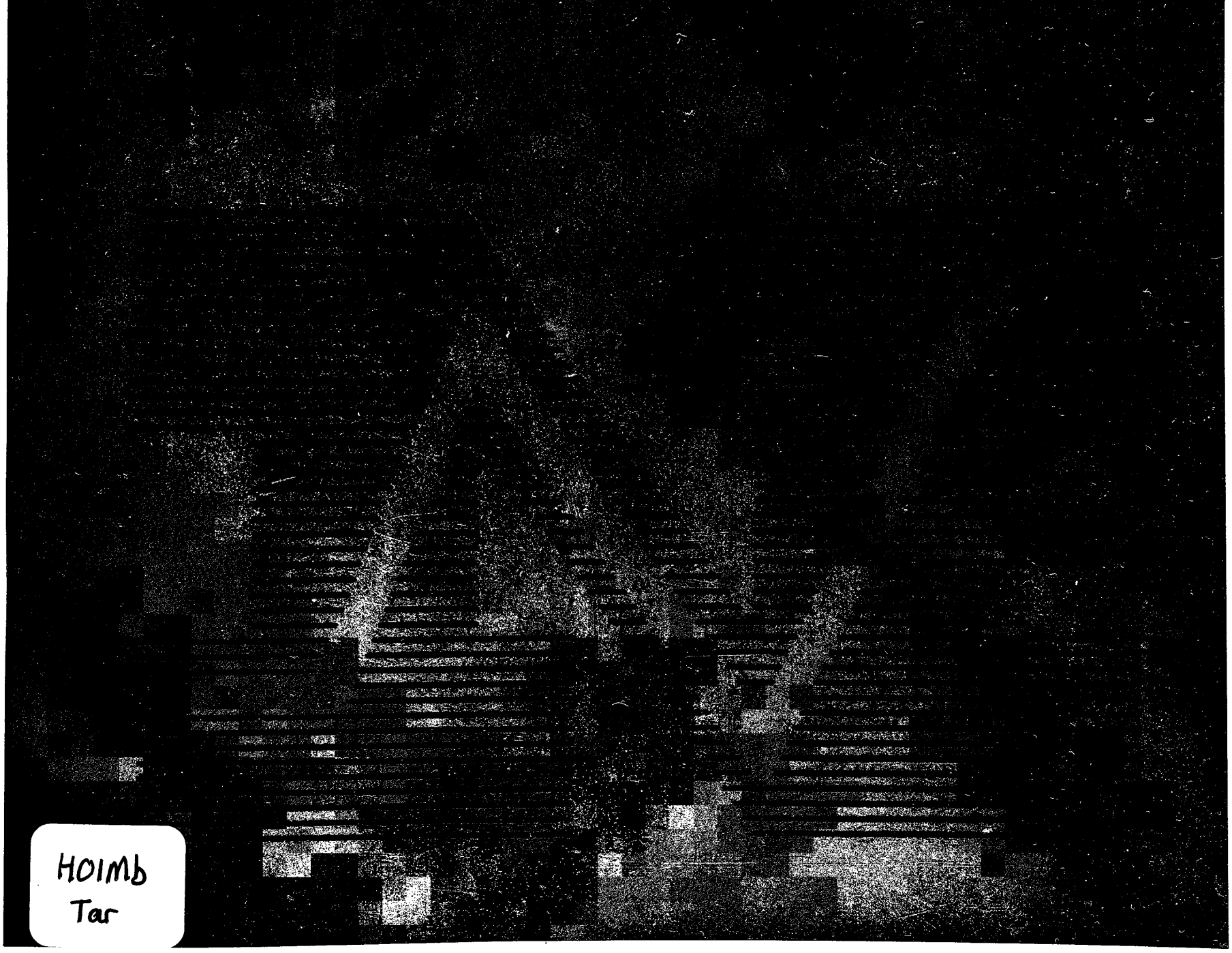
KING'S FUND NHS TRAVELLING FELLOWSHIP: AN EXAMINATION OF ESTATE MANAGEMENT TECHNIQUES IN AMERICAN HOSPITALS

PROJECT REPORT



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A C K N O W L E D G E M E N T S

I am very grateful to the King's Fund for the award of the Travelling Fellowship and thus providing me with the opportunity to examine the American Hospital Estate Function. I would also like to thank the Northern Regional Health Authority for their support in allowing leave of absence to make the visit and for the necessary additional financial backing.

Clearly, the project would not have been possible without the co-operation of a large number of people in the Hospitals visited and in other allied organisations. The people involved are too numerous to mention but all gave generously of their time and information on their particular field and for this I am most grateful. One person in this group I must single out is Mr John Crowley, the Administrative Engineer at St John's Hospital, Lowell. John spent much time and effort arranging contacts and meetings and provided me with a great deal of background information, his efforts on my behalf were much appreciated. I must also thank Sister Maria Loyola, the President of St John's for her hospitality in allowing me to use the Hospital as my base of operations.

Last but my no means least I would like to thank Miss Marjorie Harrison at the NRHA for her skill and patience in helping me to put this report together.

R P TARKENTER
Estate Planning Officer
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I N D E X

1 INTRODUCTION

The introduction in January 1989 of the Government's White Paper 'Working for Patients' heralded a new and more commercially based system of operation for the whole of the NHS. In common with other Health Authorities, the Northern Regional Health Authority set itself the task of interpreting the Government's intentions and sought to create a new framework that would provide an enhanced level of service for all the patients in the Region. Early indications were that all aspects of estate management would need to be examined in the light of the projected move towards a more commercial environment. It was assumed that the introduction of service contracts and capital charging would induce Hospital Managers to search for ways in which all the physical assets could be more efficiently utilised and in the search for examples of a more market-led style of operation, it seemed appropriate that a close examination should be made of the American model by estates staff. Enquiries soon revealed that there was no shortage of literature covering a wide range of clinical matters, health system management and finance etc but that very little useful data could be found that addressed itself specifically to estate management. The next logical step seemed to be to enquire how up-to-date information on estate management techniques in American hospitals could be obtained and these enquiries led to the King's Fund NHS Travelling Fellowship.

The prospect of visiting a small number of hospitals in the USA demanded the production of a carefully prepared plan of operation and this plan appeared to consist of two basic elements,

1 the type and location of establishments to be visited

2 the range and depth of information to be sought

The American Hospital Association Guide to the Health Care Field lists hospital by State and gives basic information on bed numbers, throughput, medical services offered etc. In looking through this list and considering local factors such as climate, geography, demography etc the New England states seemed the most appropriate area to visit and Massachusetts offered the best choice of hospitals.

Appendix No 1 gives a breakdown of the hospitals in Massachusetts and after considering this data and the types of medical services offered, the list of nine hospitals shown at Appendix No 2 was drawn up. This appeared to be a representative sample of the various types of hospitals in Massachusetts. The tenth hospital, St Joseph in Nashua, was added to the list during the project as will be explained later. Contact was then made with the American Society for Hospital Engineering sited at the American Hospital Association Headquarters in Chicago, Illinois and contacts were subsequently arranged with appropriate Estates Officers at all the nominated hospitals.

Deciding which hospitals to visit and making the necessary arrangements proved to be a relatively straight forward exercise, but deciding the range and type of information to be gathered during the project presented a few more problems. Initially a series of questions was drawn up which centred solely on estate matters, however, when considering the position in relation to a British hospital, post White Paper, it soon became apparent that this was too narrow a view. Once the proposed legislation is implemented, it will be essential for the estate to be fully integrated in the business plans of the new NHS Trust or in the District-monitored hospital. It was also borne in mind that the NRHA was at that time conducting a Regional Services Review and in visioning the future there were strong suggestions that the new Core Activities would be undertaken through corporate groups or multi-disciplinary team working. Thus Estates Officers at Region as well as at District and Unit level will need to have knowledge of a broader range of activities than hitherto. It thus seems sensible to seek information that would allow the estate operation to be seen in the context of a hospital as an operating unit, within the State/Federal regulatory framework, as well as the commercial environment. With this new remit, the questionnaire was drawn up.

The views of colleagues within the Northern Region and elsewhere were sought and comments taken on board, the final document being sent out to all the previously identified Estates Officers at the nominated hospitals some weeks ahead of the visit.

2 FIRST IMPRESSIONS

On arrival in the USA arrangements were confirmed for meetings with those engineers to whom the questionnaires had previously been sent. In addition, further arrangements were made to extend the range of enquiries to include the views of a number of hospital finance officers, planners and administrators, the intention being to provide an authoritative base for some of the general and financial topics on the questionnaire.

It soon became evident that arrangements for providing the full range of health care services in the USA are much more fragmented than in Britain. There are a wide range of providers specifically targeted at the health care business as well as those like architectural and engineering consultants, who organise themselves to work both in the health care field and in a wider commercial market.

In order to get a better grasp of these complex arrangements, the organisations listed at Appendix No 3 were either visited or contacted and information obtained. An outline of the various roles played by these organisations will be described within this report.

The general consensus obtained from the interviews and other additional data was that health delivery systems in the USA have undergone dramatic changes during the last ten years. During this period hundreds of hospitals have closed (1). In 1987, 70 hospitals closed and in 1988 the number was increased by a further 102, comprising of 89% community units (41 not for profit, 31 investor owned, 9 state or local government) and 21 non-community units. As costs have increased, employers, insurance companies and Government authorities alike sought ways to reduce charges.

In 1988 a complex package of measures was introduced by the state authorities in Massachusetts with its Universal Health Care Law - Chapter 23. The broad aim of this new law is to improve access to health care for the people of Massachusetts; re-design the hospital payment system; address the problems of hospital capacity control and introduce health insurance market reforms.

(1) The Facts - Hospitals in New Hampshire 1980-1987
published by the New Hampshire Hospital Association pl

The centre piece of Chapter 23 is the idea of universal access. This was also the guiding principle behind the Basic Health Benefits for All American Act introduced by Senator Edward Kennedy (Democrat MA) and Representative Henry Waxman (Democrat CA) in spring 1989. The Kennedy/Waxman initiative maintains the concept of a federally mandated, employer paid minimum package of health insurance benefits for all American workers. In addition the new proposals would expand the Medicaid programme to provide comparable health benefits for all uninsured Americans who are not employed or dependents of employees or who do not have access to existing public programmes. If the bill becomes law, every American would be covered by a private or public insurance plan by the year 2000. The bill was approved in July 1989 by the Senate Labor and Human Resources Committee and is awaiting further action.

Across the USA utilization of hospital services has been shifting from inpatient to outpatient treatment since 1983, the year that the Medicare Prospective Payment System was implemented. This trend is expected to continue as advanced technology allows for safer practice under these new arrangements. Hospital utilization has also been affected by a number of other factors such as the increase in managed care organisations, and the rapid development of alternative delivery systems such as surgical centres and clinics.

A common point made by finance officers during discussions was that the level of reimbursement for treating Medicare patients continues to be inadequate, and the system of reimbursement is frequently altered to the disadvantage of the hospital. All these problems put pressure on hospital management to seek ways to reduce costs.

The general view on hospital management problems encountered during the project is perhaps best summed up in the New Hampshire Hospital Association report for the period 1980-82 with the words

> But the pressures that have been evident throughout this decade are certain to accelerate, no matter how efficient hospitals become in the way in which they provide services, inadequate hospital reimbursement will continue to undermine the vitality of hospitals .....

This gloomy prediction was given in spite of the fact that in the report, the hospitals in New Hampshire were shown to have performed well across a range of indicators when compared with others in New England and against US averages.

One reason frequently put forward for New Hampshire's relatively good performance is that theirs is a less regulated and more "home-rule" approach to planning and regulation. By contrast Massachusetts is stated to be over regulated and bureaucratic, however, there was a general acceptance that Massachusetts seeks to establish and maintain high standards and these are frequently adopted by other sites, or used as a quality bench mark.

In an effort to try and define some of these differences, arrangements were made to visit St Joseph Hospital, Nashua, NH. A number of these differences will be shown in the report and it will also be shown that in the Estate field the two states have more in common than they have differences.

It was also made clear that the provision of health care services in the USA is a highly organised and complex system, involving a great deal of statutory and voluntary regulation. At best it appears that high quality health care is being delivered in accommodation that is well designed for its purpose, aesthetically pleasing and very well maintained. At worst it is a system that appears to have lost its way and is struggling to survive; in these instances, the hospital accommodation is poorly maintained and lacks many of the features considered essential in modern American hospitals.

The differences between these two extremes were seen to be most marked when comparing the acute high tech private hospital with the public long stay institution.

3 THE ROLE OF THE STATE IN THE PROVISION OF MEDICAL SERVICES

It was made clear during the visit that the various states play a significant role in the provision of health care services for their populations and that this role has been increasing in recent years.

In 1974 the federal authorities introduced the National Health Planning and Resources Act (Public Law 93-641) which was intended to establish the structure and support for health planning. Under this law agencies were to ensure a systematic development of resources especially new technology. At state level, planning was to be conducted by Health Systems Agencies (HSAs), governed by local citizens on a board having a consumer majority. Under the law a distinction is made between consumers and providers of health care services. For the most part consumers are lay citizens who do not have a policy making or fiduciary role in health institutions. The Act was intended to link health planning more closely to decisions about the allocation of health care resources by having local (not necessarily state-wide) HSAs advise public and private decision makers about the needs and priorities of an area for health programmes and services.

The HSAs are non-profit making organisations and in the state of New Hampshire, United Health Systems Agency (UHSA) Inc was appointed to this role in 1974. When set up the Agency was given the remit -

> "To promote development of a system of health service, manpower and facilities in New Hampshire which in consideration of the needs and resources of the state and its several regions will meet identified needs, promote efficiency and assure that quality health services are available and accessible to all residents in a manner which maintains continuity of care at a reasonable cost ....."

UHSA were also charged with producing a comprehensive Health System Plan (HSP) and their plan which was adopted by the Department of Health Services Planning and Review Board in 1978 described the health status of New Hampshire citizens, listed health care resources, as well as outlining goals and objectives for improvement of status and further development of the health care system in the succeeding five years.

The Agency also reviewed the states Certificate of Need (CON) Law. The purpose of the CON Law has been described by the Acting Director of Health Services Planning and Review as being "to ensure that health planning is state driven rather than being providers driven".

As part of its planning programme, the Health Services and Planning Review Board determines the needs for services and develops standards for acute and long term care. The Board then invites bids to meet the needs identified in the standards from providers through the CON process. In the current climate this is considered to be something of an academic exercise, as competition is so keen and hospitals are trying to expand their base into specialist areas that will produce income. If there is a need, hospital planners and administrators will be aware of it. Thus providers seeking to develop new programmes or expand their physical plant must obtain permission from the Review Board, through a CON application, or risk being denied reimbursement.

The CON review process is conducted in a quasi-judicial manner with applicants being sworn in at a public hearing at which the Review Board sits in judgement. At this hearing, competing local providers or other interested parties can put their case and these objectors could come from other states where the project affects an area adjacent to state boundaries.

If the applicant disagrees with the Board's decision they may file for a reconsideration. The Motion for Rehearing and Reconsideration must explain why they believe a new hearing is necessary, ie they must identify new information that only became available after the hearing and/or the procedural errors they believe occurred. If the reconsideration hearing is granted, the applicant and the opposition are provided with equal time to present their case. Following the reconsideration hearing the Board issues its final decision.

If the applicant continues to disagree with the ruling they may appeal to the State Supreme Court. The Supreme Court review is carried out against a more legal framework and the decision is final.

In filing their application, providers have to give the Board comprehensive information about the proposed facility. Guidance material is provided to assist the applicant in detailing:

1 The rationale behind the project, planning process used and various alternatives investigated and the reason for rejection.

2 Five years historical and five years projected utilization rates for all major specialities and showing type of payer ie Medicare, Private etc. Towns covered by the project are to be listed, including cross state flows; travel times and distances and road conditions, market share projections and methods calculating this.

3 Population needs for the project with reference to appropriate service planning standards.

4 Staffing patterns, listing FTE for all main staff categories including professional Medical, Nursing, Administration and Estate Maintenance and these are to be projected for a period of three years.

In reviewing this application the Board are anxious to ensure that there will be no duplication of services as a result of the project. Duplication of service is seen by the state and federal authorities as being an inefficient use of resources that will automatically lead to increased cost and hence increased charges. The 'need' for the new service must thus be very clearly demonstrated by the applicant, otherwise the CON will be rejected.

Examples of recent applications to the New Hampshire Health Services Planning Board are shown at Table No (1).

Occasionally the Board may recommend that two or more providers form a partnership where an application cannot be accepted from a single provider. Recent examples of this arrangement is in the provision of MRI services. In a number of cases separate companies have been set up to run a mobile MRI service for several local hospitals. This then only requires patient reception and vehicle docking arrangements to be provided at each of the hospitals concerned. In the hospitals visited that used this system, the mobile unit is attached to the hospital building at an appropriate point by a short flexible bridge section. The mobile facility thus becomes an integral part of the hospital's structure and services and patients do not have to leave the building.

At Worcester, in central Massachusetts, a number of health care providers came together and obtained a Certificate of Need for a new MRI. A new company was formed and purpose built accommodation provided adjacent to the University Medical Centre.

In its annual report dated November 1989 New Hampshire Health Services Planning and Review Board reviewed the current general conditions and projected trends to the year 2000 and for acute care these are shown at Appendix No (4).

In compiling this data the New Hampshire Office of State Planning projects an annual population growth of 2.4% to the year 2000. During this same period, the New Hampshire Office of Health Services Planning and Review projects a decrease in hospitalizations of 77% per year. This is based on national trends for states similar to New Hampshire. This supports New Hampshire trend data and also the general consensus that technology and consumer awareness are resulting in fewer in-patient hospitalizations.

CERTIFICATE OF NEED APPLICATIONS

HEALTH SERVICES PLANNING AND REVIEW
BOARD DECISIONS 1988

EXHIBIT 1

TYPE	APPLICANT	PROJECT	COST	DECISION
CCRC	KENDAL MANAGEMENT SERVICES	62 BED NURSING COMPONENT	$4,670,974	A
LTC	THE HOMESTEAD - COURVILLE	47 BED FACILITY	$1,576,949	A
LTC	CLIPPER OF ROCHESTER	41 BED CONVERSION	$1,425,250	A
LTC	DOVER HEALTH CARE	140 BED FACILITY	$3,880,000	D
LTC	DOVER HOUSE HEALTH CARE	50 BED ADDITION	$1,408,767	D
LTC	MADBURY NURSING HOME	100 BED FACILITY	$4,761,549	A
LTC	MEDIPLEX OF ROCHESTER	140 BED FACILITY	$4,261,932	D
LTC	DONALD STREET HEALTH CARE	60 BED ADDITION	$2,250,000	W
LTC	COURVILLE AT NASHUA	86 BED FACILITY	$4,987,240	W
LTC	INTEGRATED HEALTH SERVICES	TRANSFER OF OWNERSHIP	$3,937,083	A
MRI	NH IMAGING SERVICES	LEASE OF 2ND MRI UNIT	$0	A
AC	NASHUA MEMORIAL HOSPITAL	CONSTRUCT PARKING GARAGE	$4,600,000	A
AC	WEEKS MEMORIAL HOSPITAL	RENOVATION/EXPANSION	$1,608,000	A
AC	PARKLAND MEDICAL CENTER	RENOVATION/EXPANSION	$6,246,614	A
AC	CHESHIRE MEDICAL CENTER	RENOVATION/EXPANSION	$6,050,000	A
AC	ST. JOSEPH'S HOSPITAL	CONSTRUCT OFFICE BLDG/GARAGE	$5,430,000	A
CC	CONCORD HOSPITAL	INPATIENT CARDIAC CATH	$462,170	A
CC	EXETER HOSPITAL	INPATIENT CARDIAC CATH	$285,167	D
CC	WENTWORTH DOUGLASS HOSPITAL	INPATIENT CARDIAC CATH	$175,000	D
CC	ELLIOT HOSPITAL	INPATIENT CARDIAC CATH	$0	A
CC	ST. JOSEPH'S HOSPITAL	INPATIENT CARDIAC CATH	$430,000	A
CC	NASHUA MEMORIAL HOSPITAL	INPATIENT CARDIAC CATH	$362,000	D

KEY
CCRC - CONTINUING CARE RETIREMENT COMMUNITY
LTC - LONG TERM CARE
MRI - MAGNETIC RESONANCE IMAGING
AC - ACUTE CARE
CC - CARDIAC CATHETERIZATION
A - APPROVED
D - DENIED
W - WITHDRAWN

TAKEN FROM THE NEW HAMPSHIRE HEALTH SERVICES PLANNING AND REVIEW BOARD, ANNUAL DATA REPORT, NOVEMBER 1989

TABLE NO 1

However, national trends also result in a projected annual increase in hospitalization charges of 9.6%. At this rate, the total charges projected for the year 2000 will nearly triple 1987 levels.

Health Services Planning and Review rule He-Hea 1004.01 indicates the number of acute care beds shall not exceed 3.2 per 1000 residents statewide. Applying this rule to the estimated 1987 population yields 3383 beds. The current bed count of 3396 is in agreement with the rule. Applying this ratio to the year 2000 projects a need for an additional 1212 beds state-wide.

It is noted however that this ratio appears to be in conflict with what is actually occurring in New Hampshire.

1 The occupancy rate for acute care facilities ranges between 50% to 75% depending on facility. Excess capacity can be a major source of increased hospital costs. Some of this capacity is being absorbed by psychiatric admissions to those hospitals which are designated receiving facilities (DRFs) according to He-M 405 of the Division of Mental Health and Development Services. Also, hospitals with fewer than 100 beds have the potential to designate certain "swing" beds which can then be used as nursing beds.

2 The number of admissions to hospitals is decreasing. Technological advances not only shorten the length of stay but also provide for outpatient alternatives to inpatient admission.

3 Because communities across the state differ demographically, it is recognised that their needs may differ and any bed need formula should thus be calculated on a sub-state basis.

It is interesting to note that in 1989 an application was made by Health NorthEast based at Manchester NH to build a 90 bed hospital at Salem NH, at an estimated cost of $25.76m or £16.1m. (1) In this application the State of Massachusetts CON Space Guidelines were used, because "they incorporate several national standards and are comprehensive". (The guide for acute care services runs to some 150 pages.) There were strong objections to this application from four hospitals in New Hampshire and six in Massachusetts. The nine member Board came to the conclusion that there was no 'Unmet Need' and the application was rejected. Health NorthEast promptly applied for a reconsideration hearing, citing 37 instances of procedural error or items of new evidence.

(1) An exchange rate of $1.6 to the £ sterling is assumed throughout this report

In addition to the CON process Health Boards demand annual returns from all hospitals and licensed nursing homes. These returns cover a comprehensive range of operating and financial data including income by source, salary costs, plant operations and costs, depreciation, land and building value, assets and equipment, etc. The penalty for non-compliance (in the case of New Hampshire) is £62.50 per day of non-compliance.

Once collected, the data is aggregated under various headings, without reference to the source hospital, allowing trends and averages to be calculated. The data is then available for public use. In the case of New Hampshire, cross referencing is done with data from the adjoining states of Maine, Vermont and Massachusetts. This information is used by the state authorities to monitor health care provision standards and as part of the base data to check CON applications.

To assist with assessing the cost of new designs or adaptations the New Hampshire Department of Health and Human Services subscribe to a building cost and valuation service. This is provided by a private (for profit) company whose service includes a monthly update of cost multipliers. For June 1989 this date indicates a range of costs for a new general hospital to be from £1,126/m^2 for prestigious accommodation, ie exterior wall of marble or granite to £586/m^2 for low cost accommodation with internal walls of concrete panels or plain brick and small entrance. These costs include full mechanical and electrical services including lifts but excluding sprinklers. The heating ventilating and air conditioning (HVAC) costs are for a moderate climate Separate costs for HVAC installation indicate the range shown on Table No 2.

TABLE NO 2

AVERAGE HVAC COSTS FOR GENERAL HOSPITALS

TYPE OF ACCOMMODATION	MILD CLIMATE £/m^2	MODERATE CLIMATE £/m^2	EXTREME CLIMATE £/m^2
Prestigious	132	165	207
Low Cost	62	77	97

Their costs exclude fees and would need to be ajdusted to reflect local building costs or special site conditions and for multi-storey construction above three storeys.

Making similar comparisons by bed number the typical range is quoted as £53,438 to £128,750/bed with an average cost of £82,500/bed.

The median area per bed in general hospitals is taken as 96.2 sq m with a typical range of 58.5 to 148.6 sq m. Community hospitals, particularly teaching and newer hospitals with a higher percentage of private rooms, tend towards the higher area per bed, while older public hospitals with more ward areas and investor owned hospitals tend towards the lower side of the range.

4 REGULATORY FRAMEWORK

4.1 VOLUNTARY REGULATION

From the evidence collected during this project it appears that the American citizen lives in a highly regulated environment. The American hospital is similarly constrained, but in an effort to advance health care standards the overwhelming majority of hospital authorities have opted for an additional tier of regulation. The Joint Commission for the Accreditation of Healthcare Organisation (JCAHO) is a private, not-for-profit organisation formed in 1951 with the aim of improving the standards of care through voluntary accreditation.

The Commission is governed by a 24 man Board of Commissioners with representatives from -

the American College of Physicians
the American College of Surgeons
the American Dental Association
the American Hospital Association
the American Medical Association
plus three public members

Some 400 health care specialists are employed, including physicians, nurses, administrators, medical technologists etc, who carry out the accreditation surveys. These surveys are carried out on a three year cycle. It is the hospital's responsibility to request a survey at the appropriate time, the full fee must also be settled before the survey results are given. If surveys are not carried out accreditation; automatically lapses; thereafter reimbursement from third party payers may slow down or stop altogether.

At St John's Hospital, Lowell MA, a 250 bed acute hospital, the survey takes three days and is carried out by three JCAHO staff. An administrator is responsible for the Estate survey and hospital estates staff report that the system works quite well with the administrator being well briefed for the estate survey.

With the establishment of higher standards being accepted, the JCAHO claim a number of advantages in obtaining their accreditation, the principle ones perhaps being:

1 Third party payment is significantly expedited.

2 Government agencies favour accredited facilities in programme placement.

3 Community confidence is enhanced.

At the outset the main aim of the accreditation process was the establishment of minimum clinical standards. The proposal for establishing a system of standardisation in hospitals dates back to the Third Clinical Congress of Surgeons of North America in 1912 (1).

However, the process now covers all hospital departments and an extensive range of other health care agencies and premises.

The Joint Commission publish an "Accreditation Manual for Hospitals" (AMH) which sets out accreditation standards across twenty four service categories from Alcoholism and other Drug Dependent Services to Utilization Review. This is a 330 page document designed to be used as a means of self assessment by departmental staff, some time ahead of the visit by the Commission's survey team. This should give time to improve those areas of the service where there are doubts or reservations. The format of this assessment process is the basis of the Commission's survey report forms.

Of particular interest to estate staff is the section covering Plant Technology and Safety Management. Under this heading four standards are set, as shown below. For each Standard there are a number of Required Characteristics that describe the detailed requirements of the particular Standard. A copy of the Plant Technology and Safety Management section of the Manual is shown at Appendix No (5). The six rank scale against each of the items is used to indicate the estimated level of compliance, 1 indicating substantial and consistent compliance through to 5 indicating non-compliance. NA indicating that the item is not applicable.

Standard		**Circle One**
PL.1	**Safety Management** There is a safety management program that is designed to provide a physical environment free of hazards and to manage staff activities to reduce the risk of human injury. *	1 2 3 4 5 NA
PL.2	**Life Safety Management** There is a life safety management program designed to protect patients, personnel, visitors, and property from fire and the products of combustion and to provide for the safe use of buildings and grounds. *	1 2 3 4 5 NA

(1) See "A History of the Joint Commission on Accreditation of Hospitals by J R Roberts MD and others, P 936 Journal of the American Medical Association Vol 258, 1987.

Standard	Circle One
PL.3 Equipment Management There is an equipment management program designed to assess and control the clinical and physical risks of fixed and portable equipment used for the diagnosis, treatment, monitoring and care of patients and of other fixed and portable electrically powered equipment. *	1 2 3 4 5 NA
PL.4 Utilities Management There is a utilities management program designed to assure the operational reliability, assess the special risks and respond to failures of utility systems that support the patient care environment. *	1 2 3 4 5 NA

* The asterisked items are key factors in the accreditation process.

As can be seen at Appendix No (5) the Joint Commission use as deemed to satisfy requirement, the Life Safety Code of the National Fire Protection Association. Further reference to this code will be made later in this report.

The JCAHO publish a number of books in their Plant Technology and Safety Management (PTSM) Series. These publications are intended to guide and assist hospital staff in the process of setting up comprehensive and effective management programmes and in so doing, will satisfy their accreditation requirements.

The Plant Technology and Safety management Handbook is divided into two sections. The first outlines the background to the voluntary accreditation process, the philosophy underlying the development of standards and an overview of the PTSM standards. The second section gives a detailed appraisal of the four PL Standards outlined above, setting out basic requirements for maintenance programmes, emergency procedures, deemed to satisfy requirements, training and educational requirements, etc.

A publication designed to be used in conjunction with the JCAHO Accreditation Manual is the KIPS Survey Guide for 1989 : Hospital Accreditation Programme. This provides surveyors and hospital staff with standard specific guidelines for evaluating compliance with the PTSM specific standards. The process uses a system of Key Items, Probes and Scoring (KIPS). As an example of this system, the Utilities Management Section of the publication is reproduced at Appendix No (6); there are similar sections for the other three PL Standards.

Key items are the PTSM required characteristics that are key factors in the accreditation process. The probes are designed to examine essential elements of the PTSM programme by questioning various members of the hospital staff and by way of first hand site investigation, staff knowledge being the important criteria rather than documentation.

Answers to the probes would lead to an individual score on the scale 1 to 5 and an entry could then be made in PTSM section of the Accreditation Manual, by circling the appropriate number in the score column.

It will be noted at Appendix (5) that in the Plant Technology and Safety Management section, all the required characteristics are "key factors" in the accreditation process and thus the not applicable (NA) score cannot be used.

The accreditation process is meant to be a practical appraisal of a hospital's performance. Most of the scores reflect the Joint Commission's philosophy that a range of compliance is an appropriate measure of compliance. It is also recognised that an organisation's performance varies over time and that any attempt to measure performance absolutely would probably result in all organisations being found out of compliance.

The Survey Guide goes to some length to explain that the section on PTSM standards in the Accreditation Manual is not an "engineers chapter", nor is it made up merely of standards that can be classified as "engineering standards". Rather, the chapter consists of a set of inter-related guidelines for a management system inclusive of almost all the components of a health care organisation. It is important to note that the management system for engineering and safety functions is organisation-wide and in effect provides for four processes that fit into the workflow of the organisation. Thus, the PTSM system -

1 provides for the establishment of criteria and performance standards with which the organisation monitors and evaluates the quality of patient care. This involves the formulation and implementation of policies and procedures that address each of the key elements of the four PTSM standards.

2 effects a comprehensive process of identifying, recording and reporting all risks and hazards that may exist both locally and in the more general context. The efficacy of this process is dependent upon a number of factors including the ongoing education of personnel and effective communication between all levels.

3 provides for the integration of the PTSM functions into the organisation overall quality assurance function.

4 provides for programme evaluation and effectiveness, noting that the effectiveness of any organisation can be measured in two ways:

a by the ability to set and achieve standards

b by the ability to recognise and adapt to change

These four elements are stated to be the 'life cycle' of an organisation. They define the communication and information process required by the PTSM standards and this is shown in diagrammatic form at Enclosure No 4.1.1 - Safety Cycle.

Once established, the JCAHO recognise that the information held within a dynamic and responsive management system will not only contribute to the organisation's own effort to improve health care but to changes in health care laws, regulations and standards, as well as consumer and public attitudes.

As part of the accreditation process, organisations are expected to establish measurable standards of performance and processes designed to ensure that desirable outcomes are achieved and undesirable outcomes are avoided. In addition, the philosophy employed imposes a burden on the accredited organisation to prepare each member of staff to interact effectively with the environment and equipment.

A further useful document in the PTSM series is the Implementation of the 1989 PTSM Standards : Case Studies. The titles of the individual studies in this publication are:

1 Clinical Equipment management

2 Managing Medical Equipment with the PTSM Standards : A Biomedical Engineering Case Study

3 Utilities Management : Instituting a Monitoring System

4 Automated Environmental Control : A System for Utilities Management

5 Collecting, Processing and Presenting Safety Management Data

6 Designing a Safety Management Program

7 Life Safety Management : Bringing an Organisation into Compliance

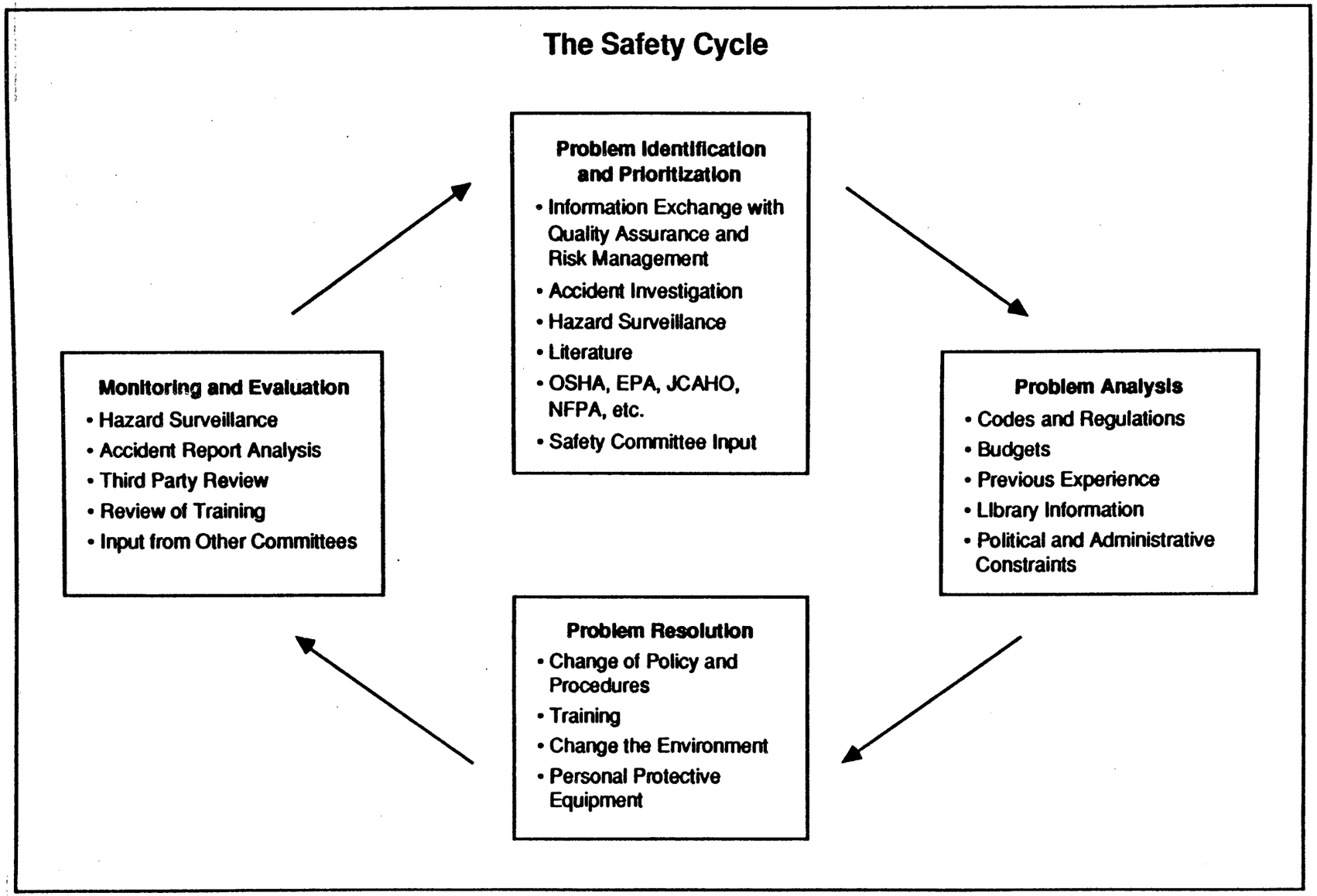

Figure 3. *An effective safety management program involves a cycle of continuing activity.*

In all but one of the studies, brief accounts are given of management programmes at a particular hospital or group of hospitals; the exception is Utilities Mangement : Instituting a Monitoring System. This contribution is provided by Mr C R Camplin, President of a firm of consultants who outlines the basic features of a monitoring system that will comply with the requirement of the JCAHO. Advice is given under the headings of system planning; inventory; component identification; preventive maintenance; response and recovery from plant failure; monitoring and evaluation, training.

The author recommends that management develop a series of indicators or thresholds, these should be measurable variables of the quality of the utilities systems and their operation. These should be developed for the particular circumstance from industry standards, professional guidelines and local knowledge. The importance of staff training is stressed as is the keeping of individual training records. The essential relationship between Utilities Management, Quality Assurance and Risk Management is also highlighted and how these elements provide a focus for efficient and effective management of the utilities that support patient care and the environment of care.

In the Autumn of 1986, a four year research programme was started. "Agenda for Change" was designed to improve the Joint Commission's ability to evaluate health care organisations and stimulate greater attention to the quality of day to day patient care. The five components targeted for development through the programme are:

1 Identification and selection of clinical indicators

2 Identification and selection of organisational and management indicators

3 Development or risk adjustment methods

4 Establishment of an on-going monitoring and evaluation process

5 Modification of survey and accreditation process

Reports on work being carried out at pilot hospitals is published three times per year in "Update" the Agenda for Change newsletter. These continue to indicate that satisfactory progress has been maintained on the project at the various hospitals throughout the USA. Information is also shared through the broadcast of "Perspectives: The Joint Commission Television Journal".

