority of the objectives and have been divided into two groups.

Group A includes the space planning problems in shape of underdimensioned rooms and rooms or areas which have been disregarded in the original planning. Group B includes other design considerations in terms of the selection and arrangement of the interior components and equipment, circulation and traffic pattern, human and ergonomic factors, illumination, color, etc.

A. SPACE PLANNING - EXPANSION & ADDITION

Since the functional organization calls for centralized facilities surrounded by other departments (page), the design must respond to this grouping of activities. The existing Intensive Care Unit is remote from the operating suite and requires transporting of patients from a public corridor.

IT IS SUGGESTED TO EXPAND THE EXISTING STRUCTURE TO THE EAST SIDE OF THE BUILDING TO ACCOMMODATE 4 ROOMS, WITH SUPPORTING AREAS, FOR CRITICAL CARE.

The existing central supply is located in the basement and requires transporting of weekly supplies to the storage area in the operating suite level, which is remote from the operating suite. Q. A-10, A-13

IT IS SUGGESTED TO ADD A CENTRALIZED STORAGE SPACE FOR DRESSINGS, MANUFACTURED AND STERILIZED SUPPLIES, AND EQUIPMENT.

Presently, the storage area for gas machines and various apparatus is nonexistent and this equipment has been stored in the clerk area. Q. C-7, A-9

IT IS RECOMMENDED TO ADD STORAGE SPACE FOR FOUR GAS MACHINES, VARIOUS APPARATUS, AND LARGE EQUIPMENT.

The changing area should comprise two divisions: a cloakroom for removing and donning street clothes, and rooms for changing to and from theater clothing. The existing physicians' locker room is not large enough for such provisions. Q. A-7

IT IS RECOMMENDED TO EXPAND THIS ROOM TO ACCOMMODATE TWO DIVISIONS WHICH WOULD ALLOW FOR 4 PHYSICIANS TO BE SIMULTANEOUSLY CHANGING THEIR CLOTHES. IT IS ALSO RECOMMENDED TO ADD BENCHES AND SHELVES, AND TO CREATE A MORE ATTRACTIVE INTERIOR ENVIRONMENT.

The existing work room and instrument storage does not satisfy the present work load. Q. A-11, A-12, B-13

IT IS SUGGESTED TO EXPAND THE WORK ROOM WITH INSTRUMENT STORAGE TO ACCOMMODATE 4 MORE LINEAR FEET OF WORK SPACE AND CABINETS.

Operating Room 2 is not large enough for routine orthopedic operative cases, and the present size of Operating Room 3 does not accommodate image intensifier and fracture extension. Q. A-3

IT IS SUGGESTED TO EXPAND OR 2 AND OR 3 TO ACCOMMODATE SUCH OPERATIONS.

The existing clean-up room is not large enough for 2 nurses to work simultaneously.

IT IS RECOMMENDED TO EXPAND THIS ROOM FOR SUCH ACTIVITY.

The existing scrub alcoves do not satisfy the present work load, they are too moist and there is splash soiling. Furthermore, there is no visual separation between the alcoves and the clerk area. Q. B-8, B-9

IT IS RECOMMENDED TO EXPAND THIS AREA TO CREATE SPACE FOR 4 PERSONS TO BE SCRUBBING SIMULTANEOUSLY AND TO CREATE A VISUAL BARRIER TO DELIMIT THE VIEW FROM THE CLERK AREA.

The existing situation does not provide space for charting and dictating for physicians. Q. B-12

IT IS RECOMMENDED TO ADD OPEN CUBICLES WITH BUILT-IN COUNTERS FOR THE DOCTORS' CHARTING AND DICTATING AREA AND TO PROVIDE A TELEPHONE AND A TABLE LAMP FOR EACH WORK SURFACE.

Presently, there is no space provision for specimens. Q. A-18

IT IS RECOMMENDED TO PROVIDE A 3' x 2' STORAGE SPACE FOR SPECIMENS.

The existing janitor room does not satisfy the present need.

IT IS RECOMMENDED TO EXPAND THIS ROOM TO ACCOMMODATE MORE SPACE FOR CLEANING EQUIPMENT AND SHELVES.