"Perspectives" is a quarterly series of thirty minute broadcasts that explore issues of common interest to hospital staff, including the Agenda for Change project. These programmes can either be received direct by Hospital Satellite Network subscribers or by video tape.

Responsibility for work on the second of the five targets listed above was given to the Organisation and Management Indicator Task Force and this work appears to be nearing completion. The September 1987 edition of "Update" indicated that during 1990 more than 5,000 hospitals accredited by the Joint Commission would initiate participation in the new monitoring survey and accreditation process. More than 3,000 mental health centres, outpatient clinics, nursing homes and hospices accredited by the Joint Commission will begin the new process during 1991.

The February 1989 edition of this newsletter detailed the work done under this heading and gave an outline of the twelve new Principles to be applied. These are:

1 Organisational Mission
2 Organisational Culture
3 Organisational Strategic Program and Resource Plan
4 Organisational Change
5 Role of Governing Board and Managerial and Clinical Leadership
6 Leadership Qualifications Evaluation and Development
7 Clinical Component of Independent Practitioners
8 Human Resources
9 Support Resources
10 Evaluation and Improvement of Patient Care
11 Organisational Integration and Co-ordination
12 Continuity and Comprehensiveness of Care

The Estate will have some involvement under a number of these headings but under Item 9 specific reference is made to:

> "Facilities, equipment and technology will be acquired and maintained in accordance with the mission statement and strategic program and resource plans. The decision-making process regarding facilities, equipment and technology is characterized by broad based participation among relevant parties."

These are only outline statements at this stage and more development work will need to be done before they have a useful monitoring system incorporating the Estate in an integrated monitoring system.

The Joint Commission provides an extensive range of guidance material to assist health care professionals seeking to maintain voluntary accreditation. The 1989 catalogue lists over one hundred publications, fourteen of which are on the topic of plant, technology and safety management. Quality assurance and related information is also well represented with thirty eight titles.

4.2 STATUTORY REGULATION

The regulatory framework described above, was designed to set and maintain standards in the field of health care provision including the estate. There are also other aspects of the more general federal or state laws, especially in the field of health and safety to which hospital authorities must also subscribe and many of these have particular bearing on the estate. These regulations are similar in many respects to those in Britain but there are also a number of interesting differences.

In Massachusetts the state and city authorities carry out a joint inspection of hospital premises. These are done on a two yearly cycle and until recently the city inspector would be checking against different Codes possibly with different requirements for the same feature. Now the city code has been abandoned and both officials seek to apply the 'State Building Code'. Normally the work is shared but the local inspector would also check car parking arrangements, outside signs etc.

The local Fire Department also carry out a quarterly inspection checking fire and safety items including sprinkler, safe storage of flammables, hazardous chemicals, rubbish etc as well as ensuring that all exits and escape routes are clear. He would also see if the fire alarm system was being maintained and tested as part of the maintenance programme, the quarterly testing of the fire alarm system is JCAHO requirement. It is a State Building Code requirement that all buildings above seventy feet or three storeys high will be protected by a sprinkler system. However, it appears to be common practice to install sprinklers even in single storey accommodation. These systems normally work off mains pressure, boosted by electrically powered pumps and all are fitted with mains pressure alarm switches.

The Department of Public Health in Massachusetts demand an annual report from the city fire department for each hospital as part of their licencing requirements. These licencing requirements also demand that where new patient areas are opened up or renovated, full Building and Fire Regulations tests are carried out, including the electrical installation. There are no periodic testing requirements for the electrical installation by the state or fire departments, however the JCAHO demands that annual tests are carried out. The State Building Code also references other Codes that are deemed to satisfy. These include a range of the National Fire Protection Association (NFPA) Codes, principally the Life Safety Code No 101 and the National Electrical Code No 70, along with the regulations of the Occupational Safety and Health Administration (OSHA) coming under the US Department of Labor.

OSHA's main responsibility is employee and general personal safety across the broad range of occupations. Typical areas covered in their regulations include means of egress; occupational health and environmental control; hazardous materials; personal protection equipment; fire protection; materials and storage; protection of portable and fixed equipment; welding and cutting and general electrical design safety standards.

With regard to the use of hazardous substances, the law demands that users:

1 give details of the substance being used to the state authorities

2 take all reasonable precautions to protect employees

3 provide full information to an employee of the substance that employee is using

The state also demands that all lifts be inspected annually by a state lift inspector; these lifts can only be maintained by certificated lift engineers. In all the hospitals visited this maintenance work was done by contractors.

All fuel burning equipment including incinerators have also to be tested annually to ensure compliance with emission standards.

Pollution via the sewerage system is also seen as a potential problem. The St John's Hospital at Lowell MA reported that they have to have their effluent and sewage tested every six months against regulations set by the Department of Environmental Quality Engineering, a federal authority. This work is carried out by a specialist company and the results sent to the Lowell Waste Water Treatment Plant. Similar requirements operate elsewhere in the state.

Incoming water supplies are also the subject of inspection. Pressure reduction valves and back flow preventors are fitted to all incoming water mains and these have to be inspected quarterly. One inspection per year must be carried out by the city inspector, the other three have to be carried out by a certificated inspector, this person could be a hospital employee or from an outside company. Considering the relatively small amount of training involved most hospitals appear to have chosen to use their own staff to do this work.

Where a hospital has its own source of potable water, the quality has to meet the standards set by the Department of Public Health and the intallation has to be regularly tested by a person not an employee of the hospital. Engineering maintenance work can only be carried out by a person with the appropriate state licence, and he can be an employee.

There are also strict licencing laws that apply to operation of steam boiler plant. Boilers working at a pressure above fifteen pounds per square inch are rated by size, and all supervising engineers and firemen must hold a current licence appropriate to their duties and the size of boiler plant they are concerned with.

An engineer with a first class licence can have charge of any size of plant. An engineer with a second class licence is allowed to have charge of a boiler or boilers each one not exceeding 105 hp or to operate a first class plant under an engineer with a first class licence. An engineer with a third class licence can have charge of and operate a boiler or boilers not exceeding in aggregate 150 hp if powered by solid fuel, or 500 hp if powered by oil, gas or electricity, or he may operate a second class plant under an engineer holding a second class licence. There is a similar classification system that applies to the licencing of firemen.

Licences are granted by the state and in Massachusetts this responsibility comes under the Department of Public Safety. The granting of a particular class of licence is conditional upon the applicant passing the state examination appropriate to that licence and having appropriate experience and training. For example, to be eligible for a first class engineer's licence the applicant must produce evidence as to his previous experience and training and must have held and used a second class engineer's licence in a second class plant for not less than one and a half years or in a first class plant as assistant engineer for one and a half years or held and used an equivalent licence in the US merchant marine service for three years or have held and used an equivalent licence from another state for three years (1).

(1) Commonwealth of Massachusetts General Law Chapter 146 Inspection of Boilers, Air Tanks and Licenses of Firemen and Operators of Hoisting Machinery - Section 49.

The examination is in two parts, a four hour written test, with a pass mark of 70%, and if successful, an oral examination of unspecified length is taken.

A general requirement is that all applicants for licences must be citizens of the United States or have filed an application for citizenship. The application must also be endorsed by an engineer or fireman holding the same or higher licence.

The Massachusetts authorities also demand that the licence of engineers and firemen be on display in the boiler room. There is also a requirement for a daily log to be kept on the boiler plant as to the condition, details of repair work etc. This log is provided by the Department of Public Safety and must be available at all times to the inspectors of that department.

Steam boilers and other pressure vessels must be inspected and tested at the time of their installation and may not be used until a certificate is issued. They must then be inspected internally and externally at least once per year for the certificate to be renewed. Similar arrangements also apply to certain types of hot water boiler. These inspections must be carried out by an authorised and certified inspector. In the hospitals visited this work was done by an insurance company inspector and in these circumstances, in Massachusetts at least, the inspector reports have to be sent to the Department of Public Safety within fourteen days of the inspection.

Massachusetts General Law Chapter 146 also gives details of licencing arrangement for equipment including refrigeration and air conditioning systems and hoisting equipment. It also covers the training and licencing requirements for oil burner technicians, pipe fitters, refrigeration technicians and hoisting equiment operators. There are a range of penalties for non-compliance under this law and as of 1984 these include the possible removal of operating licences and well as fines of up to $500, or some £312, imprisonment for up to six months or both.

There appears to be no common rule for the licencing of tradesmen in the USA and Massachusetts is one of the more strict states in demanding that heating, ventilating and air conditioning craftsmen as well as steam fitters, be licenced. However, they have allowed hospitals to be exempt from this particular rule in the employment of in-house staff but contractors working in hospitals must use licenced tradesmen. In most states plumbers are licenced as are electricians.

With regard to new construction, most states produce their own guidance documents, as to Space Needs, these are normally used in conjunction with the publication 'Guidelines for Construction and Equipment of Hospitals and Medical Facilities'. This document is published by the American Institute of Architects Committee on Architecture for Health, with the assistance of the US Department of Health and Human Services.

The 'Guidelines' were revised in 1987 and this work was done through an inter-disciplinary task force involving some 34 individuals representing a wide cross-section of interest. These include, American Institute of Architects, American Medical Association, American College of Health Care Executives, Amercian Hospital Association, Joint Commission on Accreditation of Health Organisations, American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), Institute of Electrical and Electronic Engineers plus a number of specialist federal agencies such as the office of Engineering Services and the Centre for Disease Control.

The use of standards of a number of specialist organisations are quoted as deemed to satisfy, including those of the National Fire Protection Association, Illuminating Society of North America, ASHRAE etc. Energy conservation also features prominently in the publication. Programmes of Total Energy Management as developed by US Department of Health and Human Services are recommended along with life cycle cost analogue techniques.

In Massachusetts the standards contained in the Guidelines are mandatory and are considered to be the minimum acceptable standards.

5 MARKET FORCES AND THE SYSTEM OF REIMBURSEMENT

Broadly speaking, there are two sources of funding health care in the USA.

1 Through the provision of private health insurance, or through company or personal plans.

2 Through Government funding. Included in this category would be:

a Medicare, to provide cover for the over 65s.

b Medicaid, to provide cover for the indigent population.

c Veterans Administration, which provides care for ex-members of the US armed forces in their own hospitals which are funded directly from federal sources.

It is generally accepted that the majority of hospitals are funded through Medicare, Medicaid or private insurance and this process is best demonstrated by looking at the data from the private hospitals visited.

It became clear during the visit that the private hospitals are working in a very competitive market. In this respect, the hospitals resemble any other trading organisations that are offering a service to the public. There is a significant price to be paid in order to remain competitive, checks have to be made of how the competition are doing and what they are charging across a range of activities, from costs of surgery and hotel charges to health promotion and pharmacy charges. Some hospitals use market research companies to help keep track of market trends.

As with most marketing systems, there are popular product lines, loss leaders and different pricing or reimbursement systems.

One of the more obvious results of this commercial pressure is the importance that is attached to the estate. It is taken for granted by all concerned that the quality of the hospital environment must be used as a strong selling point, it is also a plus factor in the recruitment and retention of staff. This does not lead to money being forced into the hands of the Estates Officer. However it does mean that many of the users take an active interest in the conditions of the accommodation and facilities that they rely upon. During discussions the comment was made that the link between quality of health care and quality of the hospital environment is accepted by patient and doctor alike. With this position users try to ensure that their views are taken note of when maintenance and replacement budgets are being prepared.

All the private hospitals visited had similar patterns of reimbursement and the example shown at Table No 3 illustrates the general case, the data shown having been taken from the audited accounts of one of the hospitals visited.

TABLE NO 3

TYPICAL PERCENTAGE REVENUE FROM PATIENT SERVICES - 1986/87			
PAYER	INPATIENT %	OUTPATIENT %	TOTAL %
MEDICARE	45	20	40
BLUE CROSS	20	26	21
COMMERCIAL INSURANCE CO	14	18	15
MEDICAID	8	12	9
SELF PAY	6	19	8
HMO *	6	4	6
WORKERS COMPENSATION	1	1	1
TOTAL	100%	100%	100%

Most hospitals also list minor amounts of income from donations, investment, research grants etc and all have bad debt accounts. The hospital for which the data above is quoted lost some 6% of its revenue due to either bad debt or free care.

* Health Maintenance Organisations (HMOs) contract with customers to provide an agreed range of health care services at a fixed annual charge. The HMO either provides these services direct to patients at clinics or health centres and/or at an agreed hospital. An outline of a typical HMO will be given later in the report.

From Table No 3 it can be seen that through its Medicare and Medicaid programmes the Government provided some 49% of this hospital's revenue for 1986/87. The generally quoted figure for American hospitals is between 40% and 70% and this puts the Government in a strong position when it comes to agreeing reimbursement rates. In Massachusetts, and in five or six other states, this general area is the responsibility of a Rate Setting Commission. In Massachusetts the Commission is an administrative agency within the Executive Office of Human Services, and is responsible for establishing fair, reasonable and adequate rates of reimbursement for all medical services, health care and related long term care delivered to publicly aided individuals. In addition the Commission's responsibility as a rate making agency also extends to certain types of accommodation, and to a number of social, educational and rehabilitative programmes.

The Commission is also responsible for approving contracts between Blue Cross of Massachusetts and providers of health care and for approving rates and final settlements under these contracts.

In addition, the Commission is responsible for establishing rates to be paid by commercial insurance carriers for general health supplies and medical care delivered to individuals under the Workman's Compensation Act, this Act in turn is administered by the Industrial Accident Board.

It is clear from the above that the Commonwealth of Massachusetts has taken a very firm stand in the general area of health care costs. In 1982 the system of Maximum Allowable Cost (MAC) was introduced and the base year set at 1981. Each year a hospital's MAC is increased for inflation (as measured by the Massachusetts Rate Setting Commission) and for any increases in depreciation and increased expenses. Any subsequent adjustment is based upon either a hospital's ability to generate incremental patient volume or win exception appeals. Thus income is restricted whilst there is a tendency for costs to increase if for no other reason that the effects of inflation are greater than those allowed for by the Rate Setting Commission.

There is also the problem that Medicare and Blue Cross in-patients costs are reimbursed on an individual Diagnostic Related Group (DRG) basis where a fixed cost is allowed. If the cost incurred is greater than that allowed, the hospital will normally have to stand the loss; however there is a system of appeal through a Peer Review Group (PRG). With this system there is an incentive to cut down on patient times and thus "make a profit".

Medicare regulations and Blue Cross agreements also allow for depreciation funding of capital assets and these costs are built into the reimbursement system. In an effort to assist estates and finance officers the American Hospital Association has published the guide, 'Estimated Useful Lives of Depreciable Hospital Assets'. This gives a brief introduction to the various methods of depreciation accounting and lists some 800 separate items of hospital plant and equipment assigning a useful life to each. These are contained in ten separate tables, examples of which are given below.

TABLE NO 4

ESTIMATED USEFUL LIVES OF DEPRECIABLE HOSPITAL PLANT

AHA TABLE NO	ASSET	LIFE YEARS
1	Masonry building - fireproofed	25 - 30
2	Underground sewer & water pipes	25
	Asphalt paving	10
3	Roof covering	10
	Wallpaper	5
4	Heating boiler	20
	Electrical wiring	20
	Nurse call system	15
5	Colonscope	5
	Patient monitor	7
	Wheelchair	5
6	Computer	6
	Facsimile transmitter	3
7	Gas analyser	10
	MRI equipment	5
	X-Ray unit	8
8	Bed (labour)	15
	Desk	15
	Operating light	15
	Autopsy table	20
9	Coffee maker	5
	Dishwasher	10
	Deep fat fryer	10
	Washing machine - commercial	10
	" " - domestic	8
10	Ambulance	4
	Helicopter	4
	Humidifier	8
	Water softener	12

Most of the private hospitals visited appeared to use this system to build up depreciation accounts, but in all the cases examined additional sources have to be found to fund capital developments, modernisation programmes and the like.

The accounting rules in relation to Medicare payments were again changed in April 1988 when the Commonwealth of Massachusetts introduced its Chapter 23 Universal Health Care Programme.

Chapter 23 continued the concept of Maximum Allowable Cost, but has also increased the importance of routine in-patient volume (as measured by case mix adjusted discharges) and routine outpatient volume (as measured by clinic visits).

Blue Cross and other commercial insurance companies also have a significant effect on the average hospital's revenue and examples were given where insurance companies try to use this 'commercial muscle' to reduce charges for their patients. In this way attempts are made to obtain trading discounts and instances of this type of arrangement were cited. Most hospitals however did accept that the majority of insurance companies were better payers than the Government.

Blue Cross and perhaps some other commercial insurance companies would also operate a system of payment on the DRG basis. It is however recognised that this system of reimbursement has limitations and other methods are currently being investigated. However, all the systems discussed during the visit suffered the same problem of being extremely complicated to administer and have the same tendency of depressing reimbursement rates, thus reducing available funds to all hospital departments.

The rise in the number of Health Maintenance Organisations (HMO) over the past ten years or so has had a serious effect on some hospitals. The figure of 6% quoted above is not considered a threat to that particular hospital as the bulk of their work is well outside the scope of the HMO. Many hospitals however do not have the resources to combat the competition in this way and profitable business has been lost.

At a number of the hospitals visited access was allowed to their current year's accounts and business plans. These were commercially sensitive documents giving the hospital's financial status, views on current trends in the health care market and ways they intended to hold or increase market share. All gave details of efforts to tackle the adverse effects of the Medicare reimbursement system. These measures included space rationalisation schemes associated with attempts to increase bed numbers, reallocation of beds to clinical departments that provide a better return and increasing the number of day patient cases. In most of these instances the Estates Department would need to be involved to allow the physical changes to take place. In most hospitals minor schemes would be designed and built by in-house staff. Some of the larger hospitals carry their own staff capable of designing medium sized projects, but all would rely on contractors to carry out anything other than minor schemes.

6 ASSOCIATIONS AND ALLIANCES

6.1 CATHOLIC HEALTH ASSOCIATION OF THE UNITED STATES

The picture outlined above could give impressions of the typical American hospital standing alone defending itself against the opposition at the same time battling with Government regulation. This may be so in certain instances but the majority of hospitals have joined one or more alliances or associations in an effort to gain some kind of mutual benefit and to seek common goals.

Typical of many hospitals would be St John's at Lowell MA. This is a Catholic hospital and is a member of the Catholic Health Association of the United States.

This is a non-profit organisation and provides a service similar to other religious-based alliances. There are a total of 616 member hospitals, having some 159,626 beds. These figures represent 10% and 16% respectively for non-federal hospitals in the USA. Total expenditure in these hospitals for 1988 totalled some £16.25 billion. (1)

The Catholic church's commitment to the ministry of health care is strong and deep rooted. There is a long tradition of work in this field, particularly in relation to helping the poor and disadvantaged, both in the USA and overseas. In the view of the Association's President and Chief Executive, there is a growing need for this ministry in the USA as the country -

> "is home to millions who suffer the indignities of an endlessly spinning cycle of violence, poverty and poor health. Each year thousands are sucked into the cycle. ..... society and government have made promises to keep their obligations to the poor, the elderly, the frail, the destitute. CHA as part of its commitment, is working to ensure those promises are kept" (2)

(1) '89 Catholic Hospital Facts & Figures, A Pocket Guide published by CHA

(2) 1988-89 Annual Report of the Catholic Hospital Association of the United States, Page 21.

The goals the CHA has set itself can be stated in broad terms to continue to promote the Church's health care ministry, co-operate with similar organisations and the broader community and to encourage new and existing sponsors. In more specific terms the CHA intends to -

> "advocate for justice in the present US healthcare system [and] for systemic reform to achieve universal access, [and further] to promote a continuance of care responsive to the needs of people" (1)

To assist with these tasks the CHA hold a national annual assembly with speakers being drawn from a wide background covering a range of religious and secular topics. They publish a fortnightly newspaper, the Catholic Health World, and a monthly journal Health Progress. Articles in this journal would typically cover medical items, law, finance, health policy, medical ethics etc.

6.2 THE YANKEE ALLIANCES

With more commercial purposes in mind, St John's is also a member of the Yankee Alliance. This is a small, non-profit health network covering the New England and New York states and has ten member hospitals. The stated purpose of the Alliance is to research, develop and maintain joint venture activities among major medical centres in the North East Region of the United States. The main purpose of this venture being to lower operating costs and create new revenue and during the financial year 1988 St John's claimed to have saved over $100,000 in a range of purchases through participation in the Alliance's group purchasing scheme. The Alliance also concentrates on the provision of services which individual hospitals and medical centres cannot provide as economically themselves. The goals of the organisation are:

1 To market services among members and other hospitals through Yankee Alliance whenever appropriate.

2 To strengthen and expand programs of patient care and supporting services among members in co-operation with their organised medical staffs.

3 To use economies of scale to attract resources, control cost and improve services.

(1) Taken from a statement of beliefs, missions statement and goals obtained from the CHA.

4 To promote the development of regional services centred locally around the members, in co-operation with members' organised medical staff, to enhance their competitive position.

5 To develop and conduct educational and training programmes in the field of health care and health care management.

6 To assist members in developing and marketing their existing specialised health care services.

7 To enable members to more readily access resources that will make health care delivery more cost-effective and accessible.

8 To assist in offering health care services to non-member hospitals and medical centres.

9 To promote improvement of health care related services within the region, to include the creation of subsidiary corporations for such purposes.

10 To service as an agency for joint planning and research among members in order that they may use their resources effectively and efficiently to improve the quality of health services provided to the users of those services.

11 To encourage cross-utilization of key managerial specialists or consultants within the systems.

In pursuit of these goals there are a number of on-going programmes including:

1 An extensive medical-surgical supply and pharmacy products purchasing programme and wholesale prime vendor programme.

2 Marketing and consumer analysis services.

3 Physician practice analysis service.

4 Patient accounts collection service.

5 Risk management services.

6 Quality of care measurement programme.

Other programme are at various stages of research and development.

In 1985 the Yankee Alliance itself saw the need to join a larger grouping and became a shareholder of American Healthcare Systems (AHS). This is one of 35 premier multi-health systems in the USA whose members own, lease or manage more than 500 hospitals in 43 states, having between them in excess of 100,000 beds and a combined annual revenue of some $13.3 billion.

Amongst its other activities the Alliance publishes a quarterly newsletter keeping members up-to-date with developments. Some of the current work being undertaken is illustrated in the Alliance Event Calendar. These events include meetings of the Quality Council, Materials Managers, Pharmacy Council and the Compliance Advisory Committee.

6.3 AMERICAN HOSPITAL ASSOCIATION

In common with the overwhelming majority of hospitals in the United States, St John's is also a member of the American Hospital Association (AHA). The Association's mission is:-

> "... to promote high quality health care and health services for all the people through leadership in the development of public policy, leadership in the representation and advocacy of hospital and health care organisation interests, and leadership in the provision of services to assist hospitals and health care organisations in meeting the health care needs of their communities."

The Association has some 6,000 institutional members representing a wide range of health care institutions, together with some 45,000 personal members who may be eligible to join one of the personal membership groups according to their professional interest, or the American Organisation of Nurse Executives which is an AHA subsidiary organisation.

Most AHA members are also members of state, regional or metropolitan hospital assocations. The AHA maintains close working relationships with these allied organisations through which a two way communication network is set up that helps disseminate information across the country. A major form of AHA work is with members of congress and other government agencies to ensure that laws and regulations promote quality of patient care and AHA in Washington DC, present policy positions to government both formally, through written congressional testimony and comments on proposed federal regulations and informally, in personal meetings with members of Congress, regulators and their staff.

The Association also speaks for its members before such voluntary standards organisations as the Joint Commission on Accreditation of Health Care Organisations and the National Fire Protection Association and when necessary the AHA takes legal action on behalf of the members.

From its central office in Chicago the Association runs a Resources Centre offering advice and guidance services across an extensive range of topics from Aids and Biomedical Ethics through Marketing Quality Assurance, Risk Management to Women's Health. A number of these topics are particularly aimed at the Estate Manager.

The Association claims that the Resources Centre houses the country's foremost collection of both current and historical literature on hospital and health services administration. Their general collection consists of over 47,000 volumes and more than 1,000 current periodicals, in addition there are other archive and special collections. Their current publications catalogue lists over 400 items, including books, video and audio tapes etc aimed at providing a broad range of up-to-date information and data.

The Health Planning and Administration database (HEALTH) is also offered. This is an on-line bibliographic file developed to meet the current needs of health care planners and administrators, and may be accessed via a number of subscriber networks.

Many hospitals participate in the Association Hospital Administrative Service, MONITREND. With this system monthly reports routinely provide quantitative information that permits managers to compare departmental performance in hospitals similar to their own overtime.

As can be seen from Appendix No (7) one of the 16 professional societies forming part of the American Hospital Association is the American Society for Hospital Engineering (ASHE). This is the most prominent national organisation in the USA representing estates professionals in health care facilities. ASHE has some 4,500 active members, including engineers, clinical engineers, biomedical engineers, architects, design and construction professionals and fire and safety officers.

The basic mission of the society is to -

> "provide for the personal and professional development of members so that they at all times are the best in their field and supremely qualified to help hospitals better serve the health care needs of their communities." (1)

This mission is fulfilled through the successful execution of the Society's fundamental objectives.

1 to disseminate technical and managerial information to members

2 to provide members with educational opportunities that allow for networking and sharing information

3 to increase the visibility and success of individual members through professional development and recognition programmes

4 to serve as a successful advocate for the nation's hospitals

ASHE has a full-time professional staff able to provide advice and assistance to members with any facilities management problem. The Society also runs an annual conference and exhibition at which technical educational papers are presented on topics of general interest.

The current ASHE Technical Resource Catalogue lists some 72 publications covering an extensive range of estate management topics as can be seen at Appendix No (8). The manual 'Maintenance Management for Health Care Facilities' claims to give detailed information on how to design and build a manageable and economical maintenance system. It gives detailed guidance on the building of a maintenance programme including maintenance schedule coding systems, etc. The book also gives details of how to estimate the numbers of maintenance staff required and the method of calculating productivity rates are interesting.

Productivity is defined as:

$$\text{Productivity \%} = \frac{\text{time worked}}{\text{time available}} \times 100$$

Productivity rates less than 55% are deemed to be unacceptable and rates over 85% difficult to achieve and therefore questionable.

(1) AHA Personal Membership Groups published by the American Hospital Association, p19

It is worthy of note that in-service 'training' is considered a productive activity. Whilst "keeping up with the field", "public relations efforts" and "conventions and seminars" are all quoted as being expected overheads.

A revised version of the manual is due to be published in 1990, complete with a software package.

6.4 MASSACHUSETTS HOSPITAL ASSOCIATION

The Massachusetts Hospital Association (MHA) is a not-for-profit trade association funded by and run on behalf of the hospitals in Massachusetts and is allied to the American Hospital Association. Like the AHA the MHA has an office in Washington DC from which it can monitor federal initiatives and lobby members of Congress. In putting together a five year strategic plan, the Association in 1985 included in its mission statement to -

> Promote common purpose and unity among the members.
> Be the state-wide leadership and advocacy organisation for all Massachusetts member hospitals and their corporately affiliated health care organisations by providing representation and member services to assist them in serving the health care needs of the public ....

In the intervening period the Association has produced a number of survey reports on behalf of its members, including:

1 Aids Administrative Reference Manual

2 Impact of the Nursing Home Beds Shortage on Massachusetts Hospitals: Patient Awaiting Placement Survey Report

3 Nursing Supply Survey

4 The Massachusetts Experience: Chapter 23 Universal Health Care

Since the autumn of 1988 the Health Care Finance Division of the Association has worked to bring proposals regulating the acute care hospitals uncompensated care pool put forward by the State Department of Medical Security, into line with the needs of hospitals across the state.

The proposed regulations would change the state's traditional role from monitoring the free care collection process to what the Association has described as a more onerous approach of monitoring outcomes. It has been calculated that if adopted, the new state regulations would classify 80% of hospitals as failing to efficiently collect payments. The state authorities have been asked to withdraw the regulations and seek other ways to safeguard the universal access principle embodied in Chapter 23.

Further action undertaken by the Association on behalf of members has involved taking out a law suit against the State Governor, Mr Michael Dukakis. The writ argues that the governor failed to allot $37m for the Medical Shortfall Assistant Fund in the 1988 budget which amounts to an unconstitutional impounding of funds lawfully appropriated by the legislature.

As part of the process of keeping its members informed the Association produces a regular newsletter, Update, as well as the Monday Report, a weekly news bulletin and the monthly journal Mass Health Care.

Like its sister organisation in New Hampshire the MHA is somewhat pessimistic about future health care provision. They are demonstrating their degree of concern by running a campaign under the heading "Save our Health Care System". A campaign leaflet says that in Massachusetts the state owes acute and specialist hospitals more than $300m for Medicaid services provided since 1985, and owes nursing homes about $290m. Since 1987 some 800 beds have either closed or been converted in Massachusetts hospitals and it is expected that new legislation to be introduced under Chapter 23 will result in a further 2,000 beds either closing or being converted to other use.

Through its campaigning and lobbying the Association hopes to achieve three objectives:

1 the health care system needs to be reimbursed for the care which has already been provided under Medicaid and Medicare

2 the state government must make good the support it promised and committed to pay under Chapter 23

3 to work towards guaranteeing the long term health security of all Massachusetts residents

The majority of the work undertaken by the Association on behalf of its members is at the strategic level. Services at the operational level can be provided by Applied Management Systems Inc, a wholly owned, for profit, subsidiary of the Massachusetts Hospital Association. This company employs specialists, or has access through contracting companies, in a wide range of planning and management techniques. These include architecturel design and evaluation, clinical and general operations, including space utilisation, JCAHO pre-survey productivity systems. They also have a Business Service Practice that specialises in accounts management including a debt collection service.

CO-GENERATION COMPANY INC, BOSTON MA

A GENERAL VIEW OF TOTAL ENERGY PLANT BUILDING FROM BROOKLINE AVENUE

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6.5 COGENERATION MANAGEMENT COMPANY INC

A feature of a number of health care organisations in the Longwood area of Boston is that they get their heating and electrical power from a combined heat and power supply company from a Cogeneration Management Co. This is a wholly owned subsidiary of Harvard University and the plant is generally referred to as the Medical Area Total Enery Plant (MATEP).

The plant was first established in the early 1900s when Harvard University moved its medical school from Cambridge to the Fenway area of Boston, see Enclosure No 6.5.1. The plant became a co-operative venture among its users in the 1940s and by the 1960s the equipment was outdated, under capacity and could not keep pace with the growth in the Medical Area.

A variety of operation options were considered. Continuing with steam generation was essential as none of the user institutions had their own boiler plant, and no other similar source served the area. Chilled water presented a similar problem, though that could have been got round. The main point to consider was whether, and if so, how, to generate electricity. The decision was made to go for a total energy system and the current distribution system feeding all twenty one users including Beth Israel and Brigham and Women's Hospitals.

A plant layout diagram is given at Enclosure No 6.5.2. The six diesel generators were manufactured by Mirlees Blackstone of Stockport, England, are each rated at 7000 Kw and normally operate on No 6 heavy (residual) oil, relying on No 2 oil (distillate) for start up and shut down or when on light load. These sets generate at 13,800 volts AC 60 Hz as do the two steam turbine generators, each rated at 11,000 Kw, together there is a combined generating capacity of 64 MW.

Steam is produced in the three conventional oil fired boilers each rated at 180,000 lb/hr. Two similarly rated bolers are fuelled by the waste heat from the diesel engine exhausts. Total steam capacity is thus 900,000 lb/hr at 650 psi/750°F.

Five centrifugal chiller units are used to provide the plant's 21,900 tons of chilled water capacity. Two of these units are rated at 5,000 tons each and are driven by steam turbines and three are electrically powered, two rated at 5,000 tons and one at 1,900 tons.

The average annual demand by the users is 1 billion lbs of steam, 25 million ton-hours of refrigeration and 150 million KWH of electricity.

Because the primary users are hospitals and research facilities, a large amount of spare capacity has been built into the plant, this, it is claimed, also gives considerable operational flexibility.

In addition to the plant in the generating hall there are five roof mounted cooling towers, each rated 11,000 gpm.

As part of the initial feasibility study an Environmental Impact Study also had to be carried out to satisfy the Massachusetts state authorities. This study showed that the plant would present less of an environmental problem than the smaller plant it replaced, as modern electrostatic precipitators were included in the flue design and the fuel oil used has a low sulphur content.

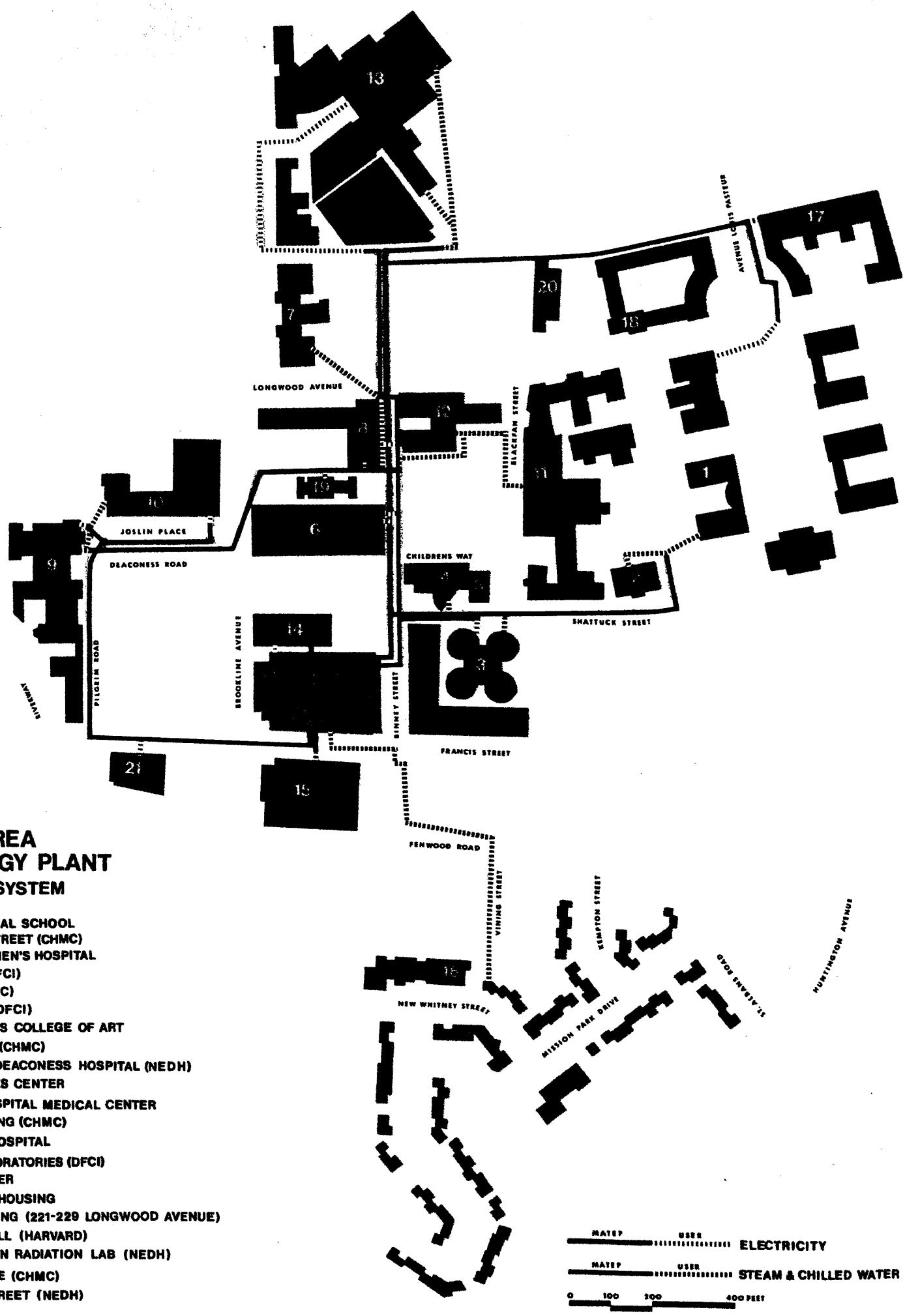
The use of diesel engines however raised new environmental issues with regard to the production of oxides of nitrogen and this threat was a cause of concern to the Massachusetts Department of Environmental Quality Engineering. After a number of lengthy hearings an operating plan was developed under which MATEP maintains monitoring stations in areas around the plant. These stations check ambient levels of nitrogen dioxide and if agreed limits are reached, the output from the diesel engines is reduced and the balance made up from connections with high voltage network of the Boston Edison Company.

MATEP operates multipart tariffs for all three of their commodities. There are summer on and off peak rates and winter on and off peak rates, and separate summer and winter maximum demand charges for both chilled water and electricity. In the case of their steam supply there is a demand charge that reduces in three stages; a sliding scale of unit charge with different rates for winter and summer plus condensate return and penalty charges.

Average charges for a typical large user are of the order of:

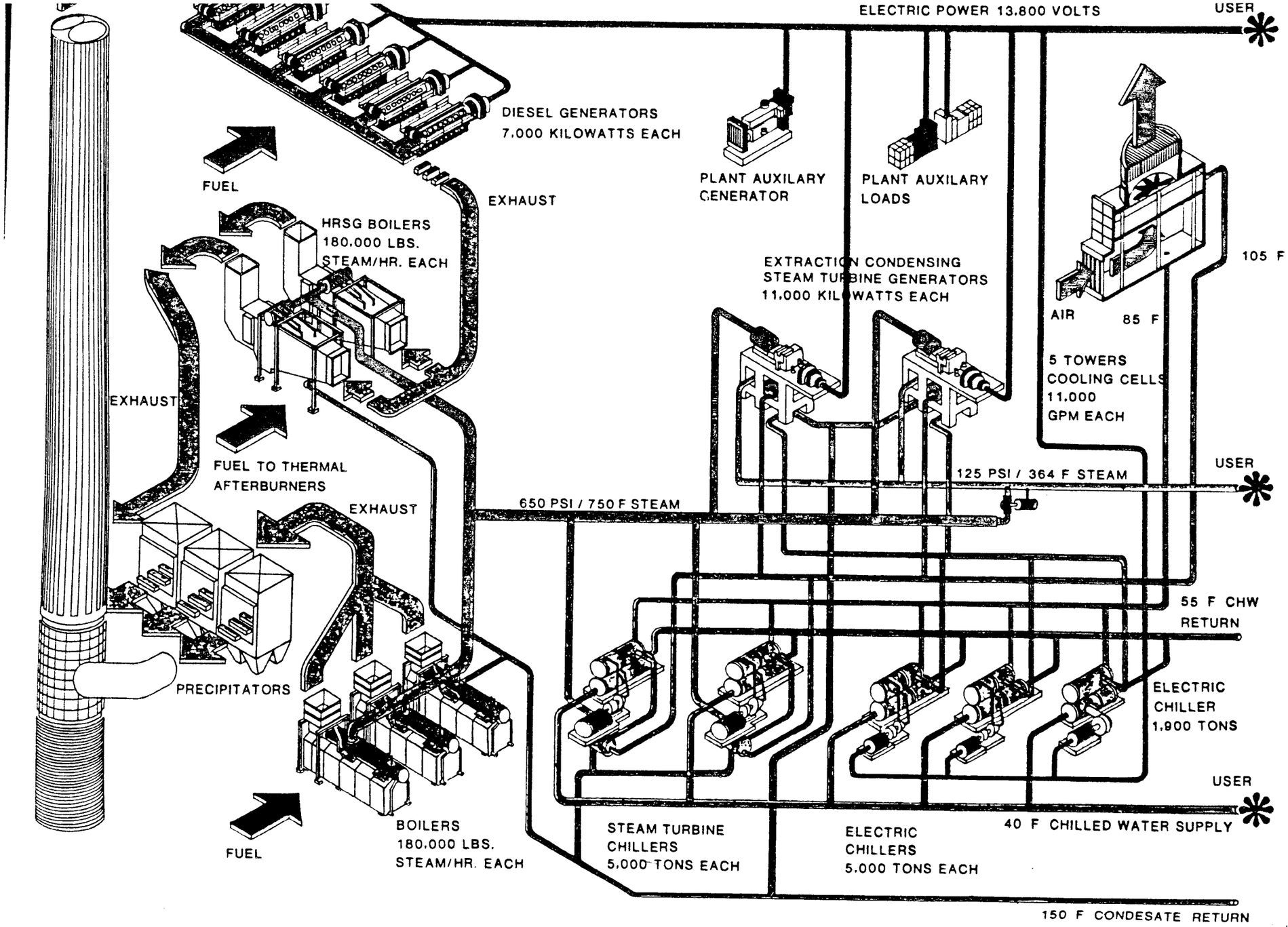
Steam	£6.40 per 1,000 lb
Electricity	3.8p per KWH
Chilled Water	11.25p per ton/hour (KWH)

ENCLOSURE NO 6.5.1



DICAL AREA
TAL ENERGY PLANT
TRIBUTION SYSTEM

HARVARD MEDICAL SCHOOL
55 SHATTUCK STREET (CHMC)
BRIGHAM & WOMEN'S HOSPITAL
JIMMY FUND (DFCI)
CARNEGIE (CHMC)
DANA CENTER (DFCI)
MASSACHUSETTS COLLEGE OF ART
CHILDRENS INN (CHMC)
NEW ENGLAND DEACONESS HOSPITAL (NEDH)
JOSLIN DIABETES CENTER
CHILDREN'S HOSPITAL MEDICAL CENTER
ENDERS BUILDING (CHMC)
BETH ISRAEL HOSPITAL
REDSTONE LABORATORIES (DFCI)
THE SERVICENTER
MISSION PARK HOUSING
LYING IN BUILDING (221-229 LONGWOOD AVENUE)
VANDERBILT HALL (HARVARD)
SHIELDS WARREN RADIATION LAB (NEDH)
GARDNER HOUSE (CHMC)
110 FRANCIS STREET (NEDH)



ENCLOSURE NO 6.5.

7 APPRENTICE TRAINING IN MASSACHUSETTS

A noticeable feature in all the hospitals visited was the absence of any form of apprentice training, in every case the hospitals are relying upon other organisations to train their licenced tradesmen.

Initial enquiries about apprentice training were made with the Department of Labor and Industry, Division of Apprentice Training. This is part of the Commonwealth of Massachusetts, Executive Office of Labor which is located in Boston. Through this Division, the state regulate apprenticeships, setting terms and conditions agreeing training programmes with appropriate trade bodies and issuing certificates and licences on successful completion of the approved training programme.

There are two routes through which apprentices are trained, vocational technical schools and work based programmes. In the building trade the work based schemes are normally operated by the appropriate trade union.

During discussions with the Director of the Division of Apprentice Training, information was requested on a work based scheme that would allow comparisons to be made with the training provided by the NRHA and other health authorities. The scheme operated by the International Brotherhood of Electrical Workers was recommended and a meeting arranged with the Assistant Director of the Joint Apprentice and Training Committee for Greater Boston.

The union operates an apprentice training scheme aimed at providing licensed craftsmen trained in modern construction and maintenance techniques. However no attempt is made to provide "cross trade training", this form of multi-skilling is not accepted by the trade unions. Schemes are run in all of the 50 states and all report to the national headquarters in Washington DC where the training curriculum is prepared. This curriculum is constantly under review and updates and/or changes are introduced at an annual convention. An extract from the curriculum is shown below at Table No (5).

TABLE NO (5)

INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS

JOINT APPRENTICE & TRAINING COMMITTEE

EXTRACT FROM TRAINING CURRICULUM FOR EVENING CLASS COURSES

YEAR	CONTENT
1	Introduction to Codes; Insulation; Electron Theory; Electrical Units; Safety; Square Roots; OHMS Law; Trigonometry; Definitions of Power; Conduit, Parallel Circuits; Ratios and Proportions, Over-Current Devices; Voltage Polarity; Magnetism; Basic Circuits; AC and DC; AC and DC Generation; Plans; Thevenin's Theory; Norton's Theory; Transformer Ratios; First Aid
2	AC and DC Meters; Induction Rectifiers; Inductive Reactance; Capacitive Reactance; Parliamentary Procedures (ie the management of meetings and debates); Wiring Diagrams; Series RL Circuits; LC Circuits; Refrigeration Cycles; Basic Air Conditioning; Parallel and Series Resonance; Filters; Power Factor; Rope Tying
3	Wiring System 480-270 Volts; Special Circuits; Basic Principles of AC Motors; Power Factor Correction; Split Phase Motors; Capacitor Motors; Repulsion Motors; Stairway Lighting; Emergency Lighting; Transformers; Theory of 3 Phase Connections; You and Your Country; Manuals; Starters; Hazardous Locations; Control Devices; Symbols; DC Motor Control; Wound Rotor Motors; Synchronous Motors; Clutches, Economics; Nuclear Safety; Stewardship; Semi-Conductors; Zener Diodes; Formanship; Power Supplies; Transducers; Busways; SCRs; TRIACs; DIACs; Amplifiers; JFET and MOSFETs; IC Timers; Digital Control; Fibre Optics; Basic Fire Alarms; Programmable Controllers; Maintenance and Trouble Shooting; Journeyman Status

The taught curriculum outlined above is contained in a number of text books that are given to the apprentices. This material has been developed over many years by the Union, it is all copyright and is jealously guarded and in these circumstances the outline given above is the best that could be obtained.

Apprentices normally join the scheme at the age of 18 straight from high school, though there is no upper age limit. There is however a stipulation that all applicants must have a high school diploma or its equivalent with a minimum of one year's study of algebra.

All the practical training is given on the job through working with licenced tradesmen, whilst academic training is received at evening classes. Attendance at evening classes is compulsory and these are normally held two nights per week in hired accommodation at local centres.

The class tutors are all ordinary working licenced tradesmen who have taken their masters certificate and undergone a further course of training to obtain a tutors certificate. Tutors courses are run in the evening and are of some 18 months to two years duration, at the end of which a state examination is sat and if successful, a state certificate is issued.

If employers wish to take advantage of the union's scheme and train apprentices on their premises, they must first sign a contract with the union agreeing to what is in effect a closed shop. Examples of such firms were given, including Harvard University and the Boston newspapers, the Globe and Herald. In all there are some 800 apprentices in training in the scheme in Massachusetts. In addition there are some 150 technicians in training in that state in a programme that only started three years ago and the final curriculum is still not developed.

Starting in September 1989, the apprentice training programme was increased from four years to five. This is designed to accommodate all the new technology that is continuously being introduced.

At the time of the visit the union rate for an electrician was $22.15/hour or £28,795 pa for a 40 hour week. This appears to be a very attractive rate of pay, but it was pointed out that in the construction industry men can be laid off for many weeks in the year due to drops in contracts, bad weather etc and during these periods they could be on reduced pay or no pay at all.

The starting pay for an apprentice, regardless of age is 30% of the journeyman's rate and is increased every six months by 5%. These rises are dependent upon satisfactory progress being maintained both on the job and at evening classes. Progress reports are sent back to the union's local office from the evening class tutors recording progress, and apprentices must maintain an average mark of 70% throughout their studies; only one lapse below this limit is allowed then the apprentice is dropped from the programme. A check is made on progress on the job through the use of the report card shown below. This card is completed on a monthly basis with the number of hours shown against the various headings. It is then sent to the local union office where a watch is kept to ensure that a balanced programme of work is being provided. If this is not the case steps would be taken to vary the job content.

However, under normal circumstances, the union officers do not visit the apprentice at his place of work or at the evening classes.

ENCLOSURE NO 7.1

APPRENTICE MONTHLY WORK REPORT CARD

APPRENTICE MONTHLY WORK REPORT CARD MO.....
YR.....

CARD MUST BE MAILED AT END OF EACH MONTH
GIVE MEASUREMENT OF TIME IN DAYS

(a) Bx.....	(f) Service.....	(l) Feeders.....
(b) Motor & Control.....	(g) Adequate Wiring.....	(m) Switch Board.....
(c) Rigid Conduit.....	(h) Low Tension Signal.....	(n) Oil Burners.....
(d) Steel Tubing.....	(i) Metal Molding.....	(o) Air Cond.....
(e) Fixtures.....	(j) Jobbing.....	(p) Fire Alarm.....
	(k) Circuit Wiring.....	

Employer.....

Name & Card No. of Mechanic.....

Apprentice Name..... Card No..... Year No.....
(PRINT)

Signature..... Date.....

On completion of the four (now five) year programme, the newly qualified journeyman gets a certificate from the state of Massachusetts confirming that they have completed an apprentice programme recognised by the state; a licence is also issued by the state staying that they are allowed to carry out electrical contracting work in that state. They also get a journeymans certificate from the union, this allows them to work in the union sector thereafter.

If the journeyman wishes, he can take a further course of study, at evening classes, for his masters certificate. In Massachusetts the state demand that the newly qualified journeyman works for at least one year before applying to sit for this certificate.

The state examination for the masters certificate is an open book, written three hour test and the candidates are examined on both the State Electric Code and the National Electric Code (NFPA 101). Having passed this test, the candidate sits a one hour verbal test.

The union also run updating training courses for journeymen on a wide range of topics that are seen to be required.

In order to pay for the apprentice and other training systems, all union members pay a levy out of their wages. Workers' contributions have also been used to help build a union training school in Boston. Work started on this new $12m 60,000 ft^2 facility in 1989, and the accommodation is scheduled to comprise 22 classrooms, 4 laboratories and 4 workshops. Initially this training school will only be used for evening classes but the hope is that in the not too distant future, off the job training for apprentices will be provided there.

8 ESTATE MAINTENANCE PRACTICE

During discussions with colleagues before the visit some of the questions most frequently raised were in connection with asset management, the apportionment of maintenance costs and how the maintenance operation fitted into the overall hospital management structure.

At the various hospitals visited, the person identified as being responsible for the estate was variously described as the Administrative Engineer, Engineering Director or the like. In general the positions were very similar to those of the Estates Officer in an NHS hospital, and for ease of description this title is used below. In the majority of cases they were third tier managers responsible to Vice Presidents, none were board members.

In all the hospitals visited the Estates Officer was responsible for the estates assets and was the budget holder. Most excluded x-ray and MRI from their responsibilities but included new works and adaptations, but only at the larger hosptials was there any form of capital development/procurement staff. Life cycle costing for all estate assets was claimed at only one hospital but the techniques were being slowly introduced at a second.

The apportionment of estate costs by department was only practiced at one hospital and even in this case these costs were not reflected in the patient charges, rather they were used as a management tool to monitor departmental costs. The complexities of patient charges and reimbursement rates was explained earlier in this report and these difficulties were quoted as being the reason why estate costs are looked on as an overhead along with all the other support services which are lumped together for costing purposes. Acountancy in American hospitals appears to be an extraordinarily complex business, and cost shifting part of the art.

On first entering any of the private hospitals listed, the high quality of the general environment was immediately apparent. As indicated earlier the value of the estate as regards appearance and reliability are accepted by all concerned. At all but one of the private hospitals visited, tours around all the facilities were arranged and many photographs were taken. From these observations the average condition of the estate, measured in NHS (Estate Code) terms would be Category A or B.

All Estates Officers in the private hospitals stated that they could usefully use more funds if given the opportunity and many thought that they were understaffed, but none claimed to have any maintenance backlog and what was seen reinforced this view. However this is not to be confused with plant replacements that form part of energy management or other cost saving schemes; in these cases, varying amounts of plant could be identified that Estates Officers would like to replace, but not because the equipment had gone beyond its useful life.

Without exception, all the hospitals visited relied heavily on their own workforces for maintenance. The general rule quoted at a number of hospitals was "if you can employ a person full time on any job, do so, if not, consider hiring the service in". To this broad generalisation estates officers would add that directly employed labour should be more dependable and have a better understanding of the buildings and plant. On the whole, these maintenance staff do not cross skill boundaries. There was very little evidence of multi-skilling other than by way of doing temporary repairs during the night or week-end shifts. The comment was occasionally made that in small community hospitals, particularly in rural areas, maintenance men tend to be "jacks of all trades" and this helps to keep costs down. Some supervisory and management staff have to be and are multi-skilled but there appeared to be no hard and fast rule on this matter, with each case being treated on its merits.

With the exception of two of the public funded hospitals all the facilities visited ran some form of planned maintenance scheme. There appeared to be no single source for any of these planned maintenance routines, they all seemed to have been developed from a mixture of AHA and JCAMO guides, manufacturers' recommendations and the personal experience of the particular engineer responsible.

With regard to the maintenance of electrical switch and distribution equipment, a number of hospitals use the services of a company who specialise in infra-red photography. This company carries out inspections on an annual basis inspecting switchgear, contacts, terminations etc for signs of overheating. Where such a problem is detected two photographs are taken, one on infra-red film and one a normal colour print that assists with locating the fault. All who used this service claimed it had prevented serious breakdowns, particularly on plant that is difficult to take out of service for checking.

The problems of Legionnaires Disease are not considered to be as serious in the USA as in Britain. In the hospitals visited cleaning and maintenance routines were limited to wet cooling towers, the sources of the original outbreak at a Philadelphia hotel in 1976. None of the hospitals visited reported introducing special measures into DHW systems and regular checks were carried out at only one hospital and it was reported that these had always been negative.

The response of Estates Officers when told of the precautions taken in NHS hospitals varied from mild surprise to total disbelief.

The possible risks from DHW supplies are understood elsewhere within the American health care system, as noted in an article in the May 1989 issue of the American Society for Hospital Engineering's Journal, Health Facilities Management. Here the author stated that:

> "current opinion holds that the DWHS in a hospital is the single most likely source of Legionella. Some studies found Legionella to exist in as many as 60 per cent of hospital DHWS sampled"

Most of the Estates Officers considered this article to be a "bit over the top".

The training of estates staff in the hospitals visited followed a fairly consistent pattern as laid down by the JCAHO. No hospial visited was currently training apprentices and the majority had never ventured into this field; for the ones who had, the training programme appeared to be poorly organised.

The most common method of firing hospital boiler plant appeared to be by dual fuel using No 6 (residual) oil and natural gas, the oil being used in the winter when gas prices are at a premium rate. None of the hospitals burned coal, though one had done some years ago but the plant had been converted to oil and gas firing.

The approach to energy management varied considerably with some having dedicated staff and extensive programmes of energy conservation schemes, whilst others had done little or nothing in this line other than to monitor fuel tariffs.

In order that general comparisons can be made with estate practice in the NHS, an effort was made to obtain some idea of wage rates. These are normally negotiated individually and are confidential. It was claimed that at most levels better pay could be obtained "outside" but the job may not be as secure.

One hospital was willing to release pay rates for 1988, samples of which are shown below. It can only be assumed that they represent some kind of broad average for a 40 hour week.

TABLE (6)

SAMPLE OF ANNUAL WAGE OF BONUS RATES FOR A NEW ENGLAND HOSPITAL FOR FINANCIAL YEAR 1988/89

JOB TITLE	BASIC ANNUAL PAY £	HOURLY SHIFT BONUS £
Unit Works Officer	31,700	-
Plumbing Supervisor	22,200	-
Electrical Supervisor	22,200	-
Licenced Electrician	17,500	0.5
Licenced HVAC Mech	16,700	0.5
Licenced Plumber	15,700	0.5

It is to be expected that estates officers in NHS hospitals would be interested in comparing British and American fuel prices, and some average prices are shown below. These rates are calculated from tariffs in force during the financial year 1988 and prices actually paid.

The price of oil in the USA fluctuates according to both home and international demand and local market forces. The range of costs for No 6 (residual) oil, including all delivery charges are shown below. This oil has a calorific value of 150,000 BTUs/US gallon and cost per BTU is also shown.

Minimum = 17.5 p/US gallon or 11.67p/100,000 BTUs
Maximum = 33.1 p/US gallon or 22.07p/100,000 BUTs

The cost of natural gas varies between summer and winter with the higher price reflecting the bigger demand in winter. The data given below is for gas used in steam raising plant and includes a small fixed charge. Other tariffs are available. The calorific value of gas is given as 1030 BTUs/1000 ft^3.

Minimum = £1.47/1000 ft^3 = 14.27p/100,000 BTUs
Maximum = £1.96/1000 ft^3 = 19.03p/100,000 BTUs

Electricity tariff structures are similar to those in Britain and where possible hospitals opt for high voltage metering, and a form of 'time of day' tariff. There are also the familiar maximum demand and fuel adjustment charges.

Typical cost for all hospital use = 3.52p/KWh.

Standards of patient accommodation varied considerably between the public and private hospitals visited. In all the private hospitals visited the accommodation consisted of only single bed rooms (private accommodation) and two bed rooms (semi-private accommodation). It appears that most insurance policies only allow for semi-private accommodation, but at a number of hospitals, it was reported that most patients prefer private rooms and many are willing to pay an additional charge of between $60 to $100 per day for a private room. However at the Beth Israel Hospital they had reduced the number of private rooms available by converting some into two bed accommodation and thus increasing their bed numbers and income.

The patient accommodation was not inspected at the Veterans Administration Medical Centre, but at the other public hospitals the accommodation appeared to consist only of multiple bed units. Normally these were three or six bed wards and in the case of Springfield Municipal Hospital some of these three bed units looked a bit tight for space.

BETH ISRAEL HOSPITAL, BOSTON MA

GENERAL VIEW OF HOSPITAL FROM BROOKLINE AVENUE

TYPICAL NURSES STATION

US3AAA

8.1 BETH ISRAEL HOSPITAL, BOSTON MA

A meeting was held with the Estates Officer who is responsible for building and engineering maintenance, energy, grounds and gardens, maintenance of furniture, maintenance of medical equipment, other than x-ray and MRI, upgrades and capital developments, parking, safety and security.

Some ten to twelve years ago a graduate mechanical engineer was engaged to update the planned maintenance routine and replace the card index system with a computer based scheme. A detailed study of all the major items of plant was undertaken and after some five years a comprehensive predictive maintenance system was set up. This is now worked as an integral part of a planned maintenance system as demanded by the JCAHO. Life cycle costing was not originally part of this program but is now slowly being introduced. These arrangements do not include lifts, as with all the other hospitals visited, the lifts at Beth Israel are maintained by a specialist outside contractor and this company operates a planned maintenance routine as well as a call out system.

Starting in financial year 1990 a specialist electronics engineer is to be employed just to service the equipment of the research community. This is a move to reduce the cost of contracts with outside companies, and the engineer will be responsible for maintenance, calibration and all minor repairs.

General maintenance staffing levels are such that some emergencies are difficult to deal with and in certain circumstances contractors have to be called in.

A maintenance watch group operate a three shift system. During the day the three disciplines in the Group, HVAC mechanics, electricians and mechanical fitters can be called by walkie talkie and respond to any call, all other maintenance staff are job assigned by a supervisor. During the evening shift, there is a lead person, a mechanic, an electrician and an electronic technician on call. Overnight there is only a watch shift of one person but he is able to call in other staff from home. Similar arrangements operate at the week-end and on holidays.

In addition to the predictive/planned maintenance system there is a repair request routine using either special requisition forms or by verbal request.

A building automation system has been slowly evolving for the past ten years or so. Initially an Andover Controls Company system was purchased. A few years later, Landis & Gyr won the tender for additional equipment and the two systems now work independently. With the addition of the new equipment it was intended to connect some 2,000 items of plant to the combined systems, but compatibility problems have reduced this number to 1,000 and plans are being made for a new stand alone system.

Currently the two systems run the following programmes: fire and life safety, security, HVAC, energy, system operation. Within the HVAC programme engineers are able to monitor and control zone temperature and humidity, valve and damper positions, re-heat temperature. Two additional controls are available, one for air volume through the use of variable patch fan blades and the other by using variable frequency drives. In the latter case no difficulties have been experienced due to spikes on the electricity supply system.

Though the present hospital building dates back to 1926, most of the building and engineering services are either renovated or new within the last ten years. Record drawings are kept, but these are not as up-to-date as the Estates Officer would like, and arrangements are currently in hand to purchase a CAD system which will correct this situation. The system will also be useful for use in future development programmes.

Each year all departmental heads, including the Estates Officer submit their capital project requests to management. These are added to a continuous running list, sub-divided by Division, and considered against the hospital's development plans. The funds for these schemes can come from a variety of sources including borrowing, transfers from revenue, depreciation fund monies etc. The list is used by the Estates Officer as a basis for estimating the cost and other implications resulting from the requests of other departments. However equipment is still purchased or gifted that has not been planned for and these invariably provide installation problems for the estates staff.

In 1973 there was virtually no air conditioning in the hospital, but programmes introduced since that time mean that the hospital is nearly 100% air conditioned. The original installations were constant volume systems, and these are now being converted to variable air volume (VAV) systems. The central air handling unit is steam heated and distributes air at 55°F, local heaters then boost this to the design temperature. At these local heat exchangers steam is being replaced by hot water but steam is used for humidification. However, high operating costs have resulted in some 90% of the humidifiers being turned off, leaving only operating theatres and intensive care suites fully operational. Consideration would only be given to using the rest of the units in exceptionally cold winter conditions.

The heating system contains a number of heating control zones. These divide the building North, South, East and West and the South elevation also has vertical zoning. With the introduction of the VAV system they have also had to introduce some perimeter heating.

At Beth Israel there is no designated energy manager and the Estates Officer asumes the role. There is however a group of staff with special responsibilities for energy. A great deal of work has already been done in this field including pipe and equipment insulation. All extract systems from laboratories and kitchens etc have been fitted with glycol filled heat recovery units. Up to a few years ago the law demanded twenty air changes per hour for operating theatres, with no re-circulation and there could be no heat recovery systems built in. These laws have now been relaxed to fifteen air changes and some re-circulation is allowed, and full advantage has been taken of these changes. Many of the steam heated radiator systems have been replaced with low temperature hot water systems.

There is a central water distillation system for the research community and this has now been converted from steam powered to a reverse osmosis system.

A lot of the sub-metering has been installed and these are closely monitored. It is not possible at the moment to connect these meters to the energy mangement system, but there are plans to rectify this when the current computer equipment is upgraded.

Low energy lighting units have been installed for some years and consideration is now being given to replacing these with the new generation of equipment available using electronic ballasts and triphosphor lamps, but they are trying to avoid being tied to one manufacturer.

All fluorescent tubes in offfice and research accommodation are bulk changed every two years. In the main this is not possible in patient areas and these tubes are changed when convenient or when they fail.

The conversion of the air conditioning system to VAV incorporating variable speed motors has also assisted with energy savings.

Up to a few years ago the federal government provided some funds for energy conservation work and Beth Israel received some $500,000 (£312,500) from this source. This programme of funding has now ceased for hospitals - though schools are still able to benefit. The state also provided funds until recently but these have also been withdrawn and diverted to fund asbestos removal schemes. The Boston Edison Electricity Company still provide funds for saving electricity (and will give domestic consumer hot water cylinder jackets) but this hospital does not qualify as they obtain their electricity from a private cogeneration company, the details of this plant will be provided later. The hospital are thus left to provide funds by themselves and over the past few years between $100,000 and $500,000 (£62,500 and £31,250) have been set aside from the capital depreciation fund.

With regard to payback periods, the lighting programme currently being reviewed, where ballasts and lamps will be replaced is estimated at between 3.9 to 4.6 years on a simple pay back calculation, with an outlay of some $300,000. A scheme recently looked at to modify fume hoods gave a pay back period of some 6.9 years but that scheme did not proceed.

Recently a contract energy management company carried out a survey of the hospital and an audit of their energy accounts but could not find any work worth doing.

Some time ago the Estates Officer introduced a system of on-the-job training for maintenance staff. If a new person starts he has to qualify for an internally awarded "certificate" before he can be allowed to do shift work. This training could last from six weeks to four months during which time he would work with various teams on the day shift only. After "qualifying" he could work week-end or evening/night shifts.

For other forms of training there is a tuition reimbursement proramme that would fund a range of evening classes and the like, this fund would reimburse 80% of the cost of the course. Certain staff would also be sent to the sterilisation manufacturers training school, this is a three week training course. Where needed, staff would be sent to equipment manufacturers for specialist training, an example given was the Energy Management System manufacturers, this arrangement was part of the contract package for that equipment.

All the training covered above is specifically training for the job. There is no provision for advanced training that is not job related, the total budget is some $5,000 (£3,125), excluding training that is part of an equipment contract. It was explained that the hard lesson had been learned that well trained staff tend to find better paid jobs elsewhere, the hospital cannot compete with a large number of other outside employers.

At the moment there are no apprentices being trained, but over the years two or three electrical apprentices have gone through their training at this hospital. Normally the young person would join the hospital from vocational school having some basic knowledge of electrical engineering. The apprentice would then be placed with a tradesman and learn on the job, but no formal programme would be followed. The apprentice would also have to attend evening classes and prepare for the state licence examination. If he passed this examination he would then be classed as a licenced maintenance electrician and could only do maintenance work, he could not do the work of a construction electrician. The comment was made that the electricians who had followed this route of training at the hospital had all left soon after qualifying so as to earn a better salary.

In October 1989 Beth Israel introduced a new management initiative under the heading Prepare 21, or preparing for the twenty first century. This is a form of the Scanlon Plan for participative management. This plan is designed as a new incentive to combat the currently worsening financial situation. Multidisciplinary teams are to be set up made up of staff from all levels from vice presidents to rank and file workers. The teams will be set the task of finding ways to improve operating performance and cut costs. Built into the system is a form of profit sharing where savings can be given back to departments for further investment. No further information about the scheme was available during the visit as it had still to be introduced. It has not proved possible to subsequently get more detailed information as the Plan is going through the US copyright process. However, signs looked good for the scheme as staff appeared keen to participate in the initiative in what appeared to be already a very well managed hospital.

The command structure for the Facilities Planning and Enginering Department is shown at Enclosure No 8.1.1. This indicates that there is a total staff complement of 66 below the Vice President to whom the Director reports.

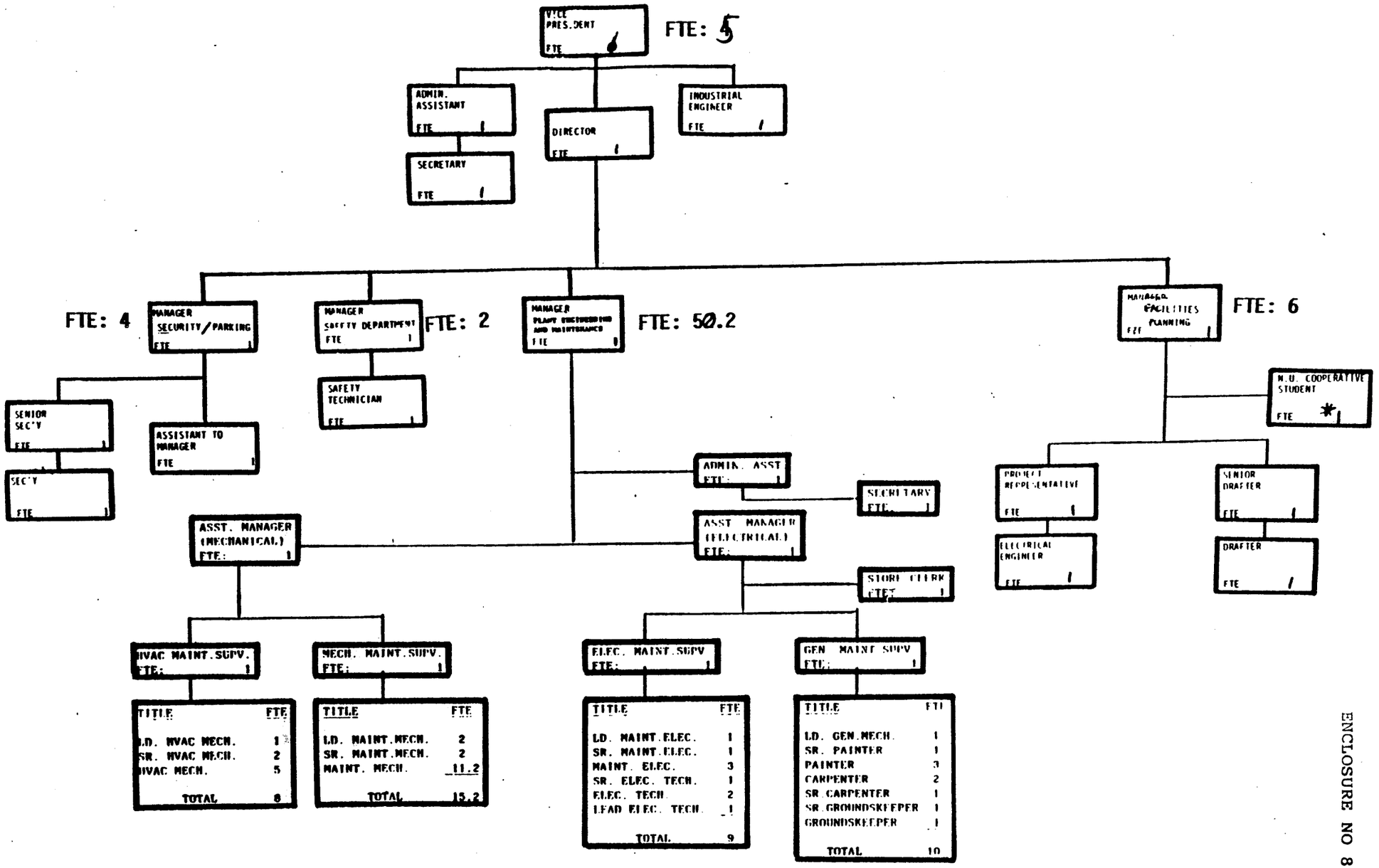
From data provided by the Estates Officer, estates costs per square metre have been calculated as shown below.

Estate maintenance, this includes some minor capital works	=	£25.66/m^2
Energy and utility includes steam, electricity, gas chilled water, water and sewage charges	=	£24.01/m^2

The Estates Officer also produces an Energy PI per block or per building and this aggregates up to produce a whole hospital figure of 248,211 BTUs/ft^2.

FACILITIES PLANNING AND ENGINEERING

DIVISION ORGANIZATION CHART



ENCLOSURE NO 8.1.1

BRIGHAM & WOMEN'S HOSPITAL, BOSTON MA

ENTRANCE TO THE RESEARCH BLOCK, FRANCIS STREET

VIEW OF NEW PATIENT TOWER FROM FRANCIS STREET WITH CO-GENERATION COMPANY CHIMNEY IN THE BACKGROUND

US3AAA

8.2 BRIGHAM & WOMEN'S HOSPITAL

During a brief discussion with the Estates Officer an outline of the history of the hospital was given together with details of maintenance operation and costs. However it was not possible to have a full tour of the site and facilities.

This hospital is sited in the centre of the Longwood medical area, close to Beth Israel, Boston Children's Hopsital and the Harvard Medical Centre. In 1975 three separate hospitals - the Boston Lying-In Hospital for Women, Peter Bent Brigham and the Robert B Brigham, decided to merge forces. They continued to operate separately until 1981 when the new tower block was completed on the current site, soon after which they dropped the three separate identities and became the Brigham and Women's Hospital.

The building that was the Lying-In Hospital is now used by general administrative staff and as a research facility. The old nurses' home is planned to be demolished and a new research block built.

The Robert B Brigham Hospital was sold to the Harvard Community Health Plan and became the Parker Hill Hospital. However, Harvard found it was not prudent to operate a small hospital by themselves so they agreed a contract with Brigham and Women's Hospitals to be their main provider.

Parker Hill Hospital was then sold to another organisation and is now a skilled nursing home and Brigham and Women's have an affiliation agreement with them.

The agreement with Harvard Community Health Plan resulted in an increase in in-patient admissions by some 40% and outpatient admissions have increased by 50%. A major campaign has recently been conducted to reduce the length of stay of in-patients and this has been quite successful.

In 1988 an Institutional Master Plan which examined the hospital's future role was agreed. Plans have now been drawn up to expand the biomedical research facility, develop patient care support facilities and expand the ambulatory care facility. All these developments will take place on the main hospital site and are scheduled for completion between 1989 and 2000.

In many respects the hospital is similar to Beth Israel though much of the accommodation was built between 1913 and 1921 and not all the services are modern. Nevertheless the building and engineering services appear to be well maintained and the quality of accommodation in the patient and reception areas is of a very high order.

Maintenance arrangements follow a similar pattern to those at BI though as can be seen from the organisational chart Brigham and Women's have a larger staff establishment.

The hospital take their steam, chilled water and electricity supplies from the MATEP cogeneration plant but they also taken an electrical supply from the Boston Edison Co.

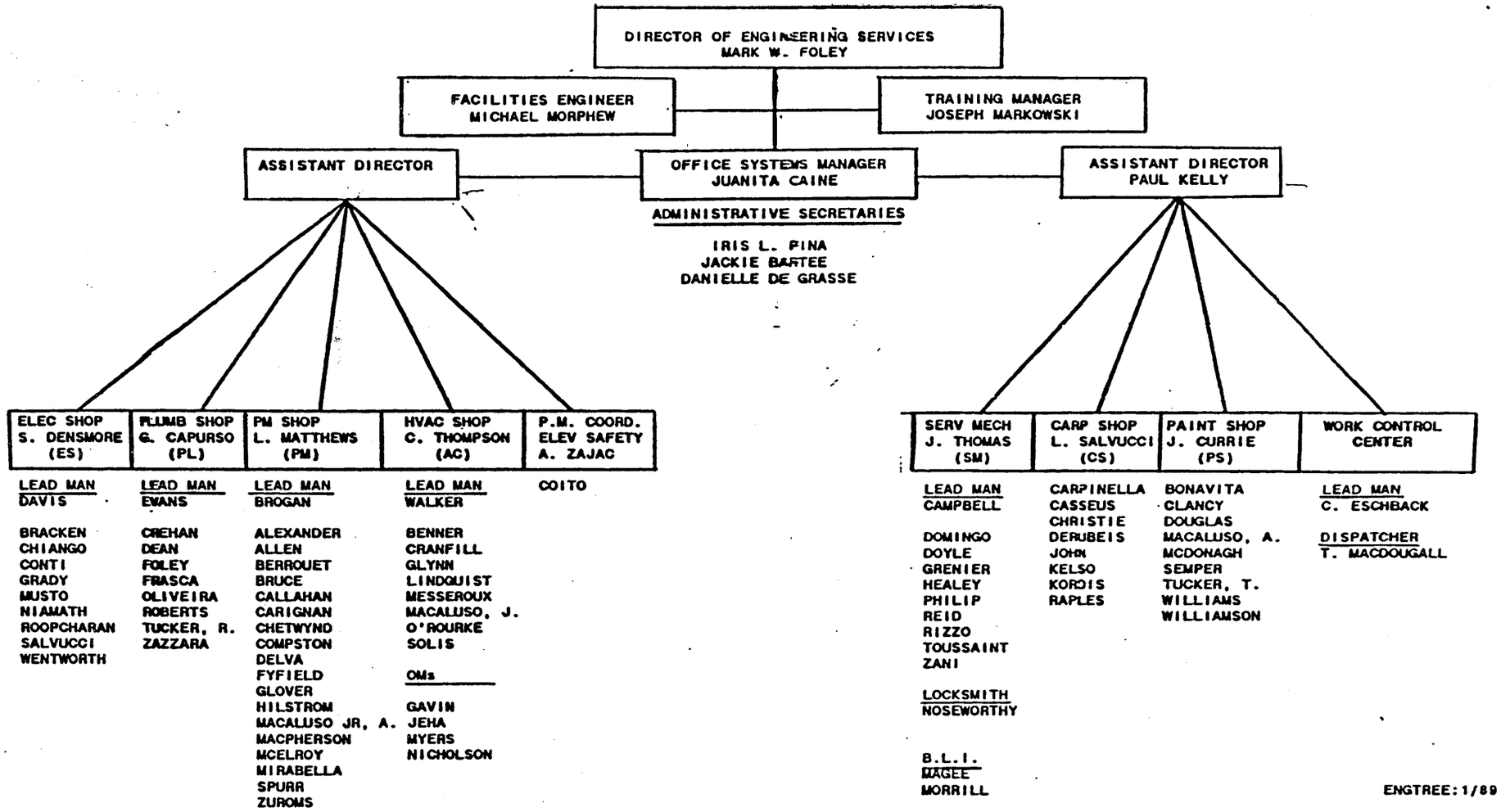
A good deal of progress has already been made at this hospital by way of energy management, though much remains to be done. Many of the older buildings are not metered for any of the services and substantial savings are forecast for further heat recovery installations with a payback of 3.2 years. Total savings of some £85,000 are anticipated from lighting installation conversions and these have payback periods varying from 1.1 to 2.2 years.