B. OTHER DESIGN CONSIDERATIONS

The existing situation demands that doctors pass through the recovery or the lounge area in order to enter the main corridor from the locker room.

IT IS RECOMMENDED TO ADD A 3' WIDE SUB-CORRIDOR FOR DOCTORS TO ENTER AND LEAVE THE LOCKER ROOM.

The existing traffic pattern does not discourage visitors, salespersons, and repair personnel, all with street clothes, from passing through the sub-sterile corridor. Q. D-4, A-4

IT IS RECOMMENDED TO CREATE SEPARATION BETWEEN CLEAN AND NON-CLEAN CORRIDOR; e.g., TO CREATE A SPATIAL LOCK TO PREVENT PEOPLE WITH STREET CLOTHES FROM PASSING THROUGH THE SUB-STERILE CORRIDOR.

The OR floor is cluttered, hard to clean, pitted, and the color is dark. Q. B-2, B-3

IT IS RECOMMENDED TO REPLACE THE EXISTING FLOOR COVERING TO SATISFY THE PRESENT STANDARDS.

There are not adequate systems to keep lines and tubing (electrical cords, suction tubing, etc.) off the floor. Q. B-5

IT IS SUGGESTED TO INSTALL A CEILING-MOUNTED UNIT FOR SUCH PROVISIONS.

The suite can not be kept secure by exclusion when not in use. Q. A-26

IT IS SUGGESTED TO ADD LOCKS TO THE DOCTORS' AND THE NURSES' LOCKER ROOMS.

Communication with other parts of the hospital with the intercom is not adequate. Presently, communication is done by telephone.
Q. A-17

IT IS RECOMMENDED TO REPLACE THE INTERCOM SYSTEM.

The existing sub-sterile corridor illumination is not adequate.
Q. A-16

The existing number of electrical outlets in operating rooms does not provide flexibility. Q. B-4

There is no adequate liquid waste disposal. Q. D-2

The suite temperature is not consistent and noise from equipment in the operating rooms creates a problem.

QUESTIONNAIRE:
EVALUATION OF THE SURGICAL SUITE
ST. MARY HOSPITAL

A. Administration

1. Is the number of ORs consistent with the present work load?
①=just right 2=too many 3=too few
2. For general-use ORs, is the size adequate?
①=just right 2=too large 3=too small
3. For the dedicated ORs (cardiac, vascular, genitourinary, eye, orthopedic, and others) is the size adequate?
1=just right 2=too large ③=too small
4. Is the traffic pattern within the suite a good one?
1=convenient and good 5=2 and 3
2=inadequately planned 6=2 and 4
3=congested ⑦=2, 3, and 4
4=not conducive to asepsis 8=3 and 4
5. Is there adequate office space for supervision?
①=yes 2=no
6. Is there adequate space for typists and other clerical workers?
①=yes 2=no
7. Is the suite dressing area and disbursement space for OR dress, shoe covers, etc, adequate?
1=yes ②=no
8. Is there a separate entrance to the suite for staff in street clothes?
①=yes 2=no
9. Is there adequate storage for items used in suite?
 - a. case carts 1=yes ②=no
 - b. electronic equipment 1=yes ②=no
 - c. gurneys 1=yes ②=no
 - d. spare bundles and supplies 1=yes ②=no
 - e. other 1=yes ②=no
10. Is the relationship to other areas convenient?
 - a. recovery room ①=yes 2=no 3=doesn't have one
 - b. blood gas laboratory 1=yes ②=no 3=doesn't have one
 - c. frozen section lab ①=yes 2=no 3=doesn't have one
 - d. lounges ①=yes 2=no 3=doesn't have one
 - e. central sterile supply 1=yes ②=no 3=doesn't have one
11. Is the arrangement and type of storage for sterile supplies adequate?
 - a. linens 1=yes ②=no
 - b. instruments in reg. use 1=yes ②=no
 - c. specialty instruments 1=yes ②=no
12. Is the arrangement for preparation of sterile supplies adequate?