Recent conversion of the constant volume air handling system in the bed tower core area to VAV with variable speed fans is forecast to produce annual savings of some £92,000 and have a payback period of 2.8 years. In the same block, annual savings of some £34,000 are expected with a payback period of 1.7 years following the re-balancing of perimeter air handling units.

From data provided by the Estates Officer, estate costs per square metre have been calculated as follows:

Estate Maintenance	=	£25.65/m^2
This includes some minor capital works and depreciation charges.		
Energy and Utility	=	£32.60/m^2

It was not possible to obtain data for energy usage at this hospital.

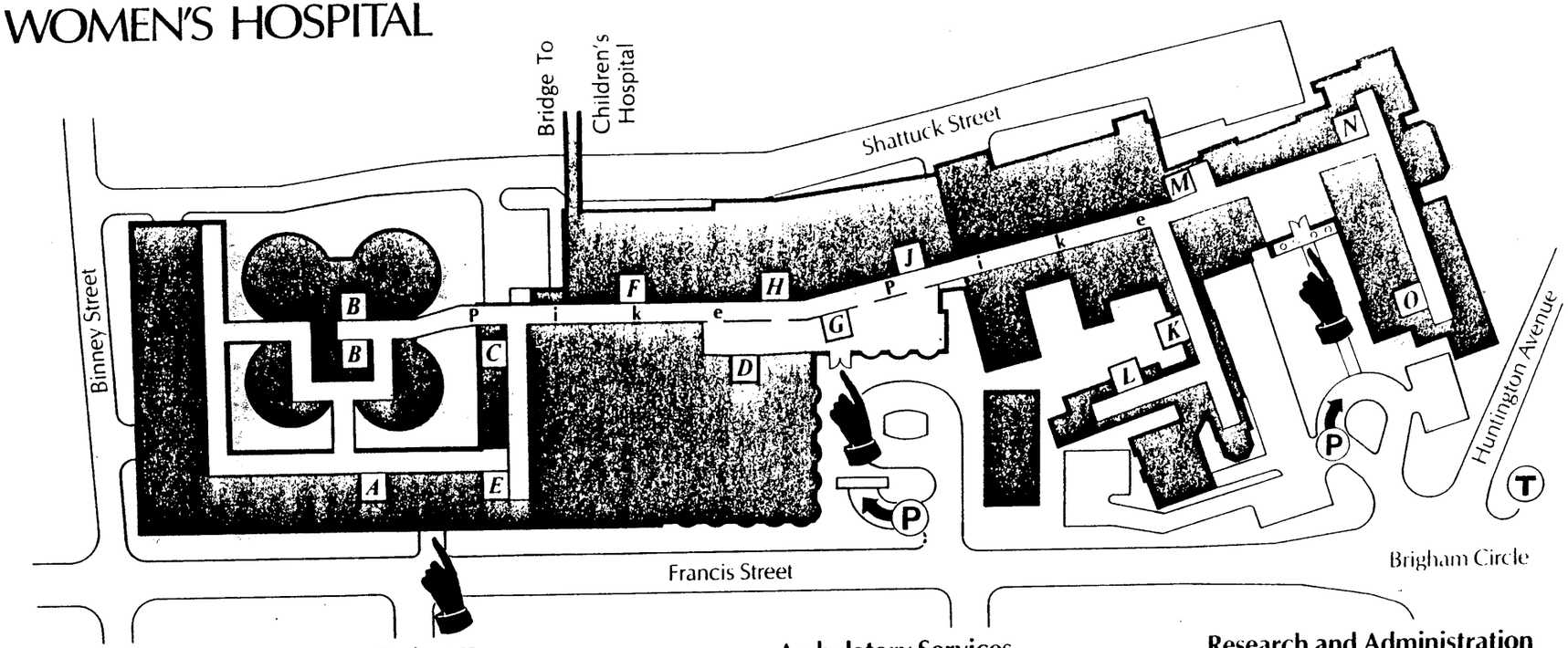


ENGTREE:1/89

TOTAL NO OF STAFF IN POST = 105

ENCLOSURE NO 8.2.1

BRIGHAM AND WOMEN'S HOSPITAL



Patient Tower
75 Francis Street

Ambulatory Services
45 Francis Street

Research and Administration
15 Francis Street

How to Use This Map

The hospital has three main entry points: Patient Tower, Ambulatory Services and Research/Administration. All are located along Francis Street. Once inside the hospital, follow the directional signs to the elevator closest to your destination. Once in the elevator go to the correct floor and follow the local signs to your destination.

Legend

- Elevators A–O
- (P) Parking
- (T) MBTA Green Line
- Main Entry Point

- Patient Tower
- Ambulatory Services
- Research and Administration

ENCLOSURE NO 8.2.2

8.3 MASSACHUSETTS GENERAL HOSPITAL (MGH)

This is an acute hospital with 1081 beds, was founded in 1811, and has a world reputation for medical research. The hospital is part of a large business organisation, the General Hospital Corporation which includes the MGH, the Institute of Health Professional Inc, the MGH Professional Services Corporation, the McLean Hospital Corporation and the Spaulding Rehabilitation Hospital Corporation.

The Massachusetts General Hospital Annual Report for 1988 quotes a total operating revenue for the General Hospital Corporation as $479,072,000 or some £299,420,000. The percentage spent on hospital services is given as:

Diagnostic and Therapeutic Services	=	50.6%
Nursing Care	=	17.7%
Plant and Equipment (including depreciation, interest, energy, telephones and maintenance)	=	10.9%
Room and Board Service	=	7.7%
Administrative Services	=	13.1%

The American Hopsital Association year book for 1989 quotes the hospital as having 34,075 admissions, an annual operating expense of $334,951,000 or some £209,334,000 and personnel totalling 8,243. The cost per bed can thus be calculated as $309,853 or £193,658 per year. See Appendix No 9.

The main hospital complex comprising 21 buildings with a total area of 2.2 million ft^2 is located on a 10.1 acre site in the old part of Boston near the entrance of the Charles River. The oldest building of the complex dates back to the 1820s. There are however other facilities away from this site including a 300,000 ft^2 research unit at the Charlestown Navy Yard. This houses the MGH Cancer Center and a Renal Research Unit. A Certificate of Need has been granted by the Commonwealth of Massachusetts for a new MRI Unit and this has been installed on this site. Plans are in hand for other developments that will double the present floor area of this research facility.

In addition, there are small outpatient hospitals of Chelsea, Charlestown and Revere plus an 80,000 ft^2 warehouse at Somerville.

Efforts are being made at MGH to tackle space allocations. This is the responsibility of a Space Committee under the chairmanship of a Vice President, all new or vacated accommodation is allocated by the committee to an agreed development plan. However there are no plans as yet to extend this system to a space utilisation review on the lines currently being undertaken in the NHS.

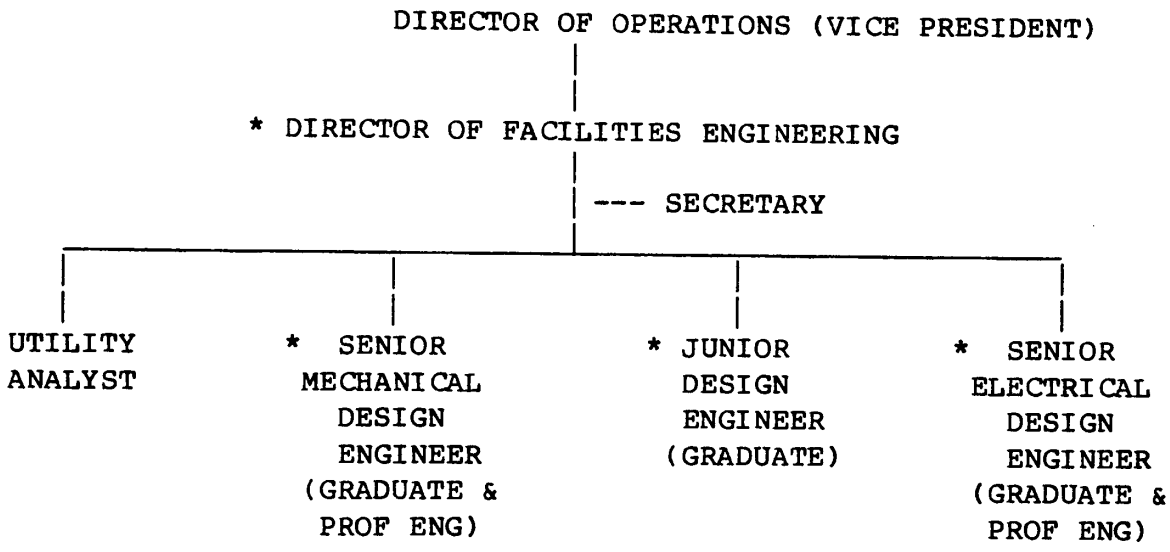
In common with many of the large organisations MGH carried much of its own insurance and deductions are made from departmental budgets to cover these costs.

In estate terms there are separate groups for Planning, Construction, Facilities Engineering and Building and Grounds Maintenance Groups, and meetings were arranged with Group Directors.

FACILITIES ENGINEERING GROUP

The Director of Facilities Engineering is involved with the long term review of all aspects of code compliance, city and national codes, and accreditation along with long term facilities planning. This group are also heavily involved in the review of designs for new construction and large adaptations, they also have a small capacity to carry out in-house designs.

FACILITIES ENGINEERING COMMAND STRUCTURE



* These engineers are described as facilities engineers and as such are expected to be skilled in all aspects of building services. Where necessary, ie in the case of new starters, suitable training courses would be provided including industrial sponsored courses and those organised by the NFPA. On-the-job training would also be provided.

The last ten years have been ones of extraordinary growth and change in which pressure was brought to bear to modernise and upgrade the facilities in order to comply with the requirements of the Department of Health and Human Service, Public Health and the JCAHO. In 1979 four units, comprising 150 beds, have been fully modernised. The others remained sub-standard in estate terms but not in terms of medical care. The hospital was also considered to be extremely crowded with insufficient space for its needs in terms of research, administrative office space and private practice space (1).

A comprehensive re-building and development programme was drawn up and is now well underway. A 24 storey tower block is currently being built and this will replace some of the most antiquated in-patient accommodation. Funds for this development programme are being raised under the "Campaign to Re-build MGH" which has a target of $169 million. As of February 1989 the funds stood at $147,200,000 with over $16 million being gifted or pledged during 1988.

Essential features of the re-build and development programme have included the introduction of new engineering services and the reduction of the cost of utilities by better energy management, the latter being seen as a form of income generation. The cornerstone of this programme was the introduction of a computerised energy mangement system. Following an extensive study of systems and manufacturer, a local manufacturer was chosen, Andover Control Systems, and installation of the equipment has progressed on an incremental basis. This system now controls the heating ventilating and air conditioning plant and equipment, remote alarms and indication, fire alarm system and security.

The opportunity was also taken to rationalise the electrical supply system. Previously there had been five 13,800/480 volt sub-stations each with their own high voltage intake resulting from previous piecemeal development. This arrangement had insufficient capacity for the planned development, it was inflexible and operated on an expensive tariff as all the transformers belonged to the supply company.

The overall capacity of the system was increased in the new scheme by the introduction of three 10,000 KVA capacity intakes from the Boston Edison Company into a new primary switching station where HT metering was installed. All the existing transformers were purchased by MGH along with some of the HT cable and a new distribution system set up. After purchasing this equipment, unforeseen capital expenditure was required in order to combat previous poor maintenance practices and involved the replacement of a number of transformers that were found to contain PCBs.

(1) Director of Facilities Engineering Report on Utility Cost Management at MGH dated 21/3/89, p2

Other improvement schemes have included the replacement of three 770 ton steam absorption chillers with three 1050 ton centrifugal machines. In some areas constant volume air distribution system have been replaced by VAV systems. In appropriate areas of the hospital automatic lighting controls have been installed along with override switches.

Two 60 KW mini-cogeneration units have been installed, each driven by an automobile engine powered by natural gas. The engines drive induction generators with their outputs connected to the hospitals 480 volt network. The waste heat from the engines being used to assist with the space heating load and domestic hot water.

Many other examples of this combined package of refurbishment and energy management work could be given but the eye catching scheme is the replacement of the steam supply system.

MGH does not have its own steam raising plant but had traditionally purchased heat from the Boston Edison Company, later to become the Boston Thermal Company. One of the early drawbacks with this supply was the lack of a condensate return which meant that hot water had to be dumped. However the Boston Water and Sewer Regulations do not allow water above 130°F to be put into their network and at one time cold water was added in order to meet the regulation. Re-heat systems were later incorporated and on the whole these were successful, but as recently as 1988 some cold water was still needing to be added.

With a poor tariff, plus condensate problems, a search was made for an alternative supply and in 1984 discussions started with the Cambridge Electric Company, which supplies electric power to most of the City of Cambridge. Negotiations were also necessary with other interested parties for wayleave and with various historic trusts. With final approvals obtained, a 14" diameter steam pipe and a 6" condensate return were routed across the Broad Canal in Cambridge, to the Longfellow Bridge which was used to cross the Charles River into Boston, a total route length of over $^{3}/_{4}$ of a mile. Expansion loops were installed on the bridge so as to avoid the use of expansion joints in such an awkward situation.

For the financial year 1988, steam was supplied to the hospital at the rate of 284,971 million lbs/year at 200 psi and a temperature of 240 to 250°F.

Over the past ten years over $10.0 million have been invested in energy conservation schemes with savings averaging some $1.1 million per year. In 1979 the energy PI for the hosptial was 358,000 BUTs/gross ft^2 and in 1988 this had been reduced to 241,000 BTUs/gross ft^2.

As a general rule the group aim, where possible, for payback periods is 2 to 3 years and many more schemes are planned.

BUILDING AND GROUNDS MAINTENANCE GROUP

The Director of Building and Grounds is responsible for the maintenance of buildings and engineering, bio-medical equipment but excluding x-ray and MRI, roadways, grounds and gardens and minor upgrades. The Group is seen to "own" all the assets it maintains.

A general review of maintenance services was underway during the time of the visit and in this respect the timing was unfortunate. The review is examining all forms of maintenance contracts, the cost of which are currently running at some $1.5 million or about £937,500. These are handled by various departments for the same or similar types of services and in many cases it is thought that the work could be done as well and cheaper by in-house staff or by arranging more competitive contracts. The apparent intention is to bring all this work under the control of the Director of Buildings and Grounds.

As in all other private hospitals visited, there is a planned maintenance programme for all the building services, fixed plant and equipment - lifts being maintained by outside contractors - and for this equipment full asset lists are maintained. However this is not the case for bio-medical equipment for which there is no asset list and consequently it is not known whether all the equipment is being maintained or not; this is another area that is to be reviewed.

Large x-ray and the MRI equipment is owned by the user department and they arrange the maintenance contracts. A similar situation applies with regard to all loose items of equipment for which no records are kept.

With regard to emergency electricity supplies, many of the buildings forming the hospital complex have their own system and are fully protected. In others there is only seen to be a need to protect essential services, including some lifts. All these systems operate independently and there is no overall plan or schedule detailing standby provision. This is a further area that is being looked at and accurate records prepared of what is being protected.

Income generation is seen to be an important feature of the work of this group, these funds being generated by carrying out minor capital schemes for other client departments. Each department has their own capital budget (defined as jobs costing over $2,500 or some £1,563) and have a free choice on who will design and carry out the work. The Building and Grounds Group are able to "tender" for this capital work up to a limit of $150,000 or some £93,750 and income from this source last year was around $2.5 million. With these arrangements the cost of the work charged reflects something approaching a commercial rate and hence a profit is generated. As an example, a tradesman may be paid $14.0/hour and with on-costs the charge to the Group budget would be about $18.0/hour but for contract work a charge of say $30.0/hour would be made. On the completion of a job an invoice will be generated on the Group's computer and this would be passed to the client department. In effect these are paper charges, but the Group maintain that work done in this way saves the hospital money.

The broad areas of responsibility of the Building and Grounds Maintenance Group are further described in the Command Structure shown below. The work of the Group on the building service equipment on the main campus is carried out by the staff under the control of the Operations Manager. All this work is carried out by tradesmen following traditional working pratices and there is resistance to the introduction of multi-skilling.

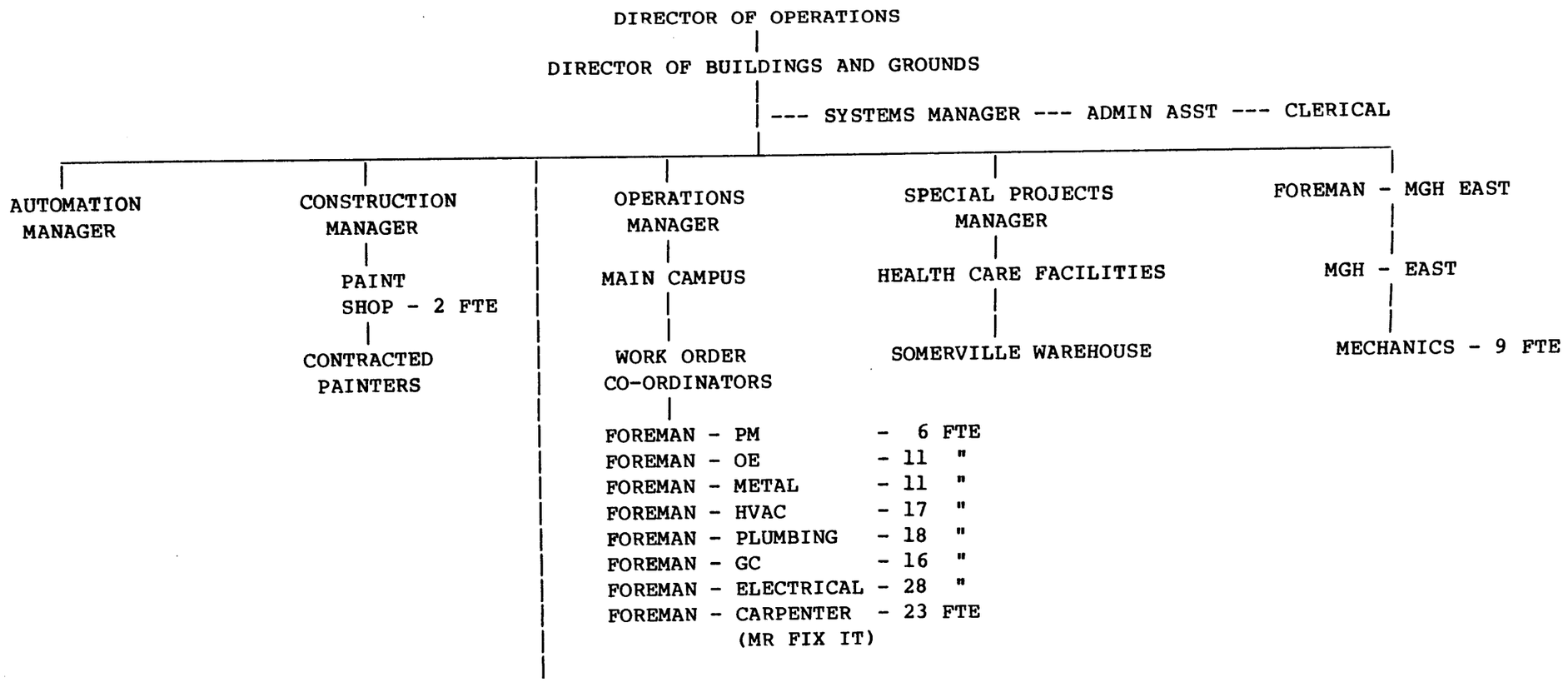
In contrast, the nine staff at the new research unit in the Charlestown Navy Yard have all agreed to operate a multi-skilling method of working and no difficulties were reported at the time of the visit.

The Group's total operating expenses for the financial year 1988/89 are quoted as some $7.67 million or approximately £4.78 million. Approximately 65% is said to cover salaries and fringe benefits. The remaining 35% non-salary items, inventory, office supplies, insurance, uniforms etc.

The $2.5 million quoted earlier coming from capital contracts is not included in the above.

It has not proved possible to calculate maintenance costs per unit area for this hospital, nor was it possible to arrange a tour round any part of the hospital.

Owing to a number of problems, including a very tight schedule of visits, it was not possible to look in at the work on Planning and Construction, however it is felt that a good representative flavour of the estate operations at the hospital has been obtained.



TOTAL ESTABLISHMENT - 180 FTE

COMMAND STRUCTURE OF BUILDINGS AND GROUNDS MAINTENANCE GROUP

MASSACHUSETTS GENERAL HOSPITAL

US2AAB

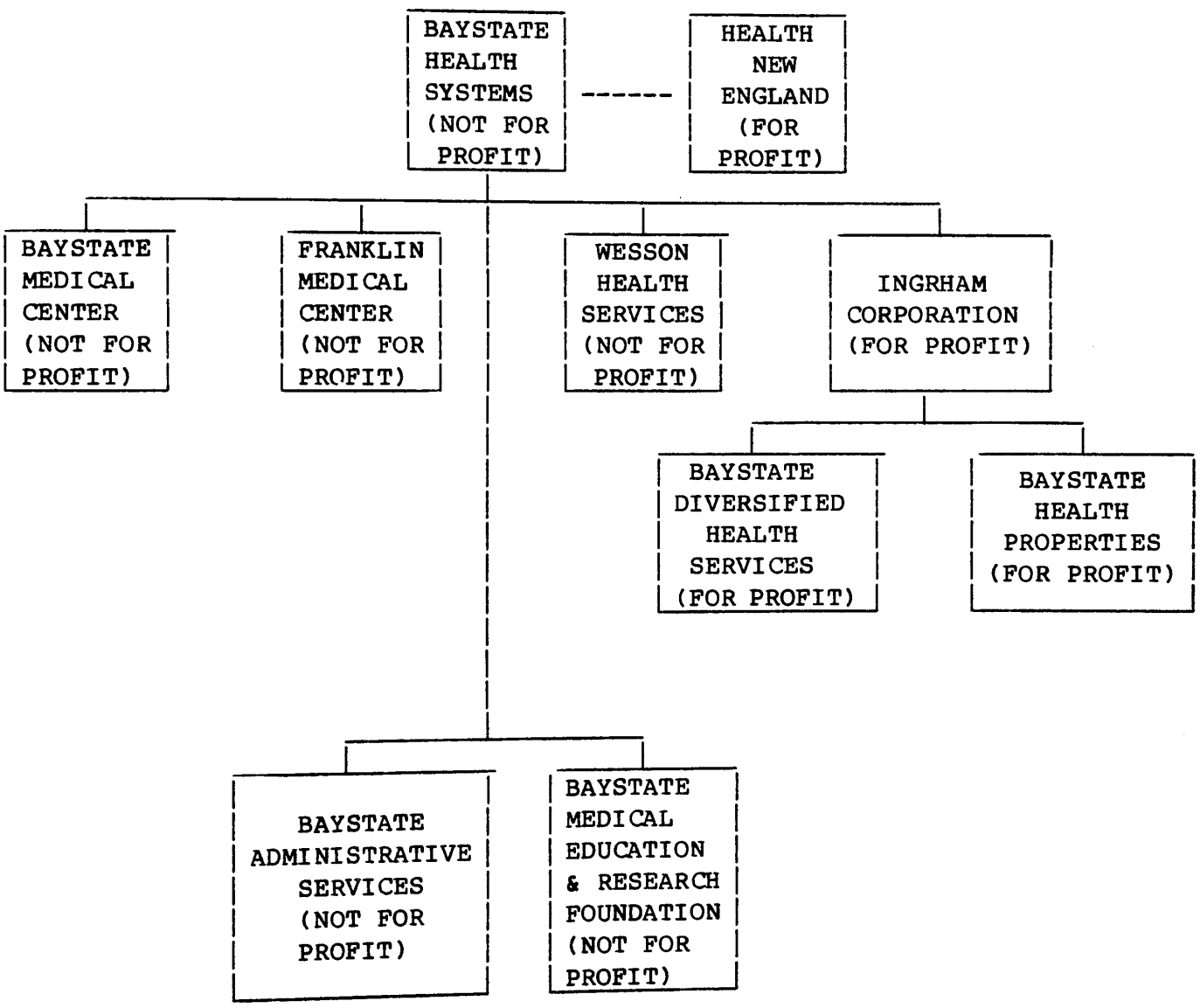
ENCLOSURE NO 8.3.1

8.4 BAYSTATE MEDICAL CENTER

This is a 741 bed acute hospital established in 1893 and located at Springfield in the west of the state of Massachusetts in the Connecticut Valley. The complex is a mixture of new and renovated accommodation, the centre piece being the centennial building opened in 1986 at a cost of $66.8 million or some £41.76 million.

The hospital is affiliated to Tufts University in Boston and is the Western Campus of Tufts Medical School.

As shown below the hospital is also part of a Baystate Health System which is a grouping of hospitals and other health related companies. The alliance is designed to provide benefits of shared management talent and gives the financial and political leverage available to large companies.



BAYSTATE HEALTH SYSTEMS & ITS MEMBER ORGANISATIONS

The Administrative Engineer (the Estates Officer) explained that he is responsible for all building and engineering services, furniture and grounds and gardens, but he is not responsible for any biomedical equipment, x-ray equipment or sterilizers. He also explained that he is not responsible for the maintenance of laundry equipment as this department employs its own mechanic. The total staffing complement of the Engineering Department is shown on the attached command structure, Enclosure No 8.4.1.

Certain members of staff are expected to be multi-skilled and thse are the two general supervisors, the Director of Engineering and the Director of Project Management. The Energy Manager/Chief Engineer and his Assistant are expected to have a broad understanding of boiler plant, controls and energy management systems. The Administrative Engineer is a professional mechanical engineer and has a broad understanding of building services systems and techniques.

The department operates a planned maintenance routine for all the plant and equipment with work order being produced on a main frame computer. This machine operates a batch processing on a 30 day cycle and is no longer suitable for the needs of the department. The intention is to move to a dedicated multi-purpose PC in the near future. At the moment it is not possible to determine productivity rates and it is hoped the new PC will get round this problem.

All the planned maintenance work is carried out by a dedicated crew of five men, none of whom are licenced tradesmen but are flexible and carry out a range of cross-trade work. However if a job requires the attention of licenced tradesmen the work would be referred back to the appropriate section.

Accurate record drawings are held for all buildings on the site. All the accommodation is named and rooms coded by building, floor and room number. At the time of the visit a start had been made to put this information onto the CAD system along with other data such as room function, floor area and departmental cost centre. In this form the information will be particularly useful to the Engineering Department for identifying the type and location of equipment. It will also prove useful to the Finance Department for identifying departmental function, cost and floor area, this information being needed when applying for reimbursement to the state. The system will also be used by environmental services again identifying department and floor area so as to establish cleaning standards for various departments, along with cleaning times and manning levels.

Some five years ago a Contract Energy Management Company carried out a survey of the complete site and identified £1.5 million or some £937,500 worth of improvement work. A contract was entered into and the hospital is currently receiving $400,000 or £250,000 per year in shared profits. This payment is at the rate of 70% to the consultant and 30% to the hospital over a 10 year period.

As part of the energy conservation scheme the consultant installed an energy management system (Andover Controls) and this now controls some 25% of HVAC equipment. Unfortunately the contract for the controls in the new centennial building had been agreed at that time and incorporated a system using stand alone intelligent controls and these are not compatible with the Andover equipment.

In 1980 an incinerator plant was installed and since then has had to be upgraded twice to meet new emission standards. The unit was installed to burn all the hospitals pathological and infectious waste and now take the waste of 38 different customers as it is the only unit in the area with a licence to operate, all the others having been closed down by the Department of Environmental Quality Engineering (DEQE). The current list of customers include other hospitals and clinics, private GPs, dentists and the Police Department who use it to burn drugs.

Initially the unit was purchased as a means of income generation through cost avoidance as it was expensive to have the waste removed, current cost of waste removed in approximately 45 centres and 28.125p per lb. The cost of operating the plant currently runs at 18 cents or 11.25p per lb.

The hospital generates some 18,000 to 20,000 lb of infectious waste per week and on average some 6,000 lb is brought in from outside. The plant operates 80 hours per week. The exhaust gases leave the unit at a temperature between 2,000 and 2,300°F, and are then passed through a waste heat boiler and into the smoke stack of about 500°F. The heat given up generates some 4,000 lbs of steam per hour at a pressure of 100 psi and this passes into the common steam distribution system from the hospital boiler plant.

The Estates Officer commented that they had had many problems with the plant and in his opinion the most critical feature of the system was the person operating the plant. It is essential he said that the operator is properly trained and has some understanding of the mechanics of the plant. The second important problem is that of internal ash migration which is necessary if the plant is to run for 24 hours a day without shut down. The ash must move from the charging door across to the ash removal area and it is critical since it cannot be removed manually unless the plant is shut down and allowed to cool for 24 to 36 hours.

There is a Project Design Section within the Department which is responsible for carrying out minor improvements and renovations. This section is funded at the rate of $2.0 to $2.5 million or £1.25 or £1.56 million per year. These funds are part of the Department's operating expenses and are provided on an annual basis with other maintenance funds. For larger or more complex projects outside consultants would normally be called in and in these cases the fees are part of the project costs.

The JCAHO accreditation team were due to inspect the hospital in late 1989 and no problems were expected. At the last inspection, three years ago, the estate was given a very favourable report, unlike the previous two reports which contained a lot of contingencies. These were mainly confined to older buildings and were mainly related to fire and safety items. Feasibility studies were carried out and it was considered that it was a better option to build new than try to bring a 1930s building up to current health care standards.

With regard to the JCAHO inspections the Estates Officer expressed the view that these are done in a very professional manner, even though the inspector is not an engineer but a professional adminsitrator. One of the earlier complaints had been about a lack of smoke stopping through fire walls; these had been deleted in service ducts and ceiling voids and were unknown to the staff. He commented that certain inspections have 'pet areas' they like to concentrate on, but in general they are very well briefed and do a good professional job.

One of the duties of the Estates Officer is to provide estates advice at the planning and feasibility stage of new projects. In this respect he works closely with the Hospital Planning Department which is made up of a nurse, a laboratory technician, an administrator and a health planning nurse. This team is responsible for service and programme planning as well as facilities and construction planning for the hospital.

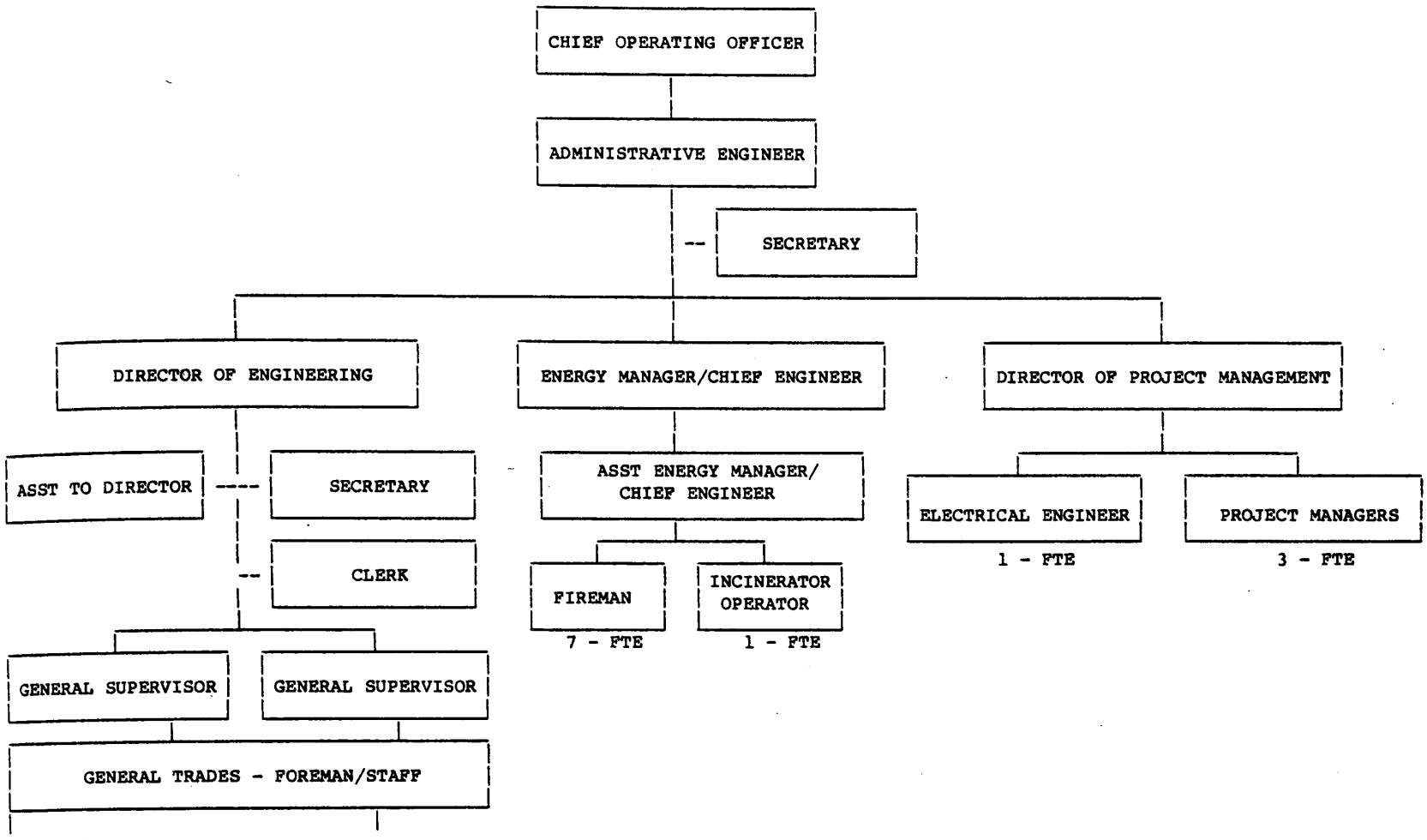
MAINTENANCE COSTS

For the financial year 1988 the maintenance cost is calculated as $\$2.83/ft^2$ or some $£19.03/m^2$.

The cost per sq ft for utilities including fuel oil, electricity, gas and water is $\$1.93/ft^2$ or $£12.98/m^2$.

BAYSTATE MEDICAL CENTRE

ENGINEERING DEPARTMENT ORGANIZATIONAL CHART



1 NO - ELECTRICAL SUPERVISOR
1 NO - LEAD ELECTRICIAN
5 NO - LICENCED ELECTRICIAN
3 NO - UNLICENCED ELECTRICIAN
1 NO - ELECTRICAL HELPER

1 NO - CARPENTRY SUPERVISOR
7 NO - CARPENTERS

1 NO - PAINTING SUPERVISOR
6 NO - PAINTERS

1 NO - PLUMBING SUPERVISOR
3 NO - LICENCED PLUMBERS
4 NO - UNLICENCED PLUMBERS

1 NO - GROUNDS SUPERVISOR
5 NO - GROUNDS KEEPERS

1 NO - MECHANICAL SUPERVISOR
13 NO - MECHANICS

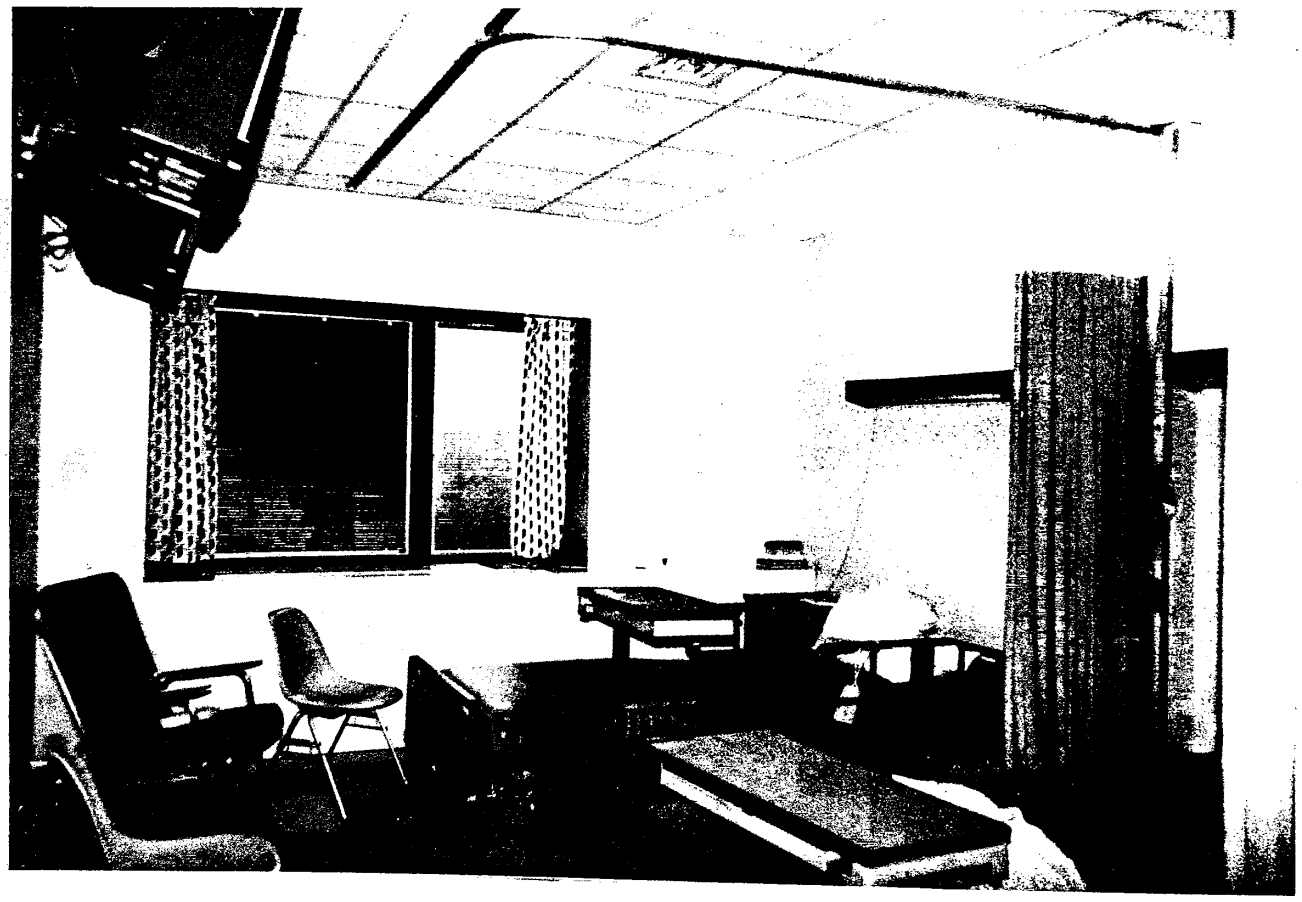
1 NO - PREVENTATIVE MAINTENANCE SUPERVISOR
9 NO - PREVENTATIVE MAINTENANCE MECHANICS

1 NO - HVAC/REFRIG SUPERVISOR
5 NO - LICENCED REFRIG TECHNICIANS
2 NO - UNLICENCED REFRIG TECHNICIANS

1 NO - MASTER MASON

ST JOHN'S HOSPITAL, LOWELL MA

HOSPITAL NURSING STATION



A GENERAL LAYOUT OF SEMI-PRIVATE PATIENTS ROOMS

US3AAA

8.5 ST JOHN'S HOSPITAL, LOWELL MA

This modern Catholic hospital was founded in the late 1860s to help serve the people of what was then a thriving textile town, along with the other members of the population of the Merrimack Valley. This is a general mission the hospital seeks to continue and in their annual report for 1988 the Chairman of the Board of Trustee and President both spoke with pride of the hospital's achievements and with optimism about their future developments. The point was made that in spite of all the financial, regulatory and technological pressures the quality of care had not dropped and that they had a "viable bottom line at a time when few hospitals have accomplished this".

A copy of the published balance sheet is printed below at Enclosure No 8.5.1 and the various data will be of general interest. A number of entries involve the estate including energy and maintenance etc and depreciation expense. The total cost of estate maintenance cannot be identified from this data as costs are spread over a number of headings. However other data from the hospitals accounts indicate that the cost of maintenance for the financial year 1988 was at the rate of £20.02/m^2 and the cost of utilities, ie energy and water was at the rate of £17.29/m^2.

A general description of the hospital plant and the maintenance routine was provided during discussions with the Estates Officer. The steam raising plant at this hospital is designed to burn No 6 (residual) oil and natural gas. This arrangement was typical of the majority of hospitals visited, the usual arrangement being that gas is burned in the summer, on a lower tariff switching to oil in the winter. However, during 1988 the price of oil fell below the gas price and this hospital switched back to oil. The No 6 heavy oil storage tanks are fitted with steam heating coils and pipelines have trace heating.

Main plant details are as follows:

Boilers:	3 x 32,000 lb/hr, 125 psi
Electricity Standby:	2 x diesel powered units each rated at 500 KW 480V 60 Hz
Chiller Plant:	2 x 800 ton, electric driven
Oil Capacity:	40,000 gallons No 6 10,000 gallons No 2
Lifts:	9 Ward Leonard drive 2 Hydraulic

Sterilizer:

2 steam) in CSSD
1 ethylene oxide)
4 flash steam units) in OR
1 utensil washer/sterilizers)

The building is fitted with a sprinkler system that is fed at mains water pressure for the Ground and First Floors, all other floors are fed by fire pumps at a pressure of 125 psi.

The hospital's organisational chart is shown below at Enclosure NO 8.5.2 and it will be seen that the Vice President for Operations and Legal Affairs is responsible for a number of departments including Engineering and Maintenance ie Estates. A further indication of the size of the organisation can be gained from the data in the AHA Year Book for 1989 which quotes the hospital as employing 734 staff.

The organisational chart of the Engineering and Maintenance Department is also shown at Enclosure No 8.5.3 and excluding the telephone system staff the Department has a complement of 25.7 wtc staff.

In order to get a better understanding of the workings of the Department an outline of duties and qualifications required for a number of the posts shown is given below. These duties would be similar in most respects to those at other hospitals.

ADMINISTRATIVE ENGINEER

Duties

Under the administrative direction of the VP, Administrative Services, plans co-ordinates and directs the activities of the engineering Department including structural modifications, inside and outside maintenance of hospital facilities and property, installation, maintenance and repair of utilities and mechanical equipment, and the operation and maintenance of the power plant.

Provides engineering expertise and assistance to the hospital administration and department heads in planning and implementing physical expansions and modifications to the property, or changes in mechanical equipment or systems to ensure maximum efficiency and timeliness of the change.

Interprets and ensures adherence to JCAHO regulations, life safety codes, OSHA and various federal, state and local building codes.

Plans, co-ordinates and implements inter-department projects and activities to ensure the availability of staff and materials to complete the work with the least disruptive effect on the area or department for which the work is performed.

Orders equipment, machinery, building materials and maintenance supplies, and provides for accurate control of inventories.

Represents the hospital in arranging for and working with outside service or installation contractors.

Develops and implements preventive maintenance programmes and integrates them with the department heads to keep down-time at a minimum.

Develops specifications, drawings, schematics and plans as required for construction alterations or installations, prepares bids and reviews them for compliance with various codes.

Works in close co-operation with the Director of Security and Safety to analyse safety and security problems and take appropriate corrective actions, serves on safety, equipment control and infection control committees.

Participates in the formulation and revision of codes and standards that may have an effect on the hospital and health care functions of the Engineering and Maintenance Department.

Reviews and determines the final disposition of requisitions for bio-medical electronic, electrical and mechanical equipment for use in the hospital.

Oversees the selection, training, scheduling and evaluation of the maintenance staff and firemen through others.

Reviews performance appraisals made by the maintenance supervisor, approves wage adjustments and assists to resolve disciplinary problems.

Performs special projects and other related duties as required or assigned.

Basic Knowledge

The equivalent of a BS in Engineering and complete knowledge of building and safety codes and regulations as they apply to hospitals in Massachusetts.

Experience

Minimum of 7-10 years of progressive maintenance engineering experience in a hospital or institutional setting including two or more years in an administrative capacity.

Independent Action

Develops short and long range plans and objectives within the scope of hospital-wide policies and goals. Consults with superiors on specific matters for clarification, interpretation or exception to hospital-wide policy may be required.

Supervisory Responsibility

Responsible for a staff of 22-25 employees.

ELECTRICIAN

Duties

Under the supervision of the Supervisor of Building Maintenance, plans and performs electrical installations, maintenance inspections and repair duties necessary in wiring circuits and other aspects of the Hospital electrical systems.

Installs and maintains lighting and electrical power circuits, apparatus, fixtures, etc.

Installs telephone equipment in accordance with local codes.

Installs bio-medical equipment such as cardio monitors, defibrillators, electro-surgical units and cardiospacemakers.

Performs installations, maintenance and repairing on non-medical equipment such as various types of pump motors, fan motors, kitchen appliances and machinery and office equipment. Follows blueprints, schematics and manufacturer's specifications.

Maintains safety records and performance inspections on all electrical equipment throughout the hospital. Perform incoming inspection on all new electrical equipment.

Instructs and trains hospital personnel regarding electrical safety and use of equipment.

Orders and maintains sufficient stock supplies to meet requirements for assigned projects.

Directs other maintenance personnel as assigned to work on specific assignments or projects.

Responsible for following standard safety regulations and maintaining and leaving work area in a clean, safe and orderly condition.

May provide functional guidance to an apprentice or helper as part of an on-the-job training programme.

May be required to perform duties of lesser, equal or higher levels of responsibility.

Basic Knowledge

Use shop mathematics, fairly complicated wiring diagrams and specifications, range of electrical testing instruments. Knowledge of electrical principles and use of electrical measuring instruments. Equivalent to high school education, plus a four year apprenticeship training. Required to have Massachussets Electrician's Licence of Journeyman.

Experience

Five or more years related experience including training and experience with telephone systems.

Independent Action

Establishes own work plans to assure timely completion of assigned electrical work in conformance with established standards, situations lacking clear precedent are reviewed with supervisor prior to proceeding with assignment or project.

Supervisory Responsibility

May be responsible for directing several maintenance personnel as assigned.

MECHANIC

Duties

Under the supervision of the Supervisor of Building Maintenance, inspects, installs, repairs and replaces pipes, fittings and plumbing fixtures to maintain the heat, water, gas, drainage and other systems.

Follows written or verbal instructions, drawings, blueprints or diagrams according to established methods, procedures and safety standards, to plan, lay out, install, trouble shoot, repair, test and maintain various piping of the heating, water, gas and drainage systems of this hospital.

Makes daily check of the steam heating lines, reducing stations, section control stations and main line traps.

Makes repairs of plumbing and steam equipment as required or assigned.

Arranges with the Administrative Engineer for shutdown time for special repairs and annual preventive maintenance repairs, including the replacement of valves and trap elements.

Assists with repairs during annual shutdown.

Repairs sump pumps and other boiler feed pumps as required.

Responsible for following standard safety regulations.

May be required to perform related duties of lesser, equal or higher levels of responsibility.

Basic Knowledge

Equivalent of vocational high school education to master shop mathematics, complicated drawings, specifications, charts and tables. Knowledge of plumbing - pipefitting method techniques and equipment.

Experience

Must be licenced as a pipefitter by the Commonwealth of Massachusetts. Four years apprenticeship training plus two years as a licenced pipefitter.

Independent Action

Establishes own work plans to assure timely completion of assigned plumbing - pipefitting work in conformance with established standards, situations lacking clear precedent are reviewed with supervisor prior to proceeding with assignment or project.

Supervisory Responsibility

May be responsible for directing several maintenance personnel as assigned.

BIOMEDICAL EQUIPMENT TECHNICIAN

Duties

Under the supervision of the Administrative Engineer, provides the necessary technical expertise to evaluate, inspect, service and repair electronic and mechanical biomedical equipment throughout the hospital.

Performs critical inspections and tests on biomedical instruments and equipment prior to purchase to ensure compliance with the manufacturer's specifications and claims and the hospital's stated requirements.

Makes recommendations based on tests and inspections to ensure that equipment purchased will best meet the hospital's needs in terms of capability, durability, efficiency and cost effectiveness.

Performs tests as required to ensure equipment performs in compliance with regulatory agency and/or hospital standards.

Instructs the medical staff and other users in the proper use and general application of biomedical equipment.

Develops a schedule for preventive maintenance of equipment, services and repairs equipment as required, and keeps up-to-date records of these activities.

Oversees installation or maintenance of biomedical equipment performed by outside vendors to ensure compliance with performance and safety standards set by regulatory agencies and/or the hospital.

Performs periodic inspections and tests on electrical equipment throughout the hospital, makes adjustments and repairs or assists others as required in order to ensure the safety of patients, staff and visitors.

Performs other related duties and special tasks as required or assigned.

Basic Knowledge

Requires a thorough knowledge of electrical principles, the ability to read schematics, wiring diagrams and assembly instructions. Must have basic knowledge of physiology to understand the application of biomedical equipment and must be able to use a broad range of test and repair equipment. Equivalent to two years of formal technical education beyond high school.

Experience

Three to five years related experience. Must be certified by the Association for Advancement of Medical Instrumentation (AAMI) or other nationally recognised certifying body as a biomedical equipment technician.

Independent Action

None

Supervisory Responsibility

None

At the heart of the Department's operating philosophy is the policy and procedure manual and a feel for its contents can be gained from the copy of the index shown at Enclosure No 8.5.4, a number of these entries can be seen to be fulfilling the requirements of the JCAHO as previously outlined.

One of these policy documents, No E5 - Employer's Review, can be seen at Enclosure No 8.5.5 and it will be seen that the intention is to carry out a comprehensive review of the employee's knowledge and understanding of the maintenance and general hospital procedures.

One of the responsibilities of the Estates Officer is to recommend the purchase and/or replacement of capital equipment and in this he must follow the official hospital policy. A copy of the policy document Capital Equipment Requests is shown at Enclosure No 8.5.6. From this document it will be seen that a statement of need has to be provided along with an estimate of the useful life. In addition, for items costing over $1,500 further justification is needed along with estimate of installation and maintenance costs.

The proper use of this sytem is meant to ensure that the full capital and revenue costs of equipment are known at the time the purchasing decision is made and that equipment is not purchased without first ensuring that all the necessary services have been costed and will be available.

During an extensive tour around the hospital it was noted that the estate maintenance standard was high and this matched the specification of the original installation. General management arrangements appeared to be of equally high quality.

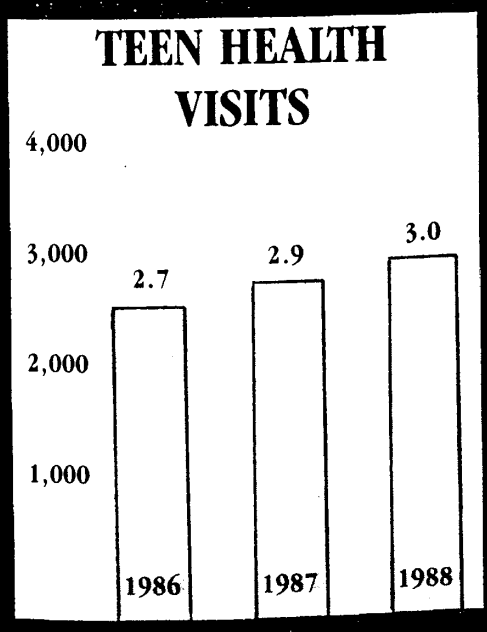
ENCLOSURE NO 8.5.1

REVENUES

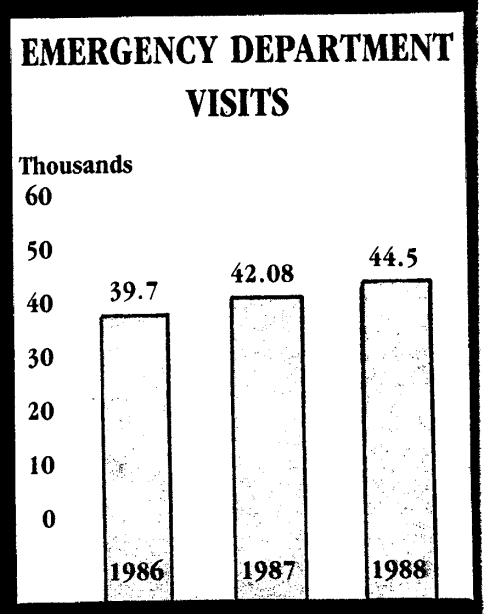
Medical Surgical Care	$ 13,025,085
Intensive Care	1,032,115
Intermediate Care	1,307,040
Pediatric Care	949,030
Special Services (Operating Room, Radiology, Laboratory, Pharmacy, Respiratory Therapy, others)	37,155,908
Less: Allowances to Third Parties	(11,855,602)
Charity and Free Care	(2,794,805)
Other Operating Revenue	796,313
Total Operating Income	**$ 39,615,084**

EXPENDITURES

Salaries, Wages and Benefits	$ 22,974,391
Medical and Surgical Supplies, Drugs	2,480,071
Housekeeping, Linens, Laundry	460,687
Food	677,720
Heat, Light, Power, Telephone, Maintenance, Etc.	1,259,776
Interest on Debt	886,284
Depreciation	1,673,966
Insurance	660,277
Other Expenses (Administration, Laboratory, Radiology, Respiratory Therapy, Pharmacy, Etc.)	8,509,889
Funds for Future Needs	32,023
Total Operating Expenditures	**$ 39,615,084**



Admissions	6,988
Emergency Visits	44,492
Operations	4,118
Surgical Day Care Procedures	1,956
Laboratory Tests	489,707
Radiology Tests	64,775
Mammograms	3,200
CT Scans	5,200
Magnetic Resonance Images	1,486
Vascular Lab Visits	769
Teen Health Visits	2,995
Pediatric Health Visits	1,577
Physical Therapy Treatments	12,672
Occupational Therapy Treatments	1,399



This annual report was produced by the Public Relations Department of St. John's Hospital.
Sister Maria Loyola, C.S.M., President
Linda H. MacCracken, Vice President, Planning & Marketing
Loyce O. Lawlor, Director, Public Relations
Andrea M. Turner, Public Relations Assistant
Design: Communication Concepts
Photography: Kevin Harkins

ST. JOHN'S HOSPITAL ORGANIZATION CHART

- BOARD OF TRUSTEES
  - MEDICAL STAFF
  - PRESIDENT — SISTER MARIA LOYOLA, C.S.M.
    - MEDICAL DIRECTOR — THOMAS J. MCNAMARA, M.D.
    - GEORGE KOLLER — EXECUTIVE VICE PRESIDENT

VICE PRESIDENT DEVELOPMENT — BERNARD A. STREETER, JR.
- AUXILIARY GROUPS LIAISON
- COMMUNITY HEALTH EDUCATION
- COMMUNITY RELATIONS
- GIFT SHOP
- HOSPITAL DEVELOPMENT
- MARKETING
- PASTORAL CARE & EDUCATION
- [redacted]
- VOLUNTEER SERVICES

VICE PRESIDENT OPERATIONS & LEGAL AFFAIRS — WILLIAM DONALDSON
- DISASTER PLANNING
- ENGINEERING & MAINTENANCE
- LABORATORY SERVICES
- LINEN SERVICES
- MATERIAL MANAGEMENT
- MEDICAL BUILDING LIAISON
- MEDICAL RECORDS
- QUALITY ASSURANCE
  - DISCHARGE PLANNING
  - UTILIZATION REVIEW
- RADIOLOGY SERVICES
- SAFETY PROGRAM
- SECURITY

VICE PRESIDENT OPERATIONS — RICHARD B. PEDIGREE, JR.
- CARDIO/VASCULAR SERVICES
- ELECTROENCEPHALOGRAPHY
- EMS SYSTEMS LIAISON
- FURNISHINGS & FUNCTIONS
- GENETIC COUNSELING
- HEALTH SCIENCE LIBRARY
- HOUSEKEEPING
- MEDICAL STAFF LIAISON
- OCCUPATIONAL THERAPY
- PHARMACY
- PHYSICAL THERAPY
- RESPIRATORY SERVICES
- RISK MANAGEMENT
- SOCIAL SERVICES

VICE PRESIDENT NURSING SERVICES — SR. ANN MACKENZIE
- INPATIENT NURSING SERVICES
- AMBULATORY NURSING SERVICES

- HUMAN RESOURCES
  - EMPLOYEE HEALTH
  - EMPLOYEE RELATIONS
  - PERSONNEL
- FOOD SERVICE
- MANAGEMENT ANALYST
- NURSING HOME LIAISON

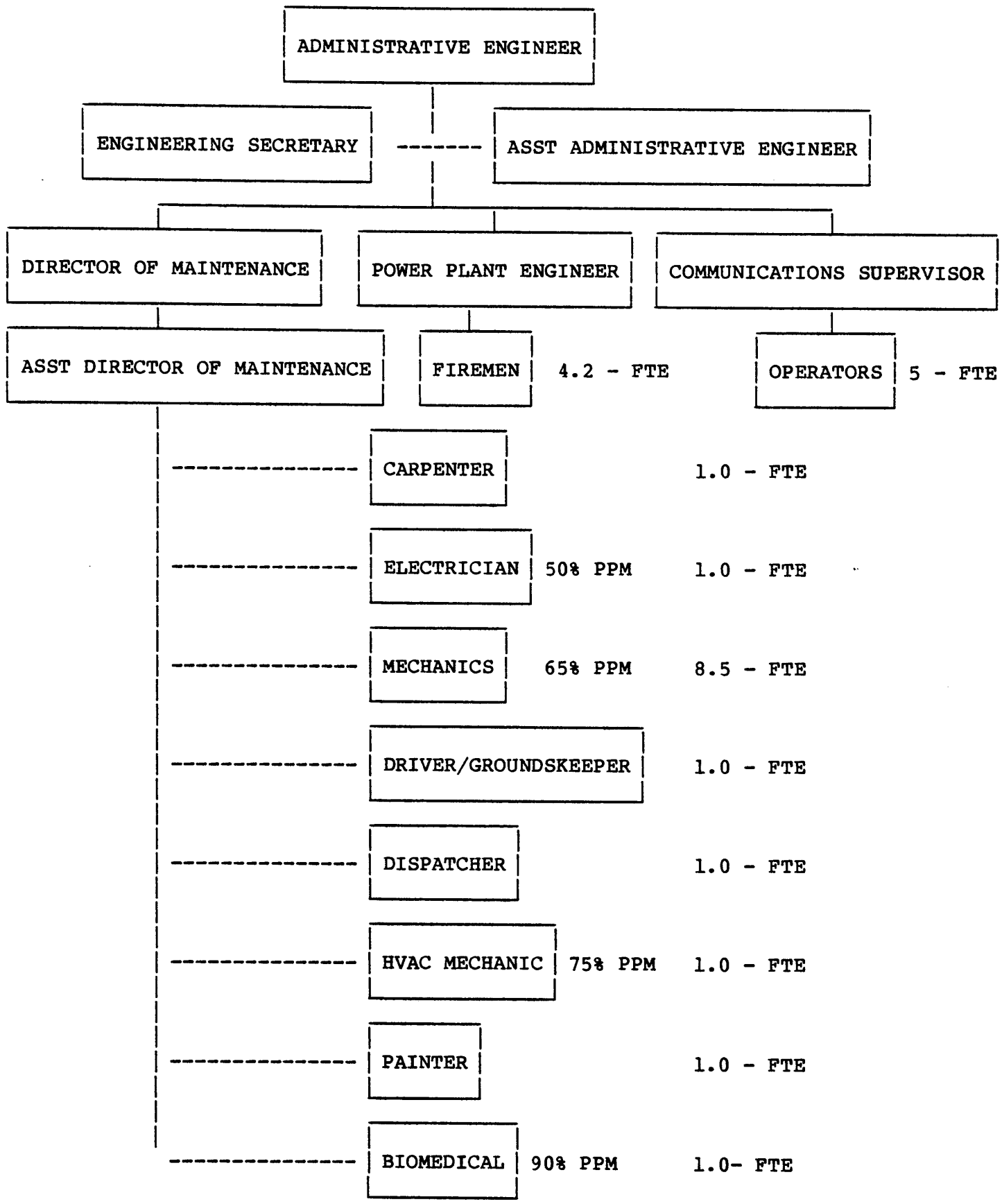
VICE PRESIDENT FINANCE — HAROLD L. LEE, JR.
- ASST. VICE PRESIDENT PATIENT AFFAIRS
  - ACCOUNTS RECEIVABLE
  - INPATIENT ADMITTING
  - OUTPATIENT ADMITTING
- CONTROLLER
  - ACCOUNTS PAYABLE
  - GENERAL ACCOUNTING
  - INTERNAL AUDITOR
  - PAYROLL
- DATA INFORMATION SYSTEMS

ENCLOSURE NO 8.5.2

ENCLOSURE NO 8.5.3

ORGANISATIONAL CHART

ENGINEERING - MAINTENANCE - COMMUNICATIONS



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MAINTENANCE DEPARTMENT
POLICY AND PROCEDURE MANUAL
INDEX

ST. JOHN'S HOSPITAL MAINTENANCE DEPARTMENT POLICY #E-5

DATE: 4/7/88

TITLE: Employee Review Policy

Yearly, on each employee's anniversary date, and in conjunction with the Annual Review for wage adjustment sent by Human Resources, the Maintenance Superintendent and/or Administrative Engineer will review the items on the attach4ed sheet entitled "Employee Review".

The purpose of this review is to:

A. Ascertain that the employee is familiar with the areas noted and provide a check list for same to assure review of all items.

B. Provide an opportunity to update any changes which may have been made since the employee's initial orientation or last review.

This review will be conducted with all Maintenance Department Employees. Emphasis on in-depth explanation and actual system survey will be carried out with those Department Employees who cover weekends, afternoon and late-night shifts.

All other Department Employees (Yard Man, Secretary, etc.) who do not normally work shifts, or would not be expected to be the sole Maintenance Department Mechanic on duty, will review these systems for familiarization only.

_____

John J. Crowley
Administrative Engineer

JJC/mlc

EMPLOYEE REVIEW

I. Fire Alarm System
   a) Operation ( )
   b) Reset
      1) Devices ( )
      2) System ( )

II. Sprinkler/Fire Pump System
   a) Operation ( )
   b) Location of Valves ( )
   c) Interface with Alarms ( )
   d) Power Supplies ( )

III. Electrical Distribution System
   a) Operation ( )
   b) Emergency Generators
      1) Starting and Phasing ( )
      2) Operation ( )
   c) Location of Feeds and Disconnects (Main) ( )
   d) Location of Breaker Panels (All areas) ( )
   e) Overall Distribution System and Panel Markings ( )

IV. Water Supply
   a) Location of Mains ( )
   b) Emergency Crossconnecting Valves and Operation ( )

V. Medical Gas System
   a) Oxygen ( )
   b) Nitrous Oxide ( )
   c) Air ( )
   d) Vacuum ( )
   e) Location of Valves and Alarms and Operation of same ( )
   f) Procedures for Patient Areas ( )

VI. Natural Gas (Utility)
   a) Location of Meters and Valves ( )
   b) Resets (Kitchen) ( )

VII. Heating, Ventilating and Air Consitioning System
   a) Operation
      1) HVAC Units ( )
      2) Reheat Pumps ( )
      3) Chillers and Cooling Towers ( )
      4) Thermostats and Re-heat Boxes ( )
      5) Induction Units ( )
      6) Associated pumps, piping and controls for 1 thru 5 above ( )

VIII. Elevators and Dumbwaiters
- a) Operation ( )
- b) Emergency Procedures ( )

IX. Departmental and Hospital Procedures and Policies
- a) Vacation ( )
- b) Sick Leave ( )
- c) Dress Code ( )
- d) Pay Policy ( )
- e) Fire Brigade ( )
- f) Electrical Safety ( )
- g) P.M. Program ( )
- h) Disaster Policy (Departmental and Hospital) ( )
- i) Hand Tools ( )

The above systems, policies and procedures were reviewed with the below named employee on _____.
(date)

Reviewed with _____
(employee signature)

By _____
(supervisor's signature)

ENCLOSURE NO 8.5.6

ST. JOHN'S HOSPITAL POLICY MEMORANDUM NO. 02-14

DATE: 3 JANUARY 1989

TITLE: CAPITAL EQUIPMENT REQUESTS

I. PURPOSE

TO OUTLINE THE PROCESS TO BE FOLLOWED IN SUBMITTING REQUESTS FOR CAPITAL EQUIPMENT TO THE CAPITAL EQUIPMENT COMMITTEE FOR REVIEW AND DETERMINATION OF PRIORITY.

II. POLICY

ST. JOHN'S HOSPITAL HAS ESTABLISHED A CAPITAL EQUIPMENT COMMITTEE (CEC) TO REVIEW ALL REQUESTS FOR CAPITAL EQUIPMENT, WITH THE EXCEPTION OF ELECTRONIC INFORMATION PROCESSING EQUIPMENT AND SOFTWARE, TO ASSURE THE EFFICIENT, EFFECTIVE, AND EQUITABLE ALLOCATION OF AVAILABLE FUNDS TO FULFILL A VARIETY OF CAPITAL BUDGETING REQUESTS.

III. PROCEDURE

A. EACH REQUEST MUST BE SUBMITTED TO THE CEC ON THE STANDARD EQUIPMENT BUDGET REQUESTS FORM (SEE ATTACHED).

B. THE INSTRUCTION SHEET ATTACHED TO THE REQUEST FORM SHOULD BE READ CAREFULLY BEFORE COMPLETING THE FORM.

C. THE CEC WILL REVIEW AND RANK ALL REQUESTS, BASED UPON PRE-SELECTED CRITERIA, DURING THE BUDGET PROCESS PRIOR TO THE BEGINNING OF EACH FISCAL YEAR.

D. DEPARTMENT HEADS WILL BE INVITED TO THE CEC MEETINGS, AS NECESSARY, TO DISCUSS THEIR REQUESTS.

E. THE HIGHEST-RANKED REQUESTS WHOSE COMBINED COSTS DO NOT EXCEED THE TOTAL CAPITAL BUDGET CUTOFF POINT WILL BE FORWARDED TO ADMINISTRATION FOR FORMAL APPROVAL. A COMMITTEE-APPROVED LISTING OF CAPITAL REQUESTS IS SUBMITTED TO PURCHASING AND EACH DEPARTMENT WILL RECEIVE NOTIFICATION. ALL PURCHASE REQUISITIONS SHOULD BE SUBMITTED BY THE SPONSOR TO PURCHASING. IT WILL THEN BE FORWARDED TO THE CHAIRPERSON OF THE CEC TO OBTAIN THE NECESSARY SIGNATURES FROM ADMINISTRATION.

F. ANY STAFFING CHANGES RESULTING FROM A CAPITAL EQUIPMENT APPROVAL WILL BE REFLECTED IN THE STAFFING STANDARDS OF THE HOSPITAL'S MANAGEMENT UTILIZATION REPORT. THEREFORE, IT IS EXPECTED THAT ALL PROJECTED STAFFING ADJUSTMENTS WILL BE IMPLEMENTED.

G. FOR CERTAIN REQUESTS, A FOLLOW-UP OF THE ECONOMIC FEASIBILITY MAY BE REQUIRED AFTER A FEW MONTHS TO INSURE THAT THE PROJECTED SAVINGS HAVE BEEN REALIZED.

H. ANY REQUESTS NOT APPROVED DURING THE FISCAL YEAR MUST BE RESUBMITTED THE FOLLOWING FISCAL YEAR IF THE DEPARTMENT WANTS CONTINUED CONSIDERATION OF THE ITEMS.

IV. RESPONSIBILITY

A. DEPARTMENT HEADS/SUPERVISORS ARE RESPONSIBLE FOR GATHERING ACCURATE INFORMATION TO COMPLETE THE REQUEST FORM AND SUBMITTING THE REQUEST DURING THE BUDGET PROCESS PRIOR TO THE BEGINNING OF EACH FISCAL YEAR.

B. THE CEC IS RESPONSIBLE FOR REVIEWING AND DETERMINING THE PRIORITY OF ALL REQUESTS AND PROVIDING FEEDBACK TO DEPARTMENT HEADS ON THE STATUS OF THEIR REQUESTS.

C. ADMINISTRATION IS RESPONSIBLE FOR FORMAL APPROVAL OF ALL PURCHASES.

V. REFERENCES

NONE.

VI. RESCISSIONS

POLICY MEMORANDUM NO. 02-14, DATED AUGUST 3, 1984.

VII. REVIEW

JANUARY 1991

Sister Maria Loyola

SISTER MARIA LOYOLA
PRESIDENT

DISTRIBUTION A

ST. JOHN'S HOSPITAL

INSTRUCTION SHEET FOR COMPLETION OF CAPITAL EQUIPMENT REQUEST FORMS

1. Item Number: Consecutive number (i.e. 1,2,3,etc.)

2. Item Description: Brief description of item requested but not brand name.

3. Number of Item: Quantity of item(s) requested.

4. Statement of Need: Should be clear and comprehensive. Questions that should be addressed include:

   a. Is it necessary to meet regulatory or accreditation standards?

   b. Will new unit increase efficiency of plant, personnel or existing equipment?

   c. Is it necessary for continued operation and performance of hospital services?

   d. Will it improve patient care, decrease patient risk, or reduce the liability of the hospital?

   e. Do statistics on community need support its necessity?

   f. Is it supported by physicians' demand?

   g. Is it necessary to improve the esthetic quality of the patient care environment?

5. Priority: Using "1" as the highest, numerically rank all items requested from highest to lowest priority.

6. Source of Acquisition: Using R=Rent, L=Lease and P=Purchase, designate how the item is to be acquired.

7. Quarter Needed: Indicate in which quarter of the upcoming fiscal year the item is needed.

8. N/R: N=New and R=Replacement. Indicate which category the equipment requested comes under.

9. Estimated Useful Life: Indicate in years, the operational life of the equipment.

10. Estimated Cost: Indicate the cost of the item at the time of delivery (include transportation costs).
    If item is $1,500 or more, complete the Equipment Justification section on the reverse side of the form.

11. Department Head Signature: Must sign to show that he/she is formally making the request.

12. Materials Management: Must sign to show that he has reviewed the request and that the estimated costs are appropriate.

13. Engineering: Must sign to show that engineering and maintenance cost estimates are appropriate.

14. Administrative Head Signature: Must sign to show that the request has been reviewed and that it is accurate and complete.

ST. JOHN'S HOSPITAL
EQUIPMENT BUDGET REQUESTS
FOR YEAR END 1983

Department: _____ Submission Date: _____

Department No. _____ Page No. _____ of _____ pages

1. Item No.	2. Item Description	3. No.of Items	4. Statement of Need	5. Priority	6. Source of Acquisition	7. Quarter Needed	8. N/R	9. Estimated Useful Life	10. *Estimated Cost

TOTAL _____

11. DEPARTMENT HEAD SIGNATURE _____

12. MATERIALS MANAGEMENT _____

13. ENGINEERING _____

14. ADMINISTRATIVE HEAD SIGNATURE _____

*If cost of item is $1,500 or more, please complete, in detail, the reverse side of this form.

ST. JOHN'S HOSPITAL

EQUIPMENT JUSTIFICATION

Item Discription: _____

For Replacement Unit: History of Current Equipment:

Item No.	Year Purchased	---- Maintenance Costs ----- FY79	FY80	FY81	FY82	FY83	Year of Obsolescence	Amount of Down Time
____	_____	____	____	____	____	____	_____	_____

List of Expenses/Savings Associated with Establishing New or Replacement Equipment:

Additional FTEs required _____ Salary Cost_____

Reduction in FTEs _____ Salary reduction _____

Supplies and Maintenance _____

_____

Installation (i.e. wiring, drainage, piping, ventilation, etc.) _____

_____

_____

Other (specify) _____

_____

Determine Revenue to be Derived from Equipment:

1. Estimate total workload (i.e. number of patients to be serviced, volume of tests, or exams performed).
   Please include figures on cost and charge per workload unit.

_____

_____

_____

_____

Additional Comments: _____

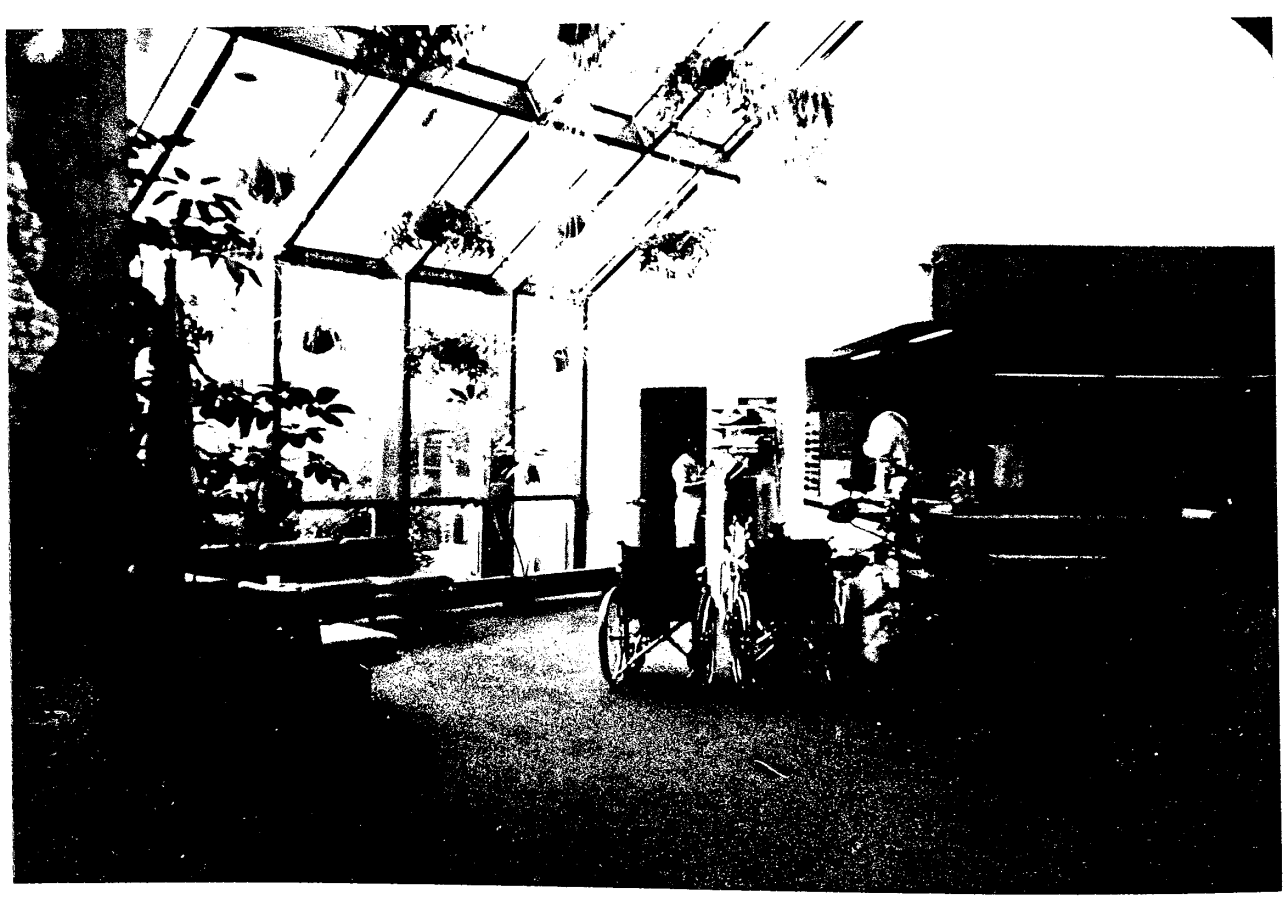
_____

_____

_____

ST JOSEPH HOSPITAL, NASHUA NH

MAIN ENTRANCE TO HOSPITAL



MAIN ENTRANCE LOBBY & RECEPTION

US3AAA

8.6 ST JOSPEH HOSPITAL, NASHUA NH

At this hospital, meetings were held with both the Chief Operating Officer and the Director of Facilities Management (Estates Officer). An outline was obtained of the general approach to health care planning in the state of New Hampshire, the possible future planning intentions for the hospital and their maintenance arrangement.