- a. linens 1=yes 2=no
 - b. instruments in regular use 1=yes 2=no
 - c. specialty instruments 1=yes 2=no
 - d. mostly carried out in central sterile supply 1=yes 2=no
13. If transport of sterile supplies is necessary, is it adequate?
 1=yes 2=no 3=Is there adequate space in the suite for emergency instrumentation?
 1=yes 2=no
14. Is the arrangement for postoperative decontamination adequate?
 a. linens 1=yes 2=no
 b. for instruments 1=yes 2=no
15. Are the administrative arrangements for suite house-keeping convenient?
 a. floor care 1=yes 2=no
 b. other 1=yes 2=no
16. Is climate control adequate? (See also OR section)
 a. suite temperature 1=yes 2=no
 b. suite humidity 1=yes 2=no
 c. general illumination 1=yes 2=no
 d. odor control 1=yes 2=no
 e. noise control 1=yes 2=no
17. Are the communications adequate?
 a. intercommunication with control station 1=yes 2=no 3=no control station
 b. communications with:
 1. laboratory 1=yes 2=no
 2. x-ray 1=yes 2=no
 3. sterile services 1=yes 2=no
 4. others (list) 1=yes 2=no
 3=no others
18. Is there a convenient specimen storage space? 1=yes 2=no
19. Is there refrigeration for blood storage? 1=yes 2=no
20. Is there a solution warmer? 1=yes 2=no
21. Is the preoperative holding area?
 1=just right 2=too large 3=too small 4=nonexistent
22. Is there adequate privacy in the holding area?
 1=yes 2=no 3=n/a
23. Are there adequate services in the holding area, eg, suction, O₂, light?
 1=yes 2=no 3=n/a
24. Is the use of hallway color (circle choice)
 Bad 1 2 3 4 5 6 Good
25. Is anesthetic gas residue adequately removed? 1=yes 2=no
26. Can door traffic be controlled? 1=yes 2=no
 a. by locks? 1=yes 2=no
 b. with observation windows? 1=yes 2=no
27. Is there adequate sterilization equipment for routine use?
 1=yes 2=no 3=largely done in sterile supply
 4=for wrapped instruments

28. Is there adequate flash sterilization equipment?
①=yes 2=no
29. Is the location of the flash sterilizer(s) proper for asepsis? ①=yes 2=no
Is it proper for convenience? ①=yes 2=no
30. Are there outpatient surgical facilities? ①=yes 2=no
31. Is there special access for outpatients? ①=yes 2=no
32. Are there spaces for visitors (eg, repair personnel)?
1=yes ②=no

B. Individual OR Design

1. Is the storage space in the OR?
1=just right 2=too large ③=too small ④=nonexistent
2. Is the OR floor a problem?
a. cluttered, hard to clean ①=yes 2=no
b. pitted ①=yes 2=no
c. tiles loose 1=yes ②=no
3. Is the color of floor good for finding dropped needles and other items? 1=yes ②=no
4. Are the wall services adequate?
a. electrical 1=yes ②=no
b. timing (clocks) ①=yes 2=no
c. suction ①=yes 2=no
d. view boxes ①=yes 2=no
e. compressed air ①=yes 2=no
f. anesthetic gases ①=yes 2=no
5. Are there adequate systems to keep lines and tubing off the floor?
a. electrical cords 1=yes ②=no
b. suction tubing 1=yes ②=no
c. other 1=yes ②=no
6. Does this arrangement facilitate floor care?
1=yes ②=no
7. Are wall and ceiling color and decor restful to the eyes?
①=yes 2=no
8. Scrubbing
a. Are the scrubbing facilities adequate? 1=yes ②=no
b. Are the scrubbing facilities properly located? 1=yes ②=no
c. Is there observation during scrubbing? ①=yes 2=no
9. Is the scrub room too moist? ①=yes 2=no
Is there splash soiling? ①=yes 2=no
10. Is the monitoring equipment properly located? ①=yes 2=no
11. Is there a room for pump and monitoring equipment?
1=yes ②=no
12. Is there an adequate desk for charting? 1=yes ②=no
13. Is there table space for opening preparation materials?
1=yes ②=no
14. Is there a backup hot and cold water system for the heart pump?
1=yes ②=no
15. Room illumination
a. Is general lighting