St Joseph is a Catholic hospital of 218 beds offering a broad range of acute care. The oldest parts of the building were erected in 1967 and the most recent were scheduled to be opened in 1989.

Building development over the past 20 years has been more in response to an immediately perceived need rather than against a long term strategy with the result that space is not being properly utilised and adjacencies are not always as the staff would like. The problem having been recognised, management are now engaged on producing a facilities strategic master plan that will incorporate their service planning needs and business plan. Early indications are that the estate element of this plan including new build will be some $15 to $20 million and will take 4 to 5 years to complete.

Accommodation on the main hospital site also includes a school of nursing amounting to some 30,500 ft^2. Off site there are two health centre/clinics, one at Merrimack comprising 4,800 ft^2 and a 3,000 ft^2 facility at Millford.

The hospital's organisational chart is given at Enclosure No 8.6.1 and this shows the full range of activities undertaken by the various departments. It will also be seen that the Facilities Management comes under the Chief Operating Officer, who is a Vice President.

The organisational chart for Facilities Management is given at Enclosure No 8.6.2.

The Estates Officer is a chartered engineer and controls a staff of 30. The Biomedical Supervisor is a master electrician and a member of the Institution of Electrical and Electronic Engineers, his assistant is also a master electrician and a certified biomedical technician.

One of the two construction electricians has his masters certificate as does the maintenance and testing electrician. The plumber also has his masters certificate. As pointed out earlier, there is no requirement for these men to be licenced, but in common with many other hospitals, employing either a licenced or a master craftsman sets a standard; the employer has some form of guarantee that a particular level of knowledge or understanding can be expected. Other criteria will depend more on personal qualities.

In common with the staff of most other hospitals, the employees at St Joseph undergo an annual performance appraisal and the form used is shown at Enclosure No 8.6.3. The first page of this form needs no explanation. On Page 2, Column A refers to the Job No in the person's Job Performance Standard, which is part of the job description. This Job Performance Standard lists all the elements (or jobs) that go to make up the total work content of the post. Typically there would be 10 of these and each would have a relative percentage weight depending upon its importance to the particular post, the total weighting adding up to 100%. Thus a performance level is attached to each element of the job and this value 4, 2 or 0, in Column B is multiplied by the % weight in Column C and their product is the point value. These are added together for all the job elements giving a total points value (maximum possible being 4 x 100% = 400).

New goals and objectives are set out in Section 3 and these would help shape the job description for the following years review.

In Section 5 the percentage increase in pay is shown and the various signatures and approvals are recorded in Section 6.

In general discussion with a number of Estates Officers it appears that over the past few years percentage increases in pay that have been available have varied from 8% to 20% pa. One Estates Officer said he was expecting to get 12% for 1989.

The plant at St Joseph consists of:

Boilers:	1 x 500 hp using No 6 oil and gas
	2 x 400 hp " " " "
Chillers:	1 x 530 ton - centrifugal type
	1 x 330 ton - absorbtion type
Standby Plant:	2 x 250 KVA diesel powered 480V 60 Hz
	1 x 350 KVA

Electricity Intake:	HT at 34,600 Volts Transformers 1 x 1500 KVA 2 x 500 KVA Distribution through hospital is at 480V 3 phase 4 wire

The Estates Officer is responsible for all building and engineering maintenance biomedical equipment, grounds and gardens, but not laundry equipment maintenance as that department employs their own engineer.

For the financial year 1988/89 estate maintenance costs were at the rate of £26.14/m^2 and for the same period energy and water costs came to £13.23/m^2. No data was available for energy usage thus a PI could not be estimated, and the cost of energy and water at £13.23/m^2 appears questionable.

In the general area of energy management it was stated that whilst a start has been made, much still needs to be done. To date, some $150,000 has been spent with savings currently running at about $50,000 per year. A building automation system has been installed, but it will be some time before full advantage can be taken of the system as much of the HVAC equipment is not able to respond to this type of control. In parts of the building the air conditioning system is 100% throw away, whilst in others there is no reserve capacity in heating system. Parts of the electrical distribution system are also fully loaded. It is intended that the facilities master plan wil take all these points on board and upgrading work will be co-ordinated with service planning goals and objectives.

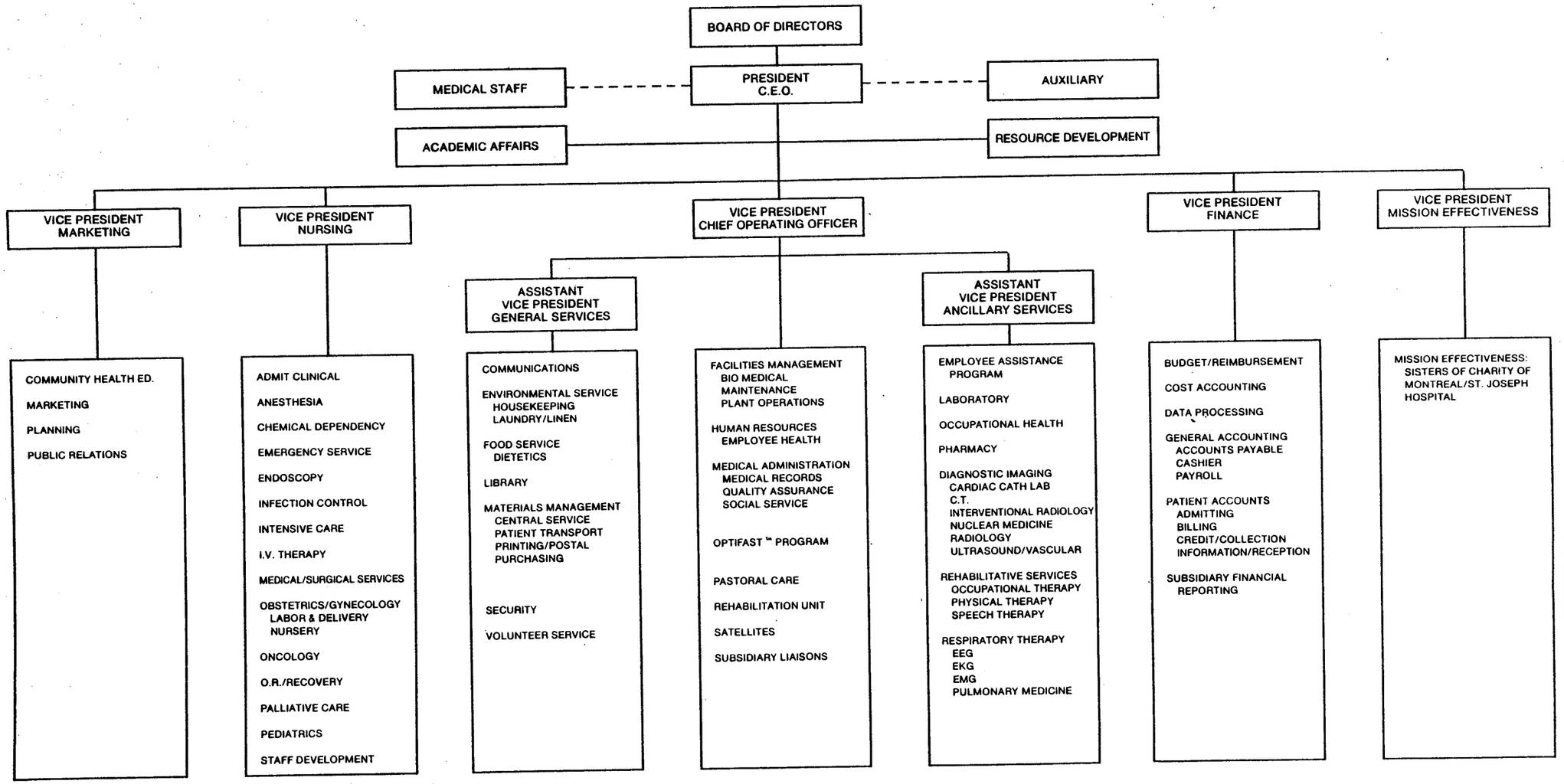
One energy conservation scheme currently in the pipeline is the installation of a plate to plate heat exchanger, this is costing some $55,000 to install and it is estimated that annual savings of about $25,000 will be saved, thus reducing the ventilation losses. A study is also underway on the feasibility of cogeneration utilisng the diesel generator plant and using the waste heat from the exhaust to pre-heat boiler feed water.

In common with many other hospitals the planned maintenance work is computer based and the Estates Officer is able to monitor this and other programmes from his own work station.

In spite of the Estates Officer's comments about the inefficiencies of parts of the services, plant and equipment, this was not apparent during a tour round the hospital. The standard of maintenance was of a high order and the general appearance of the facility was very good.

St. Joseph Hospital

ORGANIZATIONAL CHART



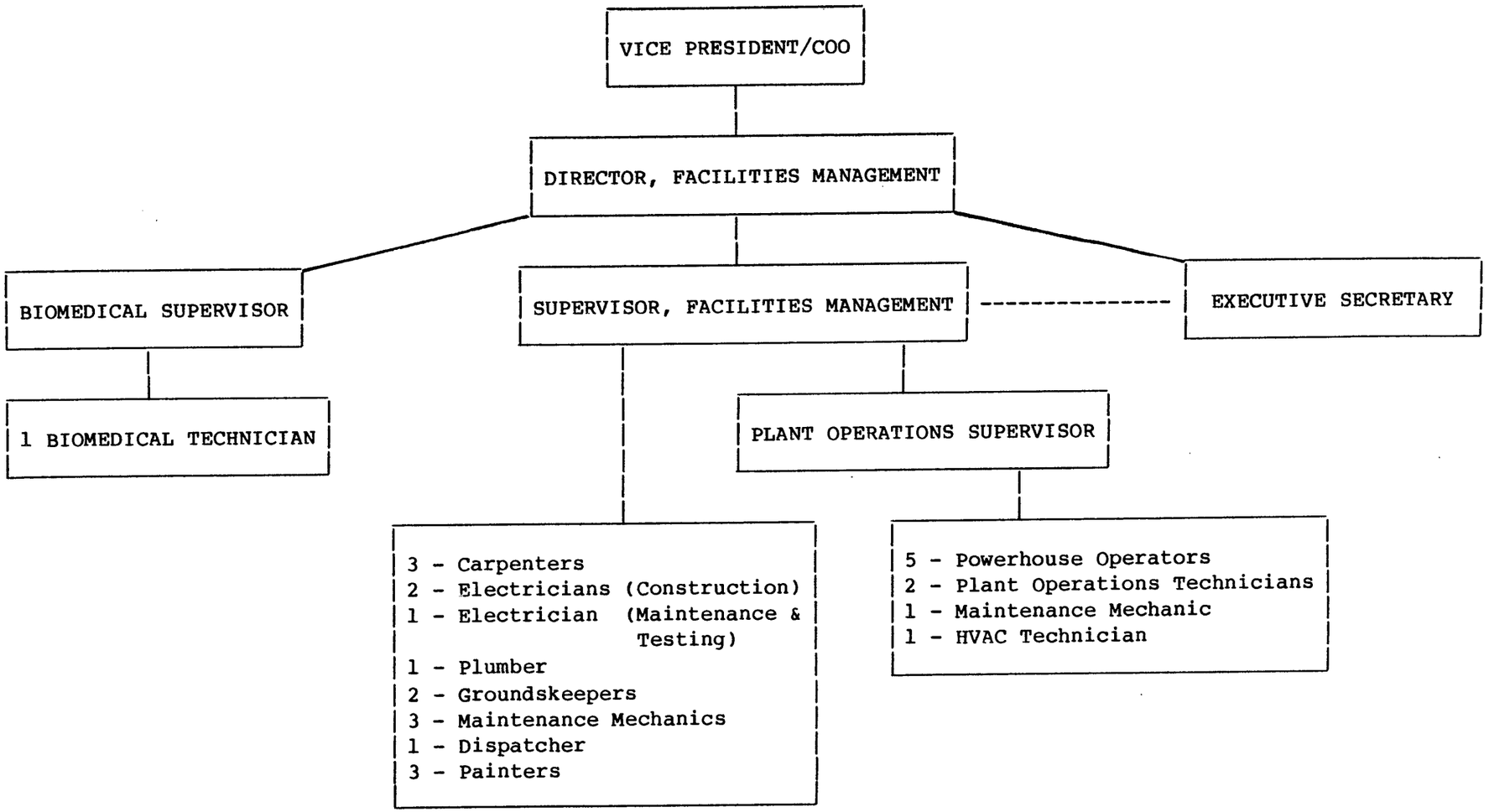
ENCLOSURE NO 8.6.1

172 Kinsley Street
Nashua, NH

Covenant Health Systems Member

PRESIDENT/CEO

2/9/89
DATE



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ENCLOSURE NO 8.6.2

ST. JOSEPH HOSPITAL
NASHUA, NEW HAMPSHIRE

ENCLOSURE NO 8.6.3

NON-ADMINISTRATIVE COUNCIL PERFORMANCE APPRAISAL

Employee's Name:_____ Position Title:_____

Supervisor's Name:_____ Position Title:_____

Department/Service:_____ Department/Service #:_____

Date of Performance Evalution Period: ___/___/___ to ___/___/___

Date of Performance Conference: ___/___/___

SECTION I. INSTRUCTIONS:

A. PERFORMANCE LEVELS -

Exceeds Standard (4 points) - This employee provides a "model" for this standard, for other employees. Requires little or no oversight or supervision concerning this standard.

Meets Standard (2 points) - This employee is viewed as competent on this standard. Requires normal oversight and supervision regarding this standard. ("Doing a Good Job").

Does Not Meet Standard (0 points) - This employee is viewed as below competency in this area and needs improvement. Requires constant oversight and close supervision.

B. ANNUAL MERIT INCREASE -

The employee's annual merit increase will be determined by the supervisor's determination of the results achieved based upon the criteria set forth in Section II.

C. RESULTS ACHIEVED/COMMENTS _

Additional sheets of paper may be added.

SECTION II. PERFORMANCE LEVELS:

A Job Standard Number	B Performance Point Value	C Relative Weight %	(B x C) Point Value	COMMENTS (May attach additional sheets)

TOTAL POINT VALUE: _____

SECTION III. GOALS AND OBJECTIVES:

SECTION IV.

A. SUPERVISOR'S RESPONSE TO PERFORMANCE APPRAISAL CONFERENCE -

B. EMPLOYEE'S RESPONSE TO PERFORMANCE APPRAISAL CONFERENCE -

SECTION V. RECOMMENDATIONS:

A. Percentage Increase:_____%

B. Withhold percentage increase, pending performance review, and another review in_____months.

SECTION VI. SIGNATURES AND APPROVALS:

A. Appraisal Conducted by, Signature: _____

Title: _____

Date: _____

B. Approved by, Signature: _____

Title: _____

Date: _____

C. This appraisal was thoroughly discussed with me.

Employee's Signature: _____

Date: _____

D. Yes, I would like to schedule an appointment with the appropriate next level of supervision.

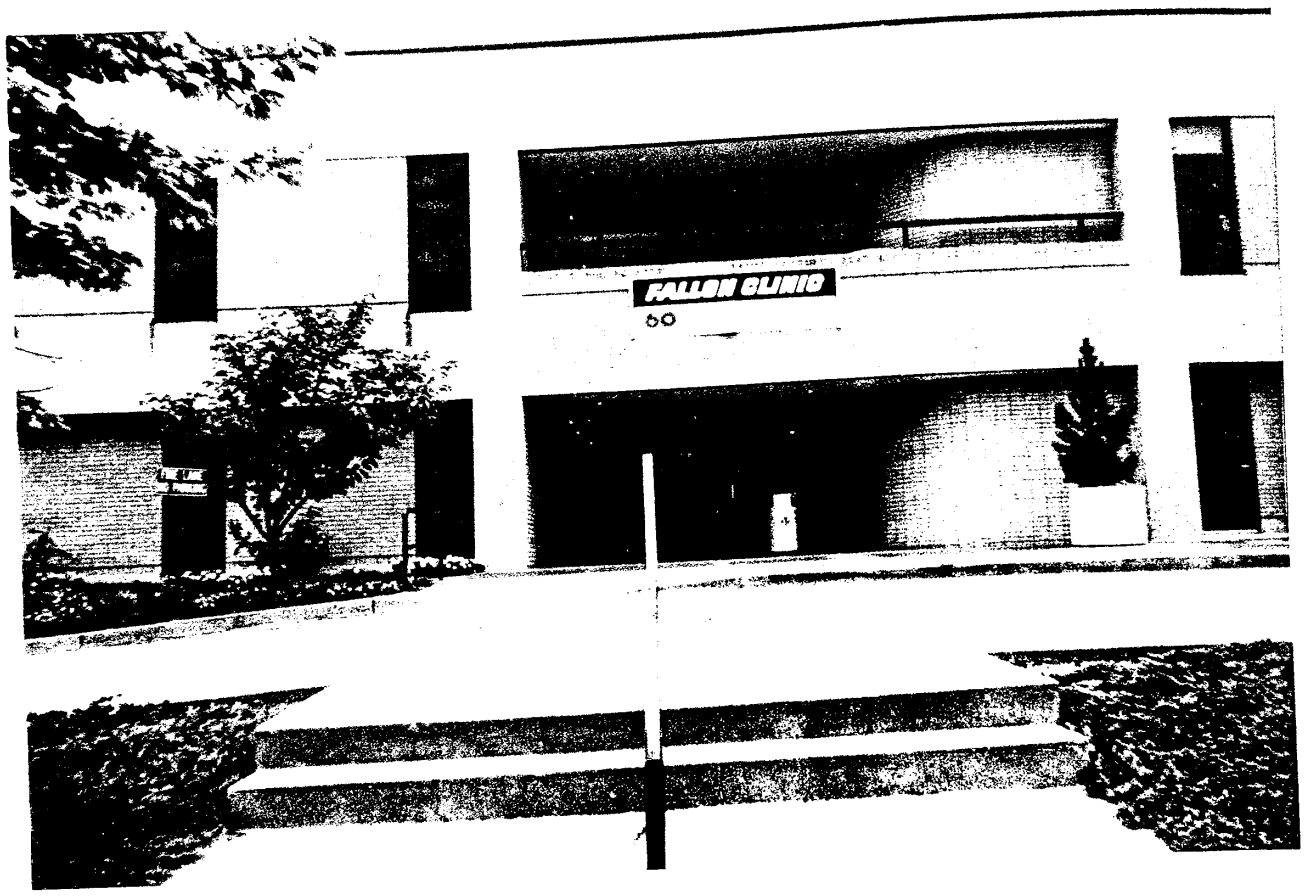
Employee's Signature: _____

Date: _____

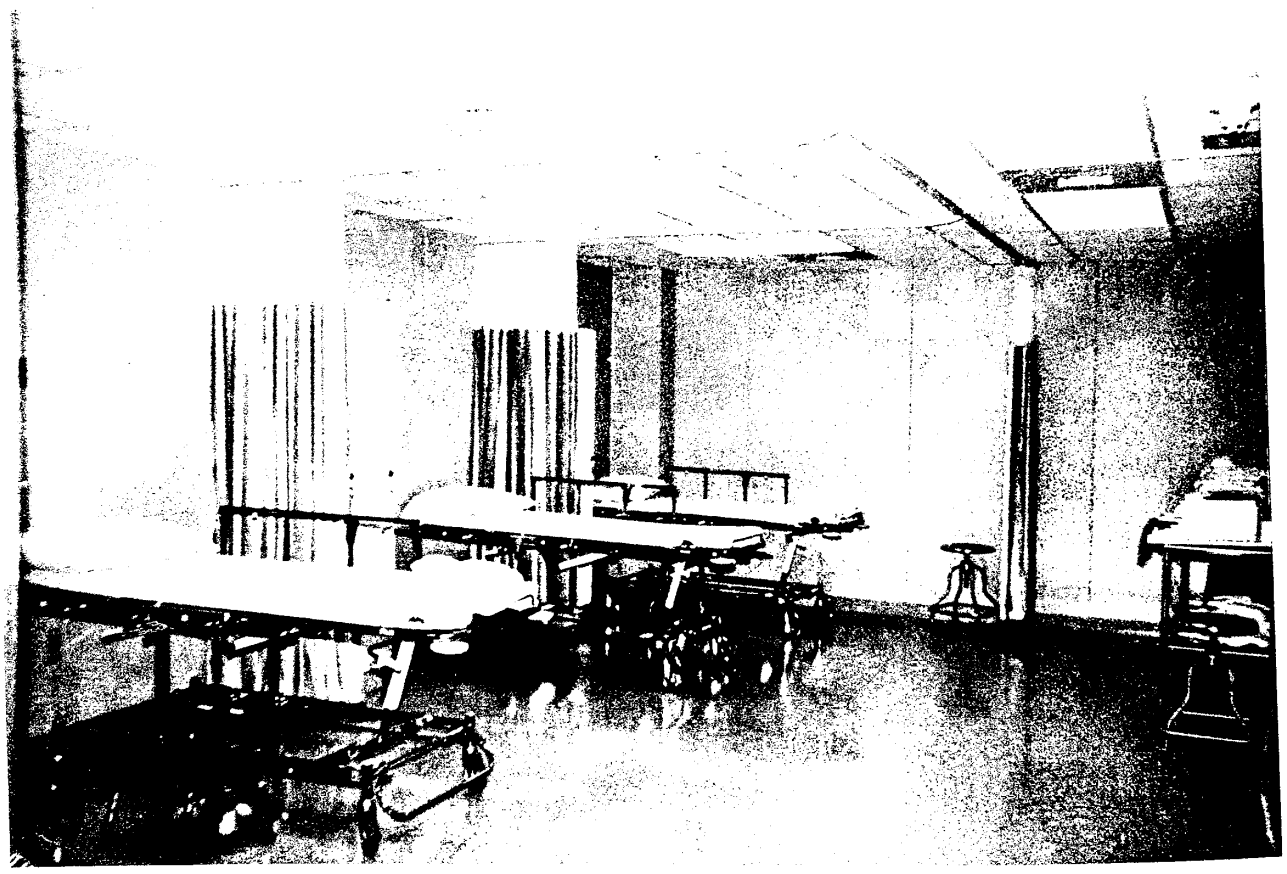
RECEIVED IN HUMAN RESOURCES:

Date:_____ Initials:_____

THE FALLON CLINIC, WORCESTER MA



PART VIEW OF FRONT ELEVATION & MAIN ENTRANCE



GENERAL LAYOUT OF EXAMINATION AND TREATMENT AREA

US3AAA

8.7 FALLON COMMUNITY HEALTH PLAN (FCHP)

This is an HMO a not for profit puchaser organisation that uses the various Fallon Clinics and other facilities as the providers, and these facilities do operate for profit.

FCHP is centred on Worcester and servicing Worcester County in central Massachusetts. The eastern edge of the service area is bounded by route 495, and they do not attempt to operate beyond this boundary as this area is covered by the Harvard Community Health Plan and Blue Cross Blue Shield.

FCHP is divided in to two sections, forming a Medical Facilities Group and Primary Care Physicians Group.

There are a total of nine medical facilities group clinics and each are fully equipped to carry out a range of minor operations and investigative surgery, and each have X-ray facilities, a pharmacy and facilities for physiotherapy. At four of the clinics opthalmologist are available and they have fully equipped workshops. The clinics are able to draw on the service of over 190 specialist medical practitioners, physical therapist, health education councillors and the like and there are six affiliated dental practices.

There are ten primary care facilties located throughout the services area and many of these are equipped to offer a small range of medical services in addition to their general medical practice. Alternatively patients may opt to receive their primary care at any one of the clinics.

The benefits claimed by FCHP are shown at Enclosure No 8.7.1 and these are for the range of patients who are under 65 years of age. Patients over 65 would be eligible to join the Senior Plan and details of this are given at Enclosure No 8.7.2.

FPHC claim to have over 103,000 members and the capacity to take on a further 35,000. The claim is made that physicians in primary care, paediatrics and obstetrics and gynaecology are on call during the time the facilities are normally closed, and that a receptionist is on duty 24 hours per day 365 days per year to provide referrals to the appropriate area for treatment.

Average waiting periods are claimed to be:-

- Routine appointments - 1 to 2 weeks
- Physical examinations and eye examinations of a routine nature - 1 to 6 weeks
- Minor illness/accident - immediate
- In office appointment - 0-20 minutes
- Emergency care - immediate

FCHP are affiliated to eleven hospitals in Massechusetts with whom they have contracts for a range of patient services. Contracts have also been arranged with four out of state hospitals for transplant surgery and these are in Dallas TX, Houston TX, Minneapolis MN and Cleveland OH.

The annual cost of individual membership for last quarter of 1989 was quoted at £722 pa billed monthly in advance. Membership is offered after screening all medical records and the applicant completing a health statement. Family rates are quoted as £1,865 pa.

The Fallon Clinic was founded in 1929. In 1977 the FCHP was established in co-operation with Blue Cross of Massachusetts and in 1980 the Plan became the first in the USA to offer HMO services to Medicare recipients under a demonstration project. Currently there are some 80,000 Junior Plan members and around 14,500 members of the Senior Plan.

The Senior Plan is designed to provide all the benefit a patient would get under Medicare, plus a range of additional benefits for $53.5 or £33.44 per month; the Plan being heavily subsidised by the Health Care Financing Administration (Medicare).

The growth in business encouraged the company to set up a Facilities Planning Department in 1987. Currently this Department is staffed by one man, a registered architect, and he is responsible for all new developments. Since the formation of the new department the total area of administrative and clinical space has increased from 191,000ft^2 to 422,000ft^2 an increase of over 120% and future developments are planned.

Because these facilities are licenced clinics rather than hospitals, they do not have to go through the Certificate of Need process which saves a lot of planning time. The buildings have to comply with the relevant sections of state and city building codes, NFPA code etc, but these are not as restrictive as they would be for a hospital ie with overnight stay and acute patients.

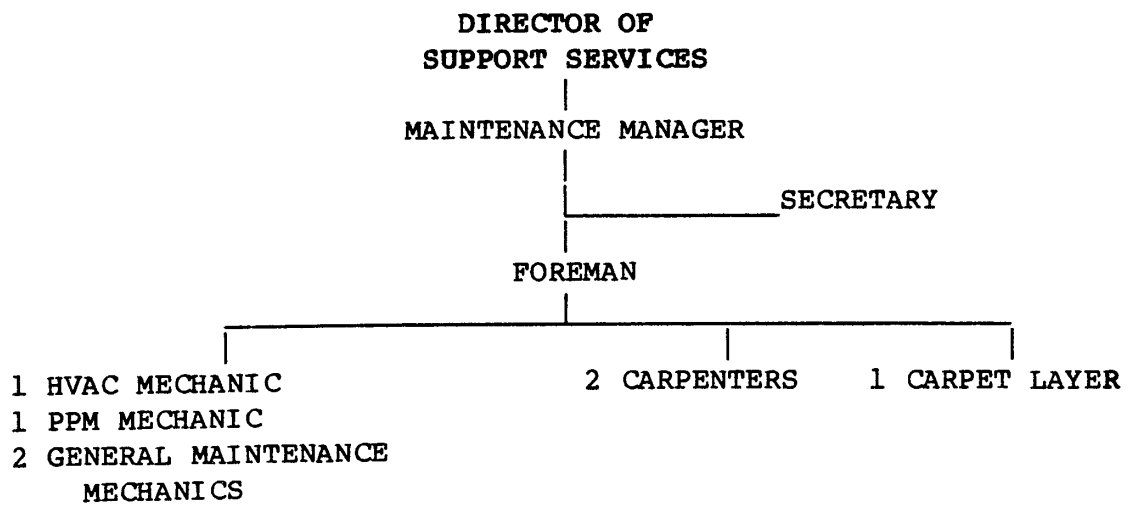
All the new facilities are 'system built' and as a guide to costs, an 18,000 ft^2 clinic was constructed in late 1986 at a cost of £693/m^2 plus £41.2/m^2 for fees. These costs do not include the cost of land, medical equipment and furniture. The Facilities Planner is responsible for appointing the architect, providing the design brief and monitoring construction standards and costs.

It is planned to increase the staffing level of this department by one additional person and to purchase a CAD system. It is envisaged that this system would be used as a development tool, looking at various options, room layouts etc of new or refurbished accommodation, record all existing plans and be networked to the Maintenance Department and then be used as the base for all the planned maintenance activities.

The Maintenance Manager is responsible for all building and engineering maintenance grounds and gardens. Lifts and X-ray equipment are maintained by specialist contractors. He is a member of the Infection Control Committee, the Risk Management Committee and is Chairman of the Safety Committee, and with these various responsibilities in mind he makes a detailed inspection of all the clinics, room by room every six months.

The Maintenance Manager joined the company about five years ago, and at that time there were four clinics with a total floor area of about 80,000 ft^2, no planned maintenance work was carried out, but the mechanics were engaged full time on breakdown maintenance.

Additional staff were employed and the complement now stands as shown below:-



In addition to the above, a self employed licenced electrical contractor is called in on a regular basis.

A planned maintenance routine was devised incorporating a comprehensive asset register. All assets are numbered and details kept on a card index system. A further card details the full list of maintenance operations and frequencies; these frequencies being recorded in a maintenance "diary" which brings up a schedule of work for each working day. The staff work $37^{3}/_{4}$ hours per week, but cover is provided six days per week as the clinics are open Saturdays.

With the doubling of accommodation over the last two years the maintenance routine is now getting stretched and the full range of checks is not always provided. The Maintenance Manager stated that faults were now beginning to develop along with some costly repairs. In the nine clinics there are over 1000 pieces of equipment to be checked and the time is not always available. A request has been made for four additional staff comprising:-

1 - foreman electrician (masters certificate)
1 - HVAC technician
2 - general maintenance mechanics

This request is being considered by management.

The Maintenance Manager is the budget holder and "owns" the assets. Budgets are calculated from the previous year plus inflation plus additions for new facilities; life cycle costing is not used, but a check is kept on plant and attempts made to forecast replacement before failure occurs. Bids for replacement capital have to be put to the Capital Expenditure Committee who meet once per year and agree the coming year's capital budget. Attempts are now being made to produce a five year forward plan, but the system has still to be properly worked out.

With regard to regulations, the clinic are regulated by the Massachusetts Department of Public Health and the premises checked every two years, the main items being life safety and infection control. The Department demand that any electrical equipment that comes into contact with a patient must be tested at least once per year and defibrillators must be checked weekly by an outside contractor.

The clinics are not accredited by the JCAHO but the management are looking to change this in the near future.

The Local Fire Department check the premises every two years and DEQE make regular checks on the backflow preventors on the X-Ray processing machines. One of the maintenance mechanics is now qualified to check and repair this equipment.

The City do not make regular checks, as the premises are not classed as a hospital, but do check all new accommodation. As yet, no work has been done with regard to energy management, and no records are kept on energy or water usage.

Some initial thoughts have been given to purchasing an energy management system that will link all the clinics by telephone lines but there are no firm plans in this direction. They have looked at various forms of lighting controls and these could be installed within the next year or so.

Electricity prices were reported to vary considerably between the two supplying authorities with one charging 4.5 cents or 2.8p per kwh and the other charging 10.5 cents or 6.5p per kwh. Water is charged at the rate of \$1.22 per 100 ft^3 and the sewage charge is \$0.8 per 100 ft^3.

The average cost of maintenance in the clinic is calculated at £7.82/m^2 and the utility cost ie gas water and electricity is £15.82/m^2.

Again it was evident that accommodation standards are high and by using system building techniques the accommodation can be easily modified to suit new arrangements.

The maintenance arrangements drawn up by the Maintenance manager are very simple to operate, but appear to be thorough, given that proper resources are available.

FALCON COMMUNITY HEALTH PLAN:
THE PLANS BENEFITS AND CHARGES

BENEFITS

AT THE FALLON CENTERS

Office visits	*$2.00 per visit*
Periodic physical examinations	*$2.00 per visit*
Eye examinations for children through age 17 (once per calendar year)	*$2.00 per visit*
Physical therapy	*$2.00 per visit*
Specialists' care	*$2.00 per visit*
Prenatal and postnatal care	*$2.00 per visit*
Prescription medications*	*$2.00 each*
Laboratory, X-ray, electrocardiograms, mammograms, and other tests	*Covered in Full*
Injections and immunizations	*Covered in Full*
Radiation therapy and respiratory therapy	*Covered in Full*
Family planning services	*Covered in Full*
Medical social services	*Covered in Full*

IN THE HOSPITAL

Unlimited days for room and board (semi-private room)**	*Covered in Full*
Physicians' and surgeons' services including operations and specialists' consultations	*Covered in Full*
Hospital services including operating room, anesthesia, recovery room, drugs, X-ray and laboratory services	*Covered in Full*
Physical and respiratory therapy	*Covered in Full*
Intensive care services	*Covered in Full*
Prescribed private duty nursing	*Covered in Full*
Maternity care—all physician's and hospital services for mother and child	*Covered in Full*

SKILLED NURSING FACILITY

Level I care in a semi-private room for all physician and institutional services up to 100 days per calendar year	*Covered in Full*

*Covers medications prescribed by a Fallon physician and purchased at a Fallon pharmacy ($2.00 per prescription or refill). Excluded are non-prescription medications, birth-control pills, vitamins, insulin and syringes. Prescriptions are not covered out of the area.

**Private room accommodations when medically necessary.

SUBSTANCE ABUSE TREATMENT

At the Fallon Centers	
Unlimited visits	*$2.00 per visit*
In Detoxification Center or General Hospital	
Unlimited days for room and board, all institutional and professional services	*Covered in Full*
In Rehabilitation Hospital	
Up to 30 days per calendar year	*Covered in Full*
2 day-treatment (outpatient) days in place of 1 inpatient day when patient agrees	*Covered in full*

MENTAL HEALTH SERVICES

At the Fallon Centers	
Up to 20 visits per calendar year	*$2.00 per visit*
In General Hospital	
Unlimited days for room and board, all institutional and professional services	*Covered in Full*
In Mental Hospital	
Up to 60 days per calendar year	*Covered in Full*

EMERGENCIES

In Service Area	
Prior authorization from FCHP for emergency room use is required, except for life-threatening emergencies. In these cases, members are expected to call FCHP as soon as possible after receiving care.	*Covered in Full*
Out of Area	
Treatment of unexpected illness or injury, anywhere in the world. Prescriptions are not covered.	*Covered in Full*

OTHER HEALTH SERVICES

Skilled home health care services (not including meals and housekeeping services)	*Covered in Full*
Corrective appliances ($1,500 per member per calendar year)	*Covered in Full*
Ambulance services	*Covered in Full*
Preventive dental care (fluoridation and cleaning only) for children through age 11—twice per calendar year	*Covered in Full*
Removal of impacted teeth	*Covered in Full*

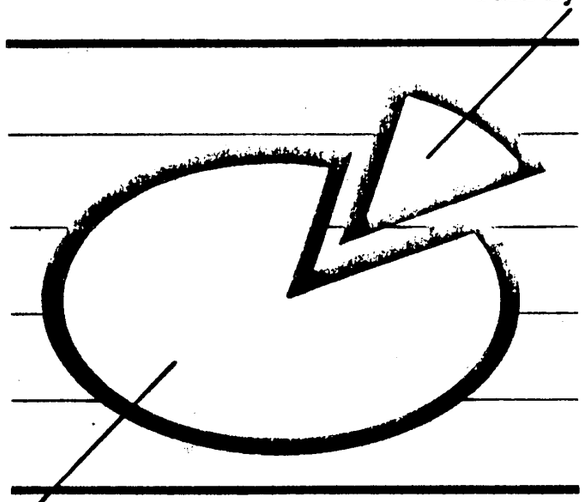
IMPORTANT: Services must be provided or arranged by Fallon professionals. FCHP will not reimburse members for services provided outside the Fallon Centers unless arranged and authorized in advance (except as specified under "Emergency Services").

Excluded are custodial confinement, conditions covered by Worker's Compensation and military service-connected disabilities.

ENCLOSURE NO 8.7.1

senior plan funding

Paid by Member
$53.50



Paid by Senior Plan
with funds provided by the Health Care Financing Administration (Medicare). Included are costs for special new benefits and Medicare covered services.

The Senior Plan provides all benefits to which you are entitled under Medicare. In addition, it covers special benefits that are not available under Medicare. You pay only $53.50 for your Senior Plan membership. The Senior Plan pays for all Medicare benefits and special benefits with funds provided by the Health Care Financing Administration (Medicare) from "Medicare Trust Funds."

services covered by the senior plan

ALL SERVICES LISTED ARE COVERED ONLY WHEN PROVIDED OR ARRANGED BY FALLON PROFESSIONALS.

SERVICE	
At the Fallon Centers or on referral to another provider:	
Office visits including all medical and surgical care	No charge
Periodic physical examinations	No charge
Consultations and care by specialists	No charge
X-ray and laboratory services	No charge
Allergy tests and injections	No charge
Immunizations	No charge
Radiation therapy	No charge
Physical, respiratory, and speech therapy	No charge
Hearing tests	No charge
Hemodialysis services	No charge
Casts and dressings	No charge
Health education and medical social services	No charge
At the Fallon Centers:	
Eye examination—one each 24-month period	No charge
Eyeglasses—one pair each 24-month period	No charge
At the Fallon Pharmacies:	
Drugs requiring a prescription	No charge

services covered by the senior plan

SERVICES	YOUR COST
In the Hospital:	
Unlimited days for room and board in semiprivate room	No charge
Physician and surgeon services including operations and specialists' consultations	No charge
Intensive Care services	No charge
Other hospital services including operating room, recovery room, anesthesia, drugs, X-ray and laboratory services	No charge
Physical and respiratory therapy	No charge
Hemodialysis services	No charge
Radiation therapy	No charge
Prescribed private duty nursing	No charge
In a Skilled Nursing Facility:	
Up to 150 days in a benefit period* for semiprivate room	No charge
Mental Health Services:	
At the Fallon Centers:	
Up to 20 visits in a calendar year for short-term therapy	No charge
In a general hospital:	
Unlimited days for room and board, professional services, and hospital services	No charge
In a mental hospital:	
Up to 90 days in a benefit period* for room and board, professional services, and hospital services	No charge

***BENEFIT PERIOD** means the period of time which starts when you are admitted to a mental hospital or skilled nursing facility. It ends once you are out of the mental hospital or skilled nursing facility for 60 days in a row.

services covered by the senior plan

SERVICES	YOUR COST
Other Health Services:	
Services of a home health care agency	No charge
Durable medical equipment and prosthetic devices	No charge
Ambulance services	No charge
Emergency Services:	
In the area:	
Prior authorization from Fallon is required, except in severe or life-threatening emergencies. In these cases, members are expected to call Fallon as soon as possible after receiving care.	No charge
Out of the area:	
Members are covered in full for emergencies and urgently needed care while traveling out of the area. Members should notify Fallon as soon as possible if care is received out of the area.	No charge

NOTE: This booklet is a summary of Senior Plan benefits. The Fallon Community Health Plan Senior Plan Evidence of Coverage defines the terms and conditions of the Plan in greater detail. Should any questions arise concerning benefits, the Senior Plan Evidence of Coverage will govern.

VETERANS ADMINISTRATION MEDICAL CENTER, BOSTON MA

GENERAL VIEW OF FRONT OF HOSPITAL FROM SOUTH HUNTINGTON AVENUE

GENERAL VIEW OF REAR OF HOSPITAL

US3AAA

8.8 VETERANS ADMINISTRATION MEDICAL CENTER, BOSTON MA

This hospital is a 604 bed acute hospital built in 1953 and is one of 172 V.A. hospitals, that provide long and/or short stay care throughout the United States making the Veterans Administration the biggest health care provider in the country. These hospitals provide health care service for ex-members of the armed forces and this means that the overwhelming majority of patients are men, although the numbers of women that are treated has increased in recent years.

During a discussion with the Assistant Chief Engineer the background to the organisation and management of the Veterans Administration was explained as was the maintenance and operation routine of this particular hospital.

The Veterans Administration is governed from Washington DC and is one of the responsibilities of the Secretary of Veterans Affairs, which is a Cabinet level post. For the purpose of organisation, the USA is divided into 7 Regions and each Region sub-divided into a number of Districts, there being 28 Districts in all. No 1 Region covers the New England States plus New York State and has 25 medical centres. The Boston Hospital is in Region No 1 and District No 1 and this District has 9 medical centres.

Whilst much general direction does come from Washington, service planning is done at District level through the Medical District Initiated Planning Process. This system holds a great deal of information, much of it on computer that uses nationally generated statistics. Whilst hospitals thus plan for their total needs, they do also cater for some cross boundary front, particularly in the popular holiday areas, where veterans could be taken ill away from home. The type of service in the "sun belt" areas also needs to take account of those veterans who move to their locations on retirement.

Traditionally the service offered to veterans is free, and in many cases the Out-Patient Departments have been used by veterans rather than visit their GP, in fact it was stated that many veterans do not have a GP, but it was not made clear what happens to these people if they live some considerable distance away from a Medical Centre.

Recently the VA has instituted a Facilities Development Plan. This work is being undertaken by outside consultants who are examining the service provision on a Region and District wide basis and will recommend a programme for the next ten years. This survey is confining itself to the provision of service from the various Medical Centres, they are not looking at any form of tie up with "civilian" hospitals, although there are local agreement beteen Medical Centres for the sharing of some specialist equipment. The main link the VA as with the private sector is through contracts with nursing homes, though they do have many of their own and are still building new units.

All construction and/or maintenance projects generated at individual hospitals below a cost of $2 million have to go to Washington for approval a year ahead of the next financial year. Projects over $2 million are considered major jobs and are handled by the Control officer at Wasington. Similarly, maintenance budget estimate is submitted to Washington and is broken down into various categories such as service contracts, bio-medical equipment maintenance, general maintenance, fuel, electricity etc.

The overall budget of the hospital does not reflect any of the original capital cost, ie the building is a "free good" and depreciation costs are not reflected in the annual costs to run the hospital.

Being Government buildings the Medical Centres stand outside the regulatory framework that controls hospitals in the private sector. Developments do not require a Certificate of Need and the State or City do not monitor building code compliance. However, the VA is a member of the American Hospital Association and the Medical Centres are accredited by the JCAHO.

The Engineering Service Department is responsible for all building and engineering maintenance, bio-medical equipment, fire and safety, energy, hazardous waste, upgrades and improvements and they have budget responsibility for this work. They are not responsible for infectious waste, maintenance of furniture and cleaning, these are the responsibility of the Building Management Department. There is no laundry at this hospital.

The organisational chart for the Department is shown at Enclosure No 8.8.1 and the number of staff shown is the limit allowed in the hospital by Central Office.

A partly computerised planned maintenance system is operated at the hospital and there is a comprehensive list of assets on computer. There is a full list of as-built drawings and these are currently being put onto a newly purchased CAD system. There is a Space Plan for the Hospital that is meant to ensure that space is used appropriately, but as yet no attempt has been made to carry out an NHS type space utilisation project.

Guidelines are given as regards the repair of specific pieces of equipment and nominal lives are assigned. There is a sliding scale that allows certain amounts of money to be spent in any one year depending on the age of equipment and the older the equipment gets the allowed expenditure is reduced. However, true life cycle costing techniques are not used. If equipment is functioning correctly then in the main it is retained. As an example, the original boiler plant is still being used and is now some 37 years old. This plant was originally coal fired but was converted some time ago to dual fuel burning No 2 oil and gas. As a further example, there is no bulk changing of fluorescent tubes.

The use of energy is monitored closely by Central Office in Washington who have appointed a firm of consultants to set targets for each individual hospital. These targets take into account building construction, type of heating and cooling equipment used etc. Each hospital makes out detailed returns on all energy used and cost, along with figures for degree days of heating and cooling. The consultant then sends each hospital an Energy Management and Control quarterly report stating their current energy target in BTU's/ft^2 their current usage and the percentage of the target achieved. This data then ranks all of the 172 hospitals. The Boston Medical Centre has a current usage of 407,000 BTU's/ft^2 a target of 315,000 BTU's/ft^2 that is set to be achieved by 1995. Each year energy conservation schemes have to be submitted to the Central Office as part of a continuing five year plan, these submissions are then prioritised according to their saving investment ratio.

Sometimes schemes are funded as requested and sometimes they are not, and the wrong sequencing of schemes can cause problems.

The VA have published a book listing a broad range of energy conservation studies that have been completed at various Medical Centres. These Energy Management tasks are grouped under different headings such as reducing ventilation rates, or domestic hot water etc.

There is a basic form of energy management system installed at this hospital, but as the building is not fully air-conditioned and the steam heating installation cannot be properly controlled, the system is limited in what it can achieve. The building has six heating zones, which does not allow for proper control and much of the cooling that is available is through the use of individual window mounted units.

A flue gas heat recovery scheme was installed some time ago, but it did not work and the manufacturer went bankrupt. The principle was to spray water through the hot flue gas as it went up the chimney and collect the heated water at the bottom. However, the theory had not taken account of the sulphur content of the heating oil and the equipment corroded and failed very quickly.

Some Medical Centers have incinerators with waste heat recovery but this is not a feasible operation in this Hospital as the incinerator is located on the roof and is primarily used to burn pathological waste only.

The approximate value of the maintenance budget is given below, salaries are not listed separately. These figures have been used to calculate energy and maintenance costs/m^2 for the hospital which has a total floor area of some 604,000 ft^2.

APPROXIMATE MAINTENANCE COSTS FOR FINANCIAL YEAR 1989

	$
Fuel (gas & oil)	500,000
Electricity	1,400,000
Service Contracts (Bio-medical)	500,000
Service Contracts (Ops & Maint.)	400,000
Ops & Maintenance Repairs	1,300,000
Vehicle Rental	70,000
Safety and Industrial Health	40,000
Operations Incidentals	20,000
	$4,230,000

Maintenance Costs = £25.16/m^2
Energy Cost = £21.15/m^2

It did not prove possible to organise a tour of this hospital, therefore a detailed appraisal cannot be given. However, a brief look at parts of the facility contrast poorly with the acute hospitals in the private sector that were visited. With an outside temperature of about 80°F on the day of the visit and coupled with high humidity the lack of air-conditioning was quickly apparent. Heavy reliance seemed to be on the use of desk and floor mounted fans in order to get some air movement.

The need for maintenance was mostly apparent through the poor decoration and broken ceiling tiles, and the tiled corridor walls presented a cold and austere atmosphere. The lack of adequate waiting areas was highlighted by queues of patients sat waiting in corridors outside examination and consulting rooms.

VETERANS ADMINISTRATION MEDICAL CENTER
BOSTON, MASSACHUSETTS

ENGINEERING SERVICE - ORGANIZATIONAL CHART

AUTHORIZED CEILING - 86
GM - 3 GS - 29
WS - 9 WG - 45

PROJECT ENG. SECTION (9)

(1) Supervisory Eng.
(1) Electrical Eng.
(3) General Engr.
(1) Engineering Tech.
(1) Engineering Tech.
(1) Engineering Tech.
(1) Eng. Draftsman

SAFETY/IND. HYGIENE SECTION (4)

(1) Safety Manager
(1) Indust. Hygien.
(1) Safety/Occup. Health Specialist
(1) Safety Tech.

GENERAL SERVICE SHOP (12)

(1) Maintenance Frm.
(1) Carpenter
(1) Carpenter
(1) Mason
(2) Laborers
(4)* Maintenance Wkmn.
(1) Motor Veh.Opr.Spr
(1) Motor Veh. Oper.

PIPEFITTER SHOP (7)

(1) Pipe. Foreman
(5) Pipefitters
(1) Pipefitter Helper

RENOVATIONS AND IMPROVEMENT SHOP (5)

(1) Maint. Foreman
(1) Maint. Mech.
(2) Electricians
(1) Carpenter

OFFICE OF THE CHIEF (9)

(1) Super. Gen. Engineer
(1) General Engineer
(1) Administrative Officer
(1) Secretary
(1) Accounting Technician
(3) Program Assistant
(1) Clerk Typist

MAINTENANCE & OPERATIONS SECTION (3)

(1) Main & Oper. Gen Frm.
(1) Asst. M & O Foreman
(1) Maintenance Controller

RECOMMENDED:

_____ DATE
Chief, Engineering Service

_____ DATE
Chief, Personnel Service

_____ DATE
Associate Medical Center Director

APPROVED:

_____ DATE
Medical Center Director

BIOMEDICAL ENG. SECTION (11)

(1) Biomedical Engr.
(1) Biomedical Engr.
(2) Biomed. Svc. Engr.
(1) Super. BMET
(1) BMET
(1) BMET
(1) BMET
(1) MER
(1) MER

BOILER PLANT (6)

(1) BP Foreman
(5) BP Operators

ELECTRICAL/MECHANICAL SHOP (12)

(1) Electrical Frm.
(5) Electricians
(2) Elec. Helpers
(1) Electronic Tech.
(3) Ind.Equipment Mech.

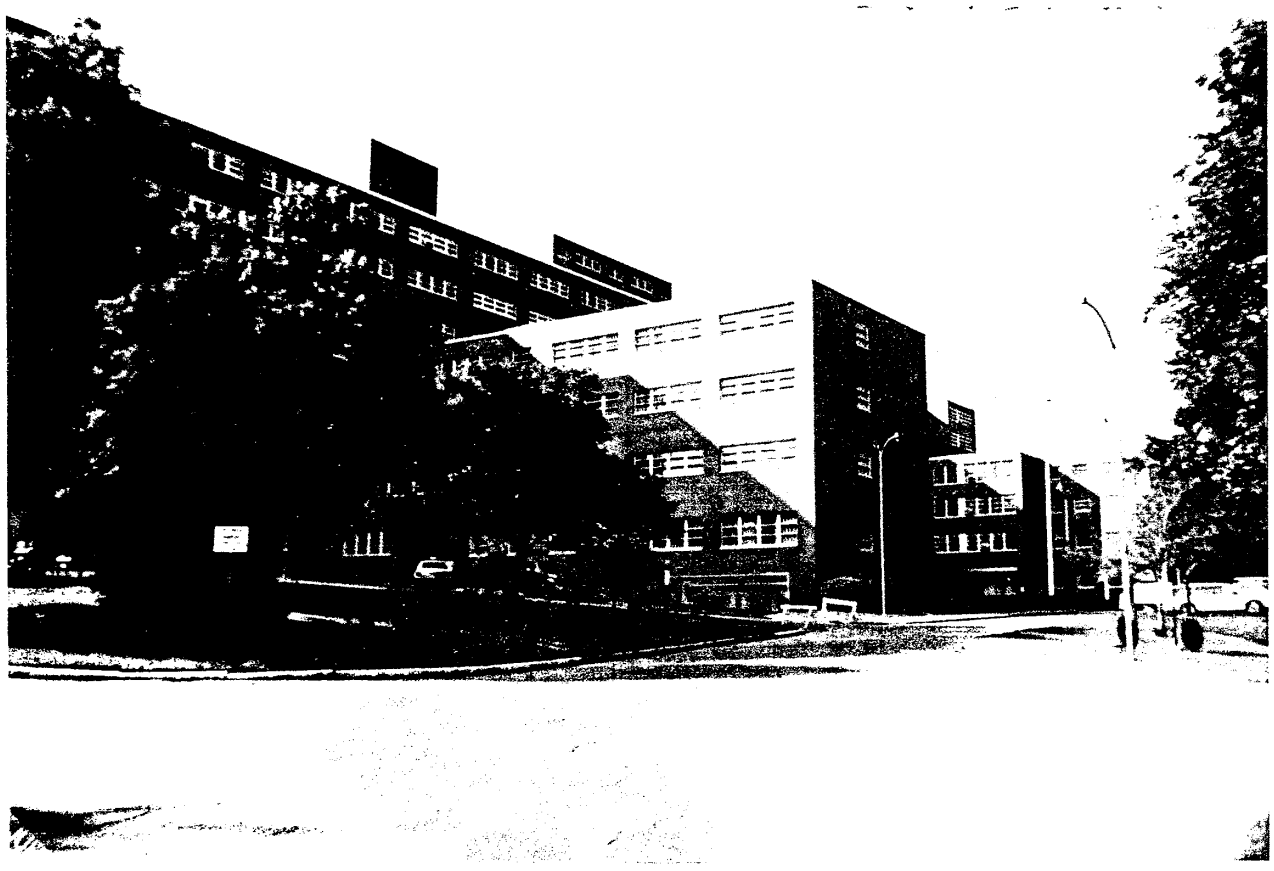
HVAC/REFRIGERATION SHOP (8)

(1) HVAC/Refrig. Frm.
(5) HVAC/Refrig. Mech.
(1) Indust. Equip.Mech.
(1) A/C Equip. Mech.
(*) A/C Equip. Mech.

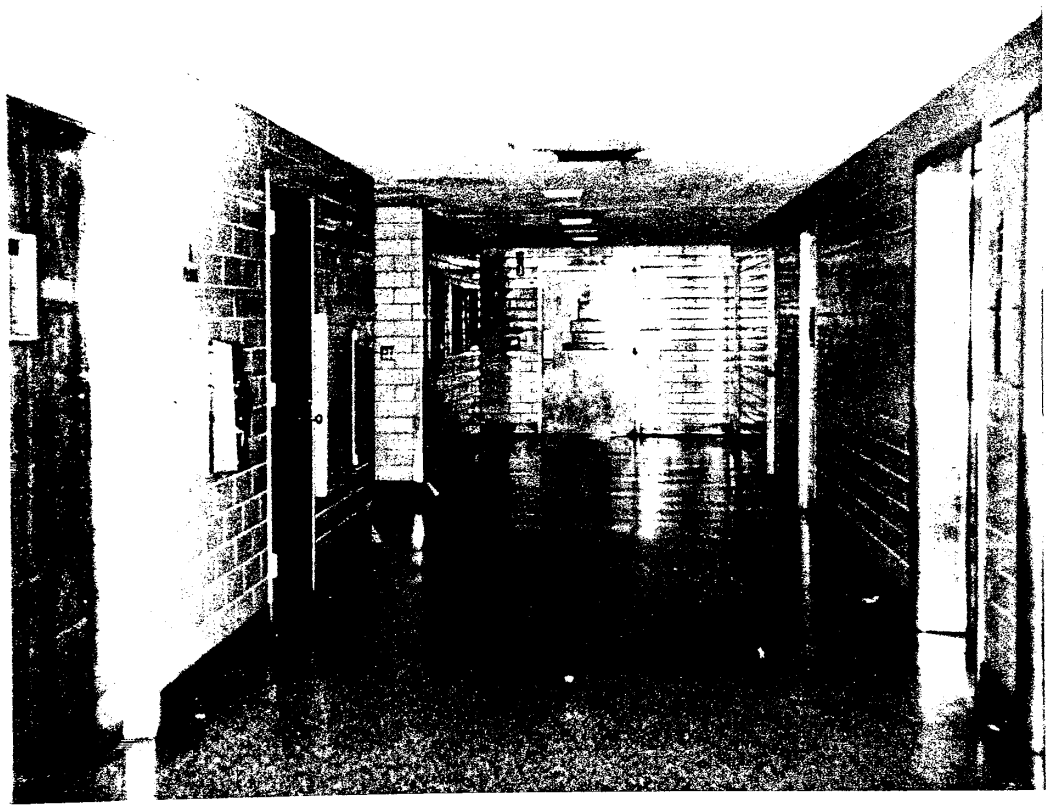
*2 positions from GSS to move to HVAC Shop through attrition.

ENCLOSURE NO 8.8.1

WORCESTER STATE HOSPITAL, WORCESTER MA



GENERAL VIEW OF MAIN HOSPITAL BLOCK



A TYPICAL CORRIDOR IN PATIENT AREA

US3AAA

8.9 WORCESTER STATE HOSPITAL

This is a 418 bed hospital coming under the responsibility of the Commonwealth of Massachusetts, Department of Mental Health and catering for patients with a mental handicap.

On approaching the site the impression is given of a large Victorian mental institution familar in Britain, with the massive and architecturally impressive building standing on a rise in 112 acres of wooded parkland. On arrival however the detail is different. The Victorian building that once housed over 600 patients stands empty and derelict, whilst the current hospital operates out of a modern red brick more functional looking building attached to the old accommodation.

During an interview with the Director for Quality Assurance, a brief outline of the hospital's recent history and current working arrangement was obtained.

Both the old and newer buildings were used up to about twenty years ago before the Community Mental Health Systems Act was introduced. The purpose of the Act was to move all patients into the Community. However the plan was not properly thought out nor fully financed to support a community based system either by federal or local funds. As a result, there were never enough kinds of beds or alternative programmes available, and over time the philosophy behind the deinstitutionalised programme was modified. Ten years ago a start was made to put the hospital treatment programme back together again. At that time the hospital was still being run down and across the board was operating below any normally accepted standard of quality.

The majority of patients left in the hospital after ten years of attempting to transfer them into the community were placed in wards by geographic ties but mixed by diagnosis and this made treatment very difficult. This mix was discontinued and the system reverted to functional groupings of care and at the time of the visit, these included acute care, continuing chronic care, geriatric and mental retardation. There are 100 beds dedicated to acute care patients who are in need of stabilisation and many of these will have places in the community they could return to and this element of the system appears to be working. The new philosphy is to target treatment on about 200 chronic patients, with all other patients out in the community. Though the hopsital is able to accommodate 418 patients according to code, there are only 344 residents and it is hoped this number will decline. There are now new community programmes better able to cope with these new management arrangements.

Funding problems still remain with the reimbursement system as patients can only be funded for a maximum of 120 days in any one year; there is thus no provision for long term care. The result of this is that the hospital does not receive reimbursable patients and the hospital was said to be the "end of the line, a no where else to go population of people".

The state fully funds the facility with little or no reimbursement from other sources and to a large extent keeps mentally handicapped people off the streets.

The hospital management prepares an annual budget and sends this to the Department of Mental Health in Boston. This is processed and a decision made as to the level of provision. For the past few years the Department has set the level at 320 patients. However there is no direct link between this number and the number of patients admitted, as stated earlier, at the time of the visit there were 344 patients in residence and last year the number was over 400.

Thus operating funds are limited but the hospital administration does not have full control of patient entry as people can be committed to the institution by the courts. The hope is that a community place will be found for this type of patient once they have been stabilised.

The hospital operates a set staffing pattern which they have developed over the past few years that they feel gives an acceptable level of quality care. It is not ideal, but it is acceptable. All the psychiatrists are contracted on an annual basis from the adjacent University of Massachusetts Medical Centre on fixed terms and conditions and the hopsital is thus affiliated to the teaching facility of the University. This affliliation is one of the few incentives to get people to work at the hospital, the pay is said now to attract them.

The hospital serves the population of central Massachusetts up to the North and South state boundaries, and they would not normally admit a patient who had a "meaningful tie" with somewhere outside their area. There is however a residual number of patients from outside their service area that they have been unable to re-locate.

The hospital does not have any form of business plan and because the property is state owned, through the Department of Mental Health, they are not allowed to arrange activities that would raise additional income. Strategic planning is done at Department level and this is only a broad outline as previously described. There are no long term plans, the hopsital is simply "living" from year to year.

All the above has to be set against a background pattern of federal overview and intervention. Some eight years ago the hospital lost its JCAHO accreditation and the ability to seek reimbursement from Medicare and Medicaid. Because the facility did not meet the standards of an independent outside agency there were no means of checking the quality of care and this automatically triggers the federal authorities to step in to check if patients' human and/or civil rights were being violated.

The federal experts who carried out the investigation covered all the professional disciplines appropriate to that hospital including the estate. The investigations took some six years and two years ago the Department of Justice at federal level took the Commonwealth of Massachusetts to court. The result was that a Settlement Agreement was drawn up, quoting what the state authorities had proposed to do to bring the hospital up to standard. The time limit for these plans to be fully implemented was February 1990.

In estate terms this had involved engineers and architects in drawing up complete refurbishment plans and submitting details to the federal authorities for approval. The first of these estate works was scheduled for the financial year 1989/90 and involved the investment of $2.7 million in fire precaution work.

The court order obliged the hospital to make quarterly reports to the federal authorities detailing progress against the agreed plan at the time of the visit, with some seven months to go to the target date, little or nothing had been done and the opinion was expressed that it looks likely that the hospital will go into receivership and be taken over by the federal authorities. Precedents for this type of action were quoted in relation to other hospitals and schools.

The background to the estate maintenance provision and the budget allocation were discussed with the Facilities Plant Manager and the fiscal Services Manager. It was explained that the Facilities Plant Manager is responsible for all the building and engineering maintenance grounds and gardens, but the Fiscal Services Manager is responsible for the budget.

No planned maintenance work has been carried out for some time as sufficient staff and funds have not been made available. If a problem does occur that the small maintenance staff cannot handle, contractors are brought in.

The main items of engineering plant, listed below, were inspected and were found to be functional, but in a poor state of repair.

4 x 500 hp No 6 oil fired boilers each generating 36,000 lb/hr.

2 x 750 KW, 2,400 Volt steam driven generator. These will supply full site load but would take some time to come on load.

1 x 150 KW, 2,400 Volt diesel generator. This looks after boiler plant and a small number of buildings.

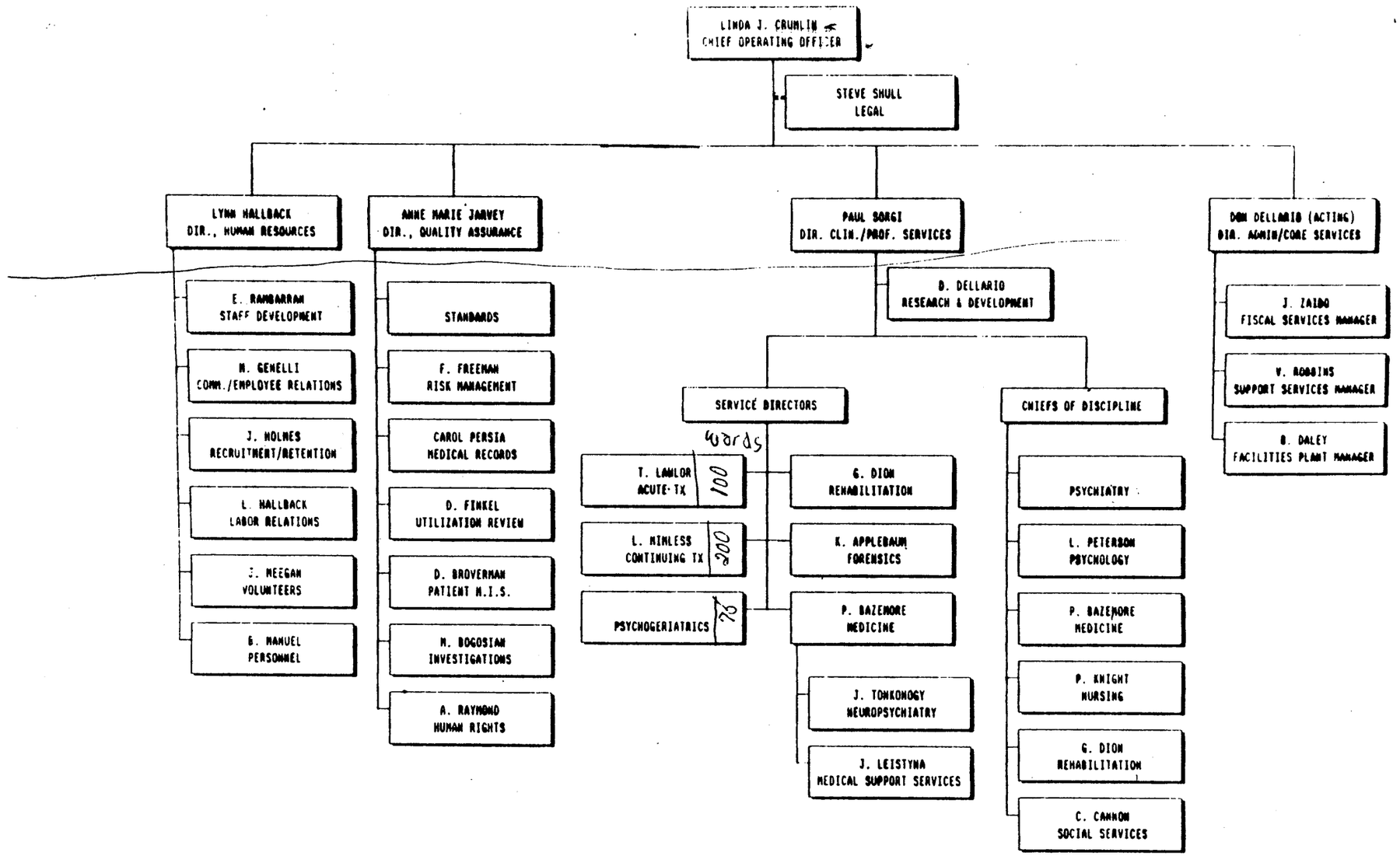
The command structure for this hospital is shown at Enclosure No 8.9.1 and the staffing structure of the Facilities Plant Management section is shown as part of the Director of Administrative and Care Services command chart at Enclosure No 8.9.2.

Estate maintenance and energy costs were given as follows. Total building areea was stated as 429,066 ft^2

Maintenance Costs excluding staff salary = $310,392 = £193,995 or some £4.86/m^2

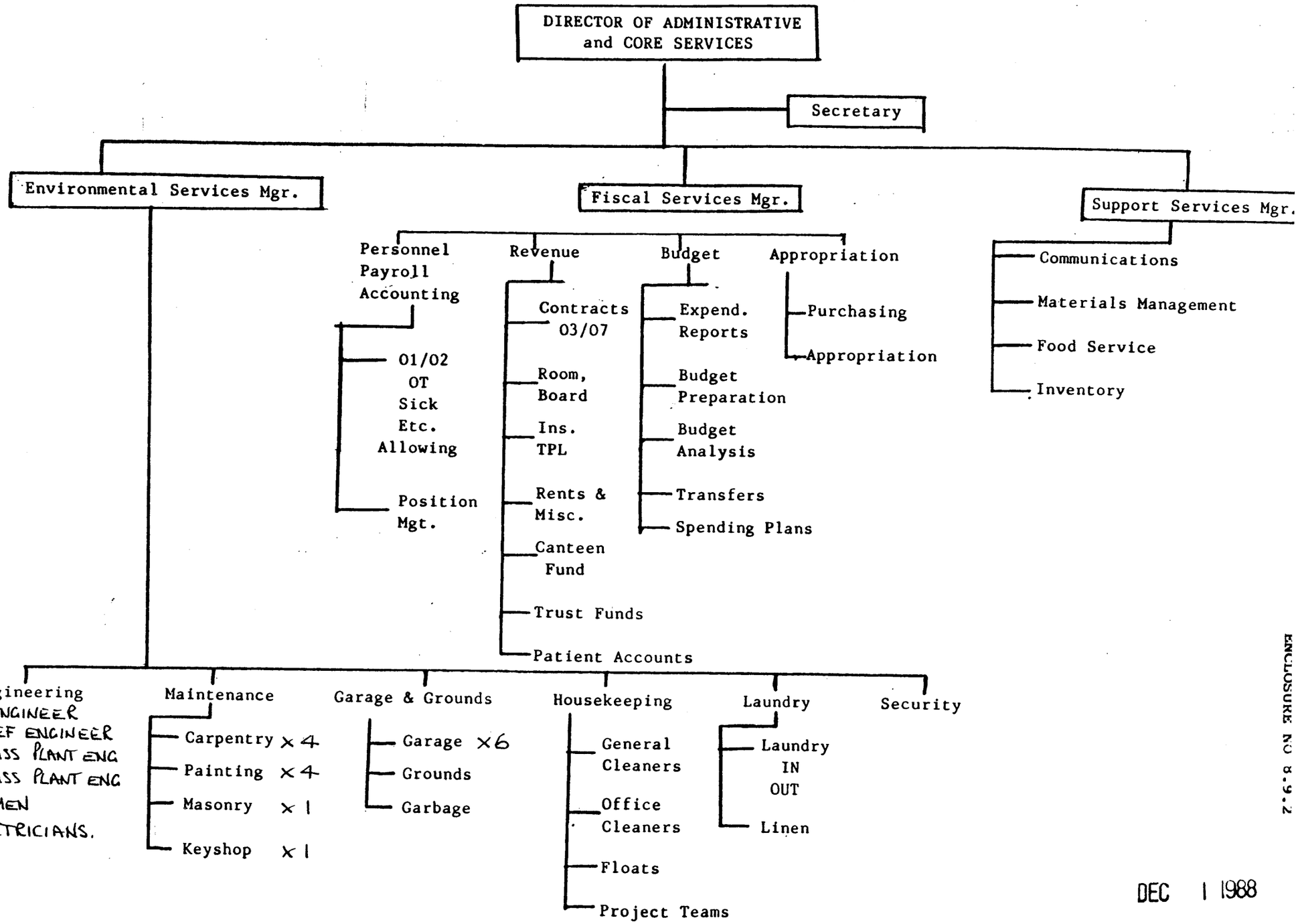
Energy and Utility Cost = $683,689 or some £10.72/$m^2$

Energy usage as estimated for heating oil only = 322,322 BTUs/ft^2.



WORCESTER STATE HOSPITAL COMMAND STRUCTURE JUL 1989

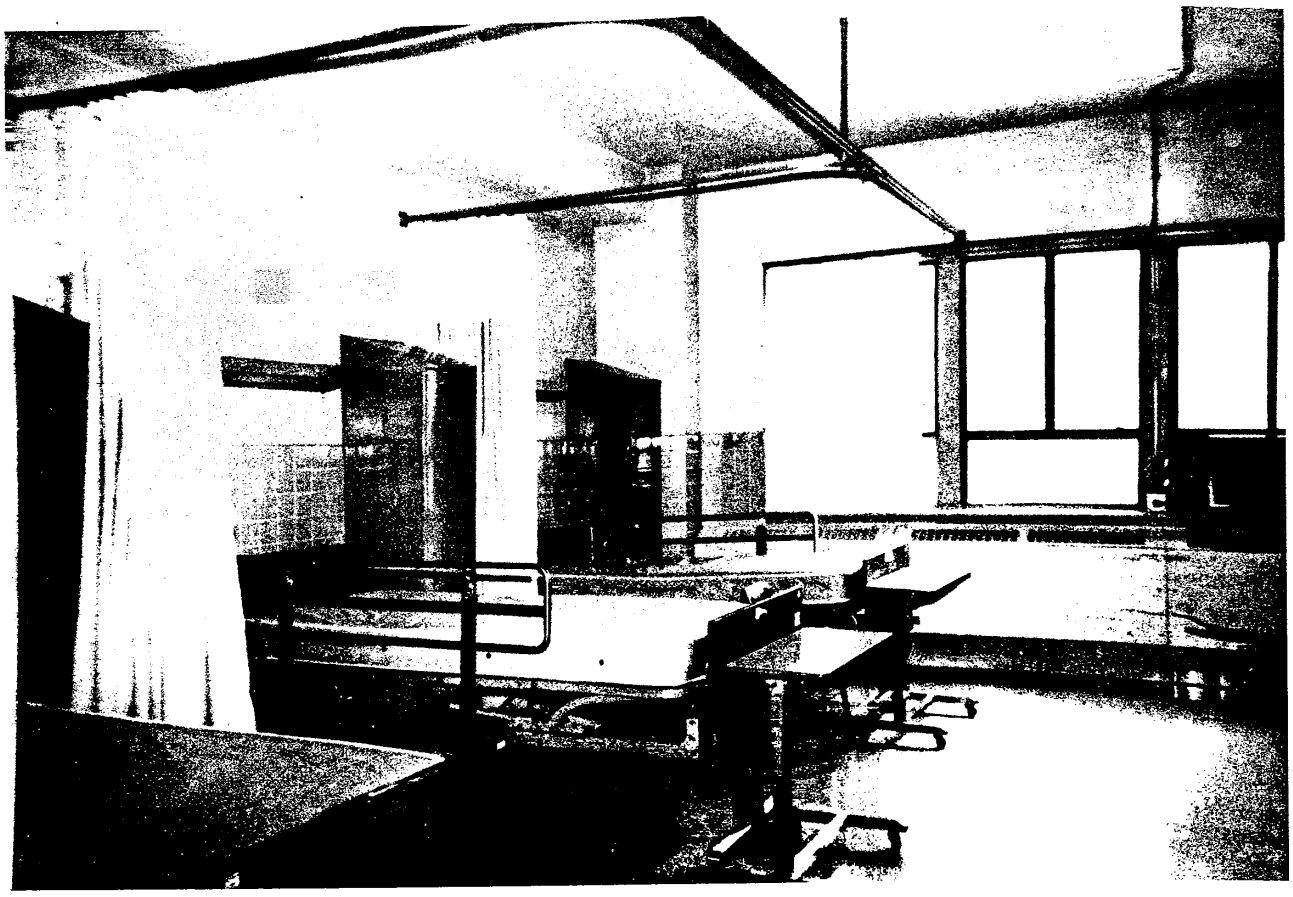
ENCLOSURE NO 8.9.1



ENCLOSURE NO 8.9.2

DEC 1 1988

TEWKSBURY HOSPITAL, TEWKSBURY MA



A TYPICAL LAYOUT OF SIX BED WARD

A TYPICAL PATIENT TOILET AREA

US3AAA

8.10 TEWKSBURY HOSPITAL

This is a long stay public hospital administered by the Commonwealth of Massachusetts Department of Public Heatlh and some idea of the management arrangements were explained during discussions with the Director of Support Services and the Director of Fiscal Affairs.

The hospital, with a capacity for 1,000 beds, is located in its own grounds some little distance from the town centre. At the time of the visit the hospital was home to some 700 people, the majority of whom are geriatric patients suffering from a range of complaints common to the elderly. There is also a programme which looks after alcoholic brain damaged women, these patients being admitted following the closure of a local mental hospital.

The hopsital also has a tradition for looking after homeless men and can normally provide accommodation for about 150. On arrival these men are medically screened, fed, clothed and found a bed. In the past the usual "customers" were old men who were drifters with alcohol related problems, but increasingly the facility is attracting the young drug abuser. Appropriate courses of treatment have been administered by the staff for as long as the patients are willing to stay, but no claim is made to be providing proper rehabilitation. The hospital is allowed to make a charge for the service of the rate of $20 per day, but few men have the cash in hand and for most, the service is provided free.

From a financial standpoint the hospital is going through a period of transition. Up to 30 June 1989, the facility was fully funded by the state. Budgets were prepared by hospital management and subitted to the Department of Public Health who then allocated what was available, which was always somewhat less than the amount requested. However as from 1 July 1989, the hospital has to generate the majority of its own budget by seeking reimbursement from the federal government and third party payers.

About 80% of its non-itinerant patients are covered by Medicaid, 16% to 18% would come under Bluecross, Blue Shield and the balance would be private insurance or personal payers.

Some of the vagaries of the Medicaid and other reimbursement systems were explained earlier, and in the past the Department of Public Health has handled this side of the business. In effect they provided the state's 50% contribution to Medicaid, claiming the other 50% from the federal authorities. They also claimed from other payers and fully funded the balance. This automatically meant that the state absorbed the cost of treatment if the patient stayed beyond the period allowed for reimbursment.

The budget requested by the hospital for the financial year 1989/90 was some $25,646,000, the Department calculated what the state's contribution through Medicaid would be and has given them $9.0 million. Up to 1989 there had also been an allocation of $2.5 million for free care, that has now been lost. It was understood that the state authorities do not intend to levy a "capital charge" on the hospital for the assets and any outstanding loans will still be serviced by the Department. To this extent the hospital does not manage the business on commercial lines. There was some uncertainty as to where they would stand in future with regard to existing backlog maintenance and possible future injections of major capital funds.

At the time of the visit the full implications of these changes were still being worked out, but a few of the background problems, particularly with regard to the estate, were explained.

This six storey hospital was built in 1961 to replace part of the earlier institution. At that time, the hospital was largely self-sufficient in meat, vegetables and dairy produce, all provided by their own farms which were part of the estate. These farms have now gone, but the estate still comprises some 800 acres, 20 houses and 40 other types of buildings plus it was claimed some 20 miles of roads. It was said that the original institution was modelled on British hospital designs, some 100 years ago. These "text books" and plans are now in the local archives.

In addition to medical services described above, the hospital also houses nine or ten outside organisations all of whom are provided with accommodation free of charge, but maintained out of hospital funds. These other agencies include a police academy, the local offices of the DEQE, the Department of Public Safety, Department of Health, a federal programme for training 4-6 year old children etc. The hopsital's concert hall is also let out to the public 2 or 3 nights per week for bingo or other events free of charge. As the law stands the hospital authorities are not allowed to charge for the use of the accommodation and they are not able to sell any of the land or generate any other income from the assets. However, during 1988 the state authorities agreed to over 100 acres of land being given to the local authority, one parcel was used to extend a cemetery and the other to develop a soccer pitch.

The hospital is a member of the AHA and, in July 1989, still had accreditation with the JCAHO. The last accreditation visit was some four years earlier and an inspection was due before the end of the year. In spite of the general lack of funds and a number of inadequacies, the management were confident that they would get accreditation, but perhaps with reservations. However there had been suggestions that whilst the facilities could still claim hospital status (there is a small operating suite, three sterilizers, x-ray equipment etc but these are rarely, if ever, used) they more accurately fulfil the role of a long term care facility ie a large nursing home and if their status was to be changed, they could be in trouble on a number of counts.

One problem would result from the fact that reimbursement rates for nursing homes are substantially lower than for hospitals, around $72 per day as compared to $102 per day. However this lower rate would be attractive to all those making reimbursement payments to the hospital and all these agencies are seeking ways to drive costs down.

A further difficulty arises because the accreditation standards for a nursing home are higher than for a hospital and they doubted their capacity to pass this higher standard. This course of events could result in the federal authorities having to intervene on behalf of the patients as they did at Worcester State Hospital, directing the state to make improvements or ultimately taking charge themselves. Prior to the visit there had been comments in the local press about intended changes at the hospital and that these were part of broader efficiency drives not only affecting the Department of Public Health but all state administration. In the education sector a number of schools had recently closed, the students being transferred to other schools and many teachers losing their jobs. With all these changes having been introduced and others in the offing, the feeling came across that management were apprehensive and in a state of shock.

There is a long history of under-funding at this hospital, and the estate has not escaped these problems. The Chief Power Plant Engineer described some of the results of this lack of investment and gave some details of the current maintenance arrangements.

Some seven years ago a window replacement programme was prepared at an estimate of some $700,000, this work did not go ahead and a recent re-estimate put the cost of the job at $2.0 million. Similarly, a lift renew scheme was suggested five years ago at an estimated cost of $800,000, this work was not carried out and the cost has increased to $1.7 million. Two of the ten lifts have been out of use for some time, having been condemned by the State Lift Inspector. It was reported that little or no plant has been replaced in the main hospital block since it was built and a similar philosophy has applied to other buildings on the site.

The hospital's organisational chart is shown at Enclosure No 8.10.1 and this shows the Power Plant Engineer's staff, ie the estates department. It was explained that the establishment for this department is 118 FTE but that there are only 60 people in post.

The Power Plant Engineer is responsible for building and engineering maintenance, furniture and energy. The maintenance of biomedical equipment is outside his remit and he is not responsible for the budget but assists the Director of General Services with its presentation.

As part of the state authority's drive for increased efficiency, the Executive Office for Administration and Finance, Division of Capital Planning and Operations (DCPO) appointed consultants in 1988 to carry out a complete review of the hospital's maintenance programme. This company, Nuclear Energy Services, took some twelve months to survey the whole facility, logging details of all plant and equipment in an asset register, assigning asset numbers and tagging all equipment. Maintenance routines were then drawn up giving details of task, frequency, time allotted for the task and the trade or skill required to do the work. A system of works orders was then devised which would act as the workman's instruction to do the particular job and a record that the work had been done, the materials used, time taken and cost of the job.

This complete programme has been placed on computer and work orders are generated as and when required. The process is illustrated at Enclosures Nos 8.10.2 - 4 and the example chosen is fan coil unit No 1530. Details for other equipment would follow similar patterns.

The computer programme produces progress reports and is able to be interrogated to check on a range of items such as programme status and orders outstanding, costs to date, performance standards of individual workmen set against the time allocated for the job etc etc.

As part of the contract, the consultant was required to train site staff on how to operate the system and how workmen should provide feedback so that the programme could be fine tuned. The consultants were also obliged to monitor the running of the system and provide DCPO with quarterly reports. Their third report dated June 1989 indicates that the hospital maintenance staff have made an excellent start and that nearly 9,000 work orders had been processed up to that time. The report also stated that emergency breakdown calls had decreased substantially since the introduction of the scheme.

All breakdown repairs or requests for work are also handled by the system. These are actioned in the first instance by either a verbal request - but in request of emergency work only - or on a Maintenance and Repair Request Form. On completion of the work, details are logged in the computer and the job costed for time and material.

Typical of other hospitals visited, the boiler plant was dual fuel fired, using No 6 oil and gas, but the hospital also generates some 71% of their own electricity, using a combination of back pressure steam turbines and diesel generators. A breakdown of electricity consumption for the financial year 1988 is shown below:

		KWH
Electricity Purchased		1,780,807
Electricity Generated	- Steam	3,471,162
	- Diesel	953,325
	TOTAL	6,205,294

The maintained area of the estate was given as 88,797m^2 and the maintenance cost quoted at £20.08/m^2 with energy costs at £8.22/m^2.

A feature of the energy reporting system is the use of Energy Indicators and these are quoted as:

Heating	-	326,000 BUT/ft^2
Total	-	334,000 BTU/ft^2

On the question of backlog maintenance the Power Plant Engineer expressed the view that some $6.0 million were needed to bring all the plant and equipment up to standard, this included lift renewal and/or repair, re-tubing the three steam boilers and replacement of the diesel generator. If building fabric, windows and the like were included the cost would be of the order of $12 to $15 million.

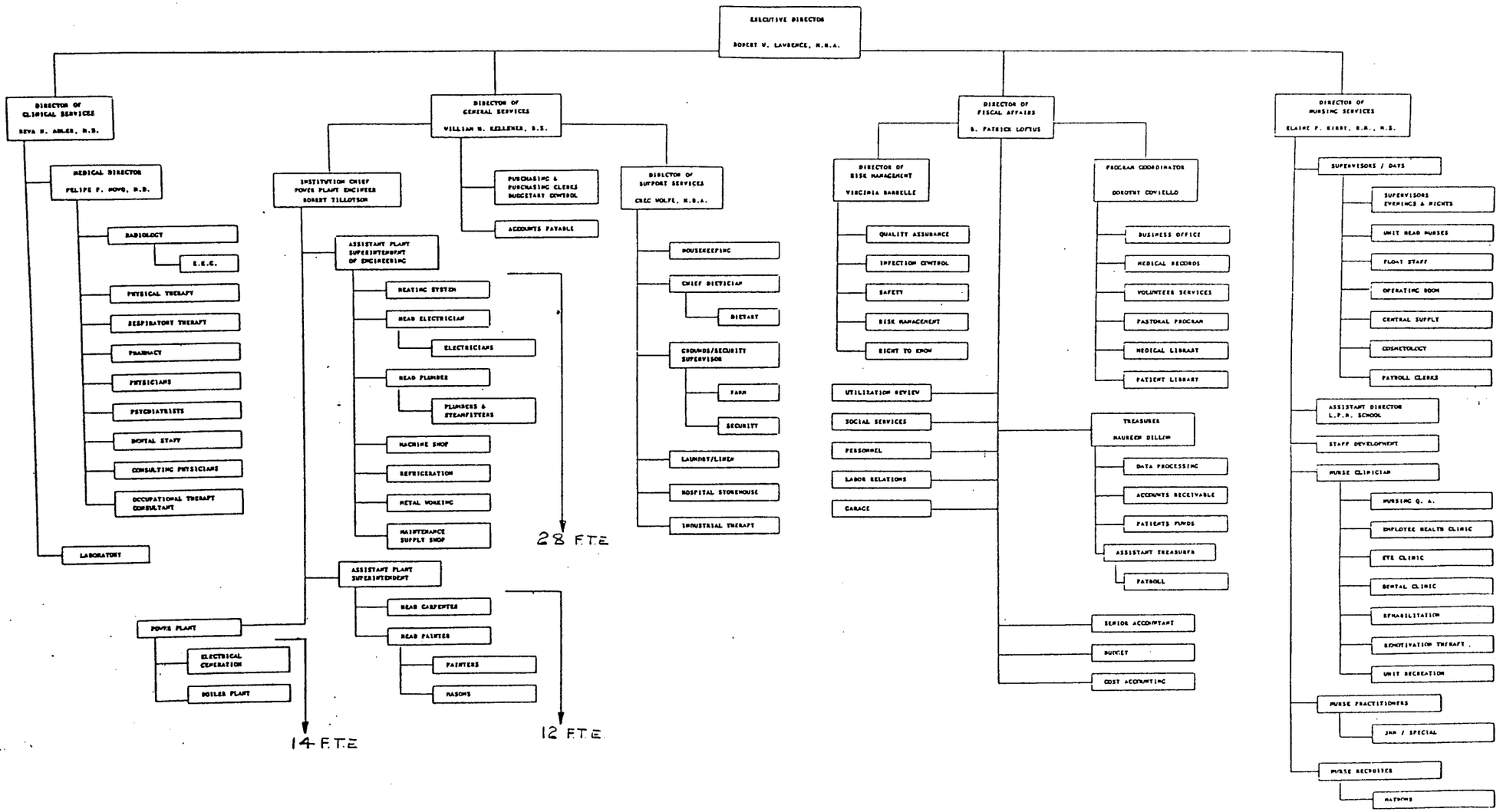
An inspection of parts of the hospital was arranged, including the boiler house and generator station. The hospital had been designed to a basic but functional level of accommodation with tiled walls in six bed wards and corridor walls tiled floor to ceiling. In the areas inspected the accommodation was plain but clean and maintained in good condition with no signs of a backlog maintenance problem.

In the boiler house, the maintenance standards were equally high and it was obvious that a great deal of time and effort had gone over the years in maintaining the equipment, including the 26 year old boiler plant, in a presentable order. It was clear the steam turbines had also been well looked after.

Looking at the size and importance of the operation at this hospital, coupled with the effort being put into the estate by DCPO, it seems unlikely that the Department of Public Health will allow it to fail. A more likely explanation appears to be that the state is taking very seriously the task of lowering costs and keeping them low.

TEWKSBURY HOSPITAL

INTERIM ORGANIZATIONAL CHART



MAY 15, 1989

ENCLOSURE NO 8.10.1

TEWKSBURY HOSPITAL

PREVENTATIVE MAINTENANCE PROGRAMME

EXAMPLE OF INVENTORY RECORD

```
                                                                CHANGE MODE
PM UNIT INVENTORY RECORD
PM UNIT NUMBER                  1530          :NEW  X:GOOD    :FAIR    :POOR CONDITION
UNIT DESCRIPTION                FAN COIL UNIT
EQUIPMENT CLASS                 AHF     FAN COIL UNIT
MANUFACTURER CODE               0036    TRANE CO
MODEL  NUMBER                   455
SERIAL NUMBER                   OF-00829
BUILDING CODE                   004     DIETARY BUILDING
LOCATION CODE                   0090    BASEMENT
REAL PROPERTY REF. NO.
FUNCTION/AREA SERVED            TRUCK LOADING AREA
IN-SERVICE DATE  (YEAR )
EST. DESIGN LIFE (YEARS)        17
EST. REPLACEMENT COST           $2,075.00
WARR. / SER. CONTR. EXPR.
DRAWING REFERENCE NO.
MANUAL  REFERENCE NO.
REMARKS:

PM ACTIVITY:  100 11029   1         2         3         4         5
PM WEEK SCHEDULE  WEEK 123456789012345678901234567890123456789012345678901234567890
freeze PMsched: N  NO.   M    M    M    M    A    M    M    M    M    M    S    M
```

```
SkipEditChangeAddResetDeleteQuit
        POWER/DRIVER:           FAN DATA:           BELTS:
                                                      TYPE      SIZE/NUMBER   QTY
DRIVER  ELECTRIC                CFM       RPM
MAKE  UNIVERSAL                 WHEEL DIAM      IN
TYPE                            MODEL NO
S/N   4EA693A3A                 TYPE BLADE          FILTERS:
                                CLASS
RPM   1550      HP 1/20         BEARING
AC/DC  AC PHASE 1 CYCLE 60
FRAME                           COILS:  ACCESS:
CONTROLS  SWITCH & THERMO-      HEAT  X  HUMID      CHILLED WATER:    STEAM:
   STAT                         COOL     SMOKE
                                PRE-H    FREEZ      TEMP IN      F    PSIG
COUPLING                        EXP VALVE           TEMP OUT     F    LB/HR
--TYPE--- --SIZE/NUMBER- QTY                          GPM             TRAP
DIRECT                           SPRAY PUMP:        CONT              CONT
                                GPM       HP          RELIEF     #    RELIEF     #

REMARKS: MTR MDL# DA21010, 115V, 1.8AMP
```

US2AAH

TASK -##-	T A S K D E S C R I P T I O N	FREQUENCY	-- LABOR -- HOURS SKILL	SEQUENCE #
001	TEWKSBURY,MASS.			
004	DIETARY BUILDING			
1530	FAN COIL UNIT			
====	DESCRIPTION: FAN COIL UNIT LOCATION: 0090 BASEMENT ASSIGNED SERVICE LEVEL: 3			
AH004	INSTALL SAFETY TAGS ON MECHANICAL & ELECTRICAL SYSTEMS AS REQUIRED	(!)ALWAYS	0.1 MECH	112303
AH223	CLEAN EQUIPMENT EXTERIOR & INTERIOR - DIRT, GREASE, FOREIGN MATERIAL	(S)EMI-ANNUAL	0.2 MECH	16240501
AH030	CLEAN MOTOR FAN, VENTS & FINS	(S)EMI-ANNUAL	0.2 MECH	20000301
AH041	LUBRICATE MOTOR BEARINGS (SEE MANUFACTURER'S MANUAL)	(A)NNUAL	0.2 MECH	200034
AH230	CHECK CONDITION, TENSION, AND ALIGNMENT OF V-BELTS. - ADJUST OR REPLACE AS NEEDED -	(S)EMI-ANNUAL	0.2 MECH	24333803
AH129	INSPECT UNIT FOR MISSING OR DAMAGED INVENTORY TAG - REORDER TAG FROM D.C.P.O. AS REQUIRED	(A)NNUAL	0.0 MECH	499897
AH144	REMOVE TAGS & RETURN UNIT TO SERVICE	(M)ONTHLY	0.2 MECH	55000000
AH237	MAKE SURE EQUIPMENT IS LEFT IN A SAFE OPERATING CONDITION. - ALL SAFETY COMPONENTS REINSTALLED.	(!)ALWAYS	0.2 MECH	566120
AH235	CLEAN UP WORK AREA	(!)ALWAYS	0.2 MECH	981860
AH236	INFORM AREA PERSONNEL AND SUPERVISOR THAT WORK IS COMPLETE.	(!)ALWAYS	0.0 MECH	997121

ENCLOSURE NO 8.10.4

{ MASS DCPO PROJECT }

DATE: 08-07-89 PREVENTIVE MAINTENANCE WORK ORDER TEWKSBURY,MASS. PAGE: 1

WORK ORDER NUMBER ACTIVITY NUMBER	10059 100 11029	PM WEEK NUMBER TO BE COMPLETED BY	30 08/04/89
PM UNIT SKILL	1530 FAN COIL UNIT MECH	BLDG LOC	004 DIETARY BUILDING 0090 BASEMENT
SPECIAL INSTRUCTIONS/COMMENTS	(M)ONTHLY PM SERVICE		

TASK#	TASK DESCRIPTION	MATERIALS	DONE
AH 004	INSTALL SAFETY TAGS ON MECHANICAL & ELECTRICAL SYSTEMS AS REQUIRED		✓
AH 144	REMOVE TAGS & RETURN UNIT TO SERVICE		✓
AH 237	MAKE SURE EQUIPMENT IS LEFT IN A SAFE OPERATING CONDITION. - ALL SAFETY COMPONENTS REINSTALLED.		✓
AH 235	CLEAN UP WORK AREA		✓
AH 236	INFORM AREA PERSONNEL AND SUPERVISOR THAT WORK IS COMPLETE.		✓

RESOURCES USED TO PERFORM THE WORK

RESO. CODE	CAT. CODE	RESOURCE DESCRIPTION	HOURS/ QTY.	EXTENDED COST
617			.30	

P.M. WORK ORDER COMP DATE EST. SERVICE TIME	7/31/89	EMPLOYEE INITIALS SUPERVISOR INITIALS	

SPRINGFIELD MUNICIPAL HOSPITAL, SPRINGFIELD MA

GENERAL VIEW OF HOSPITAL FROM STATE STREET CAR PARK

A TYPICAL LAYOUT OF THREE BED WARD

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8.11 SPRINGFIELD MUNICIPAL HOSPITAL

This is a 438 bed hospital run by the city of Springfield and provides long term care, mainly for geriatric patients but also some younger people with injuries or other serious disorders that require extended, but not acute care. The buildings associated with the hospital house a number of city-run programmes. The facility also houses the civil defence "war room" and is the centre for the city's communication system.

As can be seen from the hospital's command structure at Enclosure No 8.11.1 the Estates Officer is given the title Plant Engineer and is responsible to the Director of Support Services.

The Estates Officer, who had been in post a little over twelve months, explained that he was responsible for all building and engineering maintenance, grounds and gardens, energy, minor upgrade work, security and telecommunications. He is the budget holder for these services. The laundry plant was not part of his remit but he was responsible for providing all the energy including steam to that facility.

The main fixed plant at the hospital includes:

4 - 350 HP 125 psi No 6 oil fired steam boilers

1 - 110 ton chiller

The electricity intake is rated at 2,500 Amps, 240 volts, 3 phase, 60 Hz.

As the city of Springfield runs the municipal water supply and sewage treatment plants, the hospital gets both of these services free of charge.

The hospital was built in 1959 and much of the plant and equipment, including the boilers, are original. There is no air conditioning installed, but dehumidified fresh air is supplied to some of the patient areas, this being provided by the 110 ton chiller.

Panel radiators provide heating in most areas of the hospital but there is no zoning for any of the heating.

When the Estates Officer took up his post one of his first priorities was to set up a planned maintenance system. None had been operated previously and staff were working overtime to cope with breakdowns. At the time of the visit this new system was starting to be implemented and being controlled on a manual basis, however the intention is to put this on a P C in the near future.

Another area that had not been looked at was energy management, and no form of energy conservation work had been done. An energy management consultant had recently been called in and the company's proposals were being considered, their terms being that as a condition of funding all the capital, they took all the savings for ten years.

Though the hospital is only capable of accommodating 438 beds, at the time of the visit, only 280 patients were being housed and parts of the hospital were closed off awaiting renovations.

The hospital is in the process of applying for dual licence to operate both as a hospital and a long term care facility. A condition of this licence is that the two facilities, though sharing the same building, have to functionally and managerially separate and the renovation work will provide this separation. On completion the Estates Officer will have to keep separate accounts for the two facilities.

Whilst it was not made clear whether these changes had been forced on the hospital authorities or not, it was stated that they had lost accreditation two years earlier (and the 1989 AHA Guide to the Health Care Field lists the hospital as not being JCAHO accredited) but this had now been restored and they were able to seek reimbursement from Medicare and Medicaid.

The range of work covered by the renovations is extensive and appears to reflect the higher standard of care demanded by the authorities for a long term care facility. In all the refurbishment work has been estimated at $5.0 million and includes the following main items:

- individual "through the wall" air conditioning units in patient areas

- increasing the electricity supply capacity from 2,500 Amp, 240 volt, 3 phase intake to 5,000 amp, 13,800 volt, 3 phase with HT metering. Plus new internal distribution system

- install a new sprinkler system, only the basement covered originally

- replace two of the four 350 HP No 6 oil fired steam boilers with package units of the same size but with oil and gas dual fuel capacity

- provide new steam distribution and condensate pipework and new steam traps, complete with all necessary controls to provide seven heating zones in the building

- provide a new standby electrical generator and extend existing distribution system

- new windows on the whole of the north side of the building

- improve the doctor/nurse working areas

- upgrade fire alarm system

The plans for this work were drawn up by consultants, with some input from the Estates Officer, and have been passed by the city and state engineers; at the time of the visit they were with the Department of Public Health in Boston awaiting their approval.

Once approved, the job will be put out to tender by the consultant to five contractors named by the Estates Officer, there is no official list of contractors. The Estates Officer is also able to specify all the plant and equipment by manufacturer and type. Once the work starts on site, he will provide the Clerk of Works. Funds for the project have been provided by a bond taken out by the city.

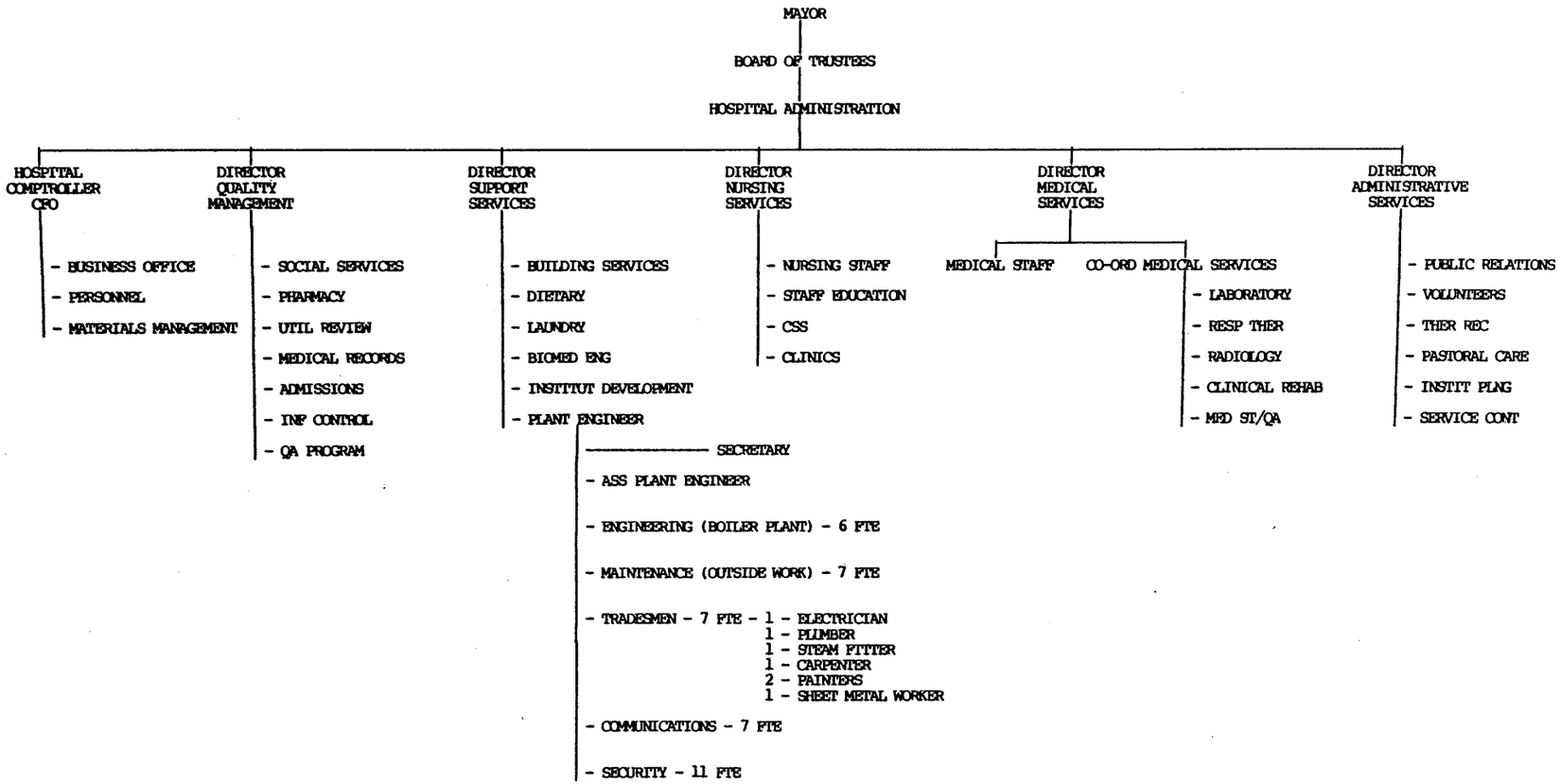
Once the work is completed, the Estates Officer will be appointing an HVAC technician to maintain the new air conditioning units. Ideally he would also like to take on a further five tradesmen and have an increase of $100,000 on his current budget of some $1.4 million, but these improvements he thinks are most unlikely.

It was the view of the Estates Officer that once the renovation works are completed there will be little backlog maintenance remaining, other than the replacement of the two remaining boilers. He could see little hope of the boilers being replaced in the near future and they were in fact scheduled to be re-lined during the 1989 summer shutdown.

Estimates of maintenance expenditure were provided by the Estates Officer but the accounting system does not allow a breakdown of costs to take out items such as costs associated with communication and security, provision of heat to laundry or the provision of energy and maintenance to other users of the building. The cost of energy and maintenance per ft^2 has therefore not been calculated.

SPRINGFIELD MUNICIPAL HOSPITAL

DEPARTMENT ORGANISATION



TOTAL ESTATES STAFF = 41 FTE

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ENCLOSURE NO 8.11.1

9 CONCLUSIONS

As indicated in the introduction, the reason for embarking on this project was to examine a model of health care provision operating within a highly competitive and market lead environment, the hope being that the information obtained would assist estates officers and other interested colleagues at Unit, District and Region as they make their plans for the introduction of the White Paper proposals.

This was seen to be a relatively broad remit and a good deal of information has been gained. This information not only outlines the estate operation in a number of different types of hospitals, but also sets the background to the provision of health care in the USA, thus allowing the estate function to be examined in context. There is of necessity, a large number of strands to the provision of health care in a modern complex society, many of these are inter-related and inter-dependent and the very complex nature of the American health care system has been demonstrated.

When the plans for this project were conceived, a number of general assumptions had been made with regard to the 'American model', these included:

1 all private hospitals would be independent operators

2 the majority of hospitals would operate for profit

3 the hospitals' main motivating force would be that of the market place

4 there would be a minimum of involvement by government agencies

5 government authorities would run few, if any, hospitals themselves

6 standards across the board would be high

7 a high level of efficiency would be evident in all departments of the hospital including the estate

8 estate departments would operate with a large input from outside contractors, and directly employed labour would be tightly controlled

9 all estate work would be costed by department and these costs would be identified and form part of the patients account

10 cost of treatment would be high and the majority of people would not have complete insurance cover

The project was intended to clarify these assumptions and fill in some of the detail that would help to demonstrate how the estates department of an American hospital operates.

The evidence in the report indicates that there is no simple 'American model', that health care provision in the USA is in a state of crisis and that the estate services are provided against a background of statutory and voluntary regulation.

The report demonstrates that a number of the listed assumptions were spectacularly incorrect, whilst others were quite close to the mark. The list does however illustrate what is now felt to be an embarrassing level of ignorance of the system of health care provision in the USA.

One important area of activity that came as something of a surprise was the work of the JACAHO. There has been some criticism in the US of their accreditation system, as highlighted at a King's Fund seminar in September 1989. Dr Paul Schyve, Director of the Department of Standards at the JCAHO, expressed the view that the Commission's manual of standards was 'too fat' and that a 'thinner manual' was a top priority.(1) This general view however does not appear to be shared by the estates officers at any of the hospitals visited. Indeed, from the comments made, it seems reasonable to say that the process is highly regarded, as are the survey staff. It is of interest to note that the Fallon Community Health Plan intends to seek accreditation in the near future though they are not obliged to and their business is currently expanding.

Estates officers take the accreditation process very seriously, along with the monitoring processes described in the report. Dr Schyve is doubtless correct when he states that only some 2% of hospitals are refused accreditation and that these are normally 'old large state psychiatric institutions' or small rural hospitals with only 10 to 15 beds. If the private hospitals visited in this project are typical, it would be difficult to find sufficient grounds, with regard to the estate function at least, for refusing accreditation. The important role played by the JCAHO in ensuring that these high standards are maintained in the private hospitals has been made in the report, however the public hospitals are a different question.

(1) See report in The Health Service Journal, 12 October 1989, p1241

The extensive guidance material published by JCAHO in their Plant Technology and Safety Mangement series is not too detailed but clearly sets out their aims, leaving the individual hospital management to devise their own detailed systems, the essential element being that these arrangements must be a hospital-wide co-ordinated package. The JCAHO try to apply this principle in a practical way accepting that a range of compliance will be the norm. They also recognise the advantage to be gained from having a well trained fully informed work force, as emphasised by their method of interviewing a random selection of staff and questioning them on their understanding of policies and procedures. The employee review system that results from this process, a sample of which is illustrated at Enclosure No 8.5.5, would appear to be worthy of further study.

The Commission's current initiative 'Agenda for Change' would appear to be worthy of further study and some useful information could result from monitoring the outcome of the various pilot studies.

It is clear from the AHA Year Book and other data that few, if any, American hospitals are 'lone operators'. The benefits of joining alliances for mutual protection, and in order to gain advantages from economies of scale, developing purchasing procedures and education programmes etc are obvious. In the case of the Yankee Alliance, they saw the need to join with an even larger group, and it is interesting to note their link with the JCAHO through the work of the Compliance Advisory Committee.

The 'hard nosed' commercial approach of the hospitals towards each other appears to be tempered in a number of ways; perhaps through a forced union brought about by the CON process in the case of shared MRI facilities, or more interestingly in the shared ownership of a cogeneration plant as illustrated at Boston. In this case the various hospitals are in very close proximity to each other and compete commercially in a number of clinical fields. These kind of working arrangements clearly make for interesting management and accountancy systems.

An example of good business co-operation linked to estate rationalisation is given at the Brigham and Women's Hospital. There is also an exmaple here of how to successfully develop a hospital on a very restricted site, bounded on all sides by busy roads.

Beth Israel hospital provides an interesting example in the development of a business management system and monitoring their programme 'Towards 21' should prove useful. Here, as at Brigham and Women's, the modernisation of an old hospital has been successfully undertaken and would no doubt be an interesting case study.

Both hospitals appear to prove the JCAHO thesis that good management can be recognised by its ability to set and achieve standards and its ability to recognise and adapt to change.

It could be argued that the setting of estate and general accommodation standards are to some extent subjective, depending in some measure on what the customer expects. In the USA it has become the accepted norm to provide private or semi-private rooms complete with a high standard of service. Similar parallels can perhaps be drawn with the standards set for hotels, restaurants, shops etc where the paying customer demands value for money. In the public hospital the same customer/provider relationship does not apply. Here the hospital is but one part of a large administrative department and the standards governed to some extent by what is politically affordable.

However, this is not to say that the state and federal authorities do not take their health planning role seriously. In both New Hampshire and Massachusetts the Certificate of Need process is used to try and regulate utilization rates and keep reimbursement costs down. The report of the New Hampshire office of Health Service Planning and Review for 1989, stressed their commitment to control planning, but their forecast of costs tripling by the year 2000 would appear to indicate that they are losing this particular aspect of the battle.

The financial problems of the Veterans Administration were highlighted in an article in the US weekly journal Modern Healthcare, dated 11 August 1989. Here a picture is painted of lengthening waiting lists, an ageing and sicker veterans population, federal budget cutbacks and management's inability to cope with the problems. The director of the Medical Center at Maywood ILL gave examples of the rationing of health care and means testing of incomes, he said that if incomes were above a certain level, the veterans were told "sorry we can't treat you".

Appendix No 9 indicates a pattern of spending in the American private hospitals visited as being consistently higher than those hospitals in the Northern Region. This should indicate that there is proportionately more money available for the estate in American hospitals and this does appear to be the case. It was intended that Appendix No 9 be used to illustrate comparison between US and NHS hospital costs including those of the estate but differences in accounting systems and the practice in the US of cost shifting, makes this kind of simple comparison difficult to justify. NHS Estate Performance Indicator (PIs) data would perhaps give the closest parallel to the maintenance cost data quoted in the report, but even here the results could well be misleading as there is no certainty of like comparison.

The approach to energy conservation in the hospitals visited is interesting. A number of Estates Officers in the private hospitals stated that up to the mid-1970s, hospitals were paid all their expenses, more or less without question, and there was thus no incentive to save energy or be efficient. It is shown in the report that some hospitals have taken the question of energy management more seriously than others and some considerable savings have been made. However in a number of hospitals the information on energy usage was not available, whilst in others the data had to be calculated from invoice records. The use of energy PIs does not appear to be uniformly adopted.

It is clear that over the last ten to fifteen years, the pressure has progressively been increased on hospitals to reduce costs. All the private hospitals operate under the same regulatory framework and face similar problems, but no two hospitals are alike, each having different management structures, corporate aims, physical (or estate) problems and commercial pressures. All the private hospitals visited appear to be successfully tackling the difficulties they are confronting, though some have progressed further than others with the introduction of new maintenance and management techniques.

The questions raised by colleagues at the start of the project about asset management have been answered in the report. The system of asset 'ownership' in US hospitals appears to be similar to that in the NHS with the Estates Officer being responsible for maintenance and being the budget holder. The maintenance of x-ray and other imaging equipment is not normally the responsibility of the Estates Officer.

It has been shown that the estate cost element of patient charges is 'lost' in the hospital's general overheads rather than be separately identified as previous imagined, this policy appears to be dictated by the complexities of the accounting system. The various approaches to planned maintenance have been demonstrated, here there are a number of close parallels with NHS practice, notable differences being the general lack of cross trade working amongst craftsmen and the non-use of bonus systems.

In this report no attempt has been made to give a detailed account of the estate maintenance management practices at any one hospital. Many of the common routines and techniques have been quoted as have many of the good (or bad) features. The picture that has been painted should provide the reader with a background to the American health care system, seen mainly from the estate point of view, and allow conclusions to be drawn as to what in the NHS context could be adopted as 'best practice', bearing in mind the obvious dangers involved when trying to apply systems and techniques away from the processes for which they have been developed.

In one area at least there is no need to examine American practice in search of a role model. The engineering apprentice training scheme as currently recommended by the Department of Health and run by the NRHA and a number of other Regions is outstanding in comparison to what was pointed out as being typical in the USA. However the American practice of licencing tradesmen has much to recommend it.

In its unique approach to the provision of health care, the "American system" has produced some good examples of first class and flourishing hospitals providing high quality treatment. At the same time there are many hospitals that are struggling to survive whilst others operate near or below the generally agreed minimum standards, both ends of this spectrum have been illustrated in the report. The "system" has also left a very large number of its citizens without access to proper health care and the generally quoted figure for this group of indviduals is around 30 million. The report indicates that this problem is recognised and attempts are being made at various levels to address the deficiency through the provision of some form of universal health care.

KING'S FUND NHS