- (1) adequate ①=yes 2=no
- (2) sufficiently controllable? ①=yes 2=no
- (3) adequately arranged for
 - (a) scrub nurse? ①=yes 2=no
 - (b) circulating nurse? ①=yes 2=no
 - (c) anesthetist? ①=yes 2=no
 - (d) housekeeping? ①=yes 2=no
 - (e) locating dropped needles and other items? ①=yes 2=no
 - (f) patient comfort? ①=yes 2=no
- b. Is task light (surgical light)
 - (1) adequate in amount? ①=yes 2=no
 - (2) adequate in brightness control? ①=yes 2=no
 - (3) adequate in pattern size? ①=yes 2=no
 - (4) adequate in pattern shape? ①=yes 2=no
 - (5) adequate in shadow reduction? ①=yes 2=no
 - (6) adequate in heat control? ①=yes 2=no
 - (7) adequately flexible? ①=yes 2=no
 - (8) adequate in positioning method? ①=yes 2=no
 - (9) easy to position? ①=yes 2=no
 - (10) stable? ①=yes 2=no
- c. Is illumination of secondary operative site adequate? ①=yes ②=no
- d. Are all illumination sources easy to clean? ①=yes 2=no
- e. Does the emergency switchover system for use in case of primary power failure conform with standards? ①=yes 2=no
- f. Is the relamping simple? ①=yes 2=no
- g. Is television coordination with the task light fixture adequate? ①=yes ②=no
- h. Are there sources of glare in the room? ①=yes ②=no

C. Anesthesia

- 1. Is there adequate office space for anesthesia staff? ①=yes ②=no
- 2. Is the office space convenient for control supervision? ①=yes ②=no
- 3. Is the space accessible to the recovery area? ①=yes ②=no
- 4. Is there space for technical procedures? ①=yes ②=no
- 5. Is there an adequate workroom? ①=yes ②=no
- 6. Are there space and a provision for decontamination? ①=yes ②=no
- 7. Is there adequate central storage space? ①=yes ②=no
- 8. Are there adequate piped gases? ①=yes 2=no
- 9. Are the piped gases properly located? ①=yes 2=no
- 10. Is there a centrally observable alarm system? ①=yes 2=no

11. Is there adequate provision for management of exhaust? ①=yes 2=no
12. Is there adequate storage space for tanks? ①=yes 2=no
13. Is there an adequate "panic system"? ①=yes 2=no
14. Is there a centralized-call public address system to all rooms? ①=yes 2=no
15. Are there clean and soiled work spaces? ①=yes 2=no

D. Housekeeping

1. Is there adequate storage? 1=yes ②=no
2. Is there adequate liquid waste disposal? 1=yes ②=no
3. Is there adequate space for changing clothes? ①=yes 2=no
4. Is there suitable traffic control for personnel leaving and returning to the suite? 1=yes ②=no
5. Is the facility for changing filters
a. controlled by meters indicating need? ①=yes 2=no
b. accessible? 1=yes ②=no

E. Security

1. Can the suite be kept secure by exclusion when not in use? 1=yes ②=no
2. Is the suite design compatible with an adequate fire plan? ①=yes 2=no
3. Can dangerous drugs be kept secure? ①=yes 2=no

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ST. MARY HOSPITAL
SURGERY SUITE

by

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AN ABSTRACT OF A MASTER'S REPORT
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This report will cover the review of the current physical facilities in surgery suite in St. Mary Hospital, Manhattan, Kansas. It will address the condition of the current physical facilities in the above area and option for their updating and future development.

The report will be separated into three parts:

1. investigating-- acquiring, digesting, and presentation of information on current physical characteristics of above area.
2. synthesis--determining, creating, and inventing solutions.
3. selection of physical arrangements.

The criteria will be according to present hospital standards and codes and four different evaluation methodology (archival records, physical environmental checklist, semantic differential, and open ended interview).

This report develops part 1 and lay the ground work for part 2 and 3, which will be presented in graphic form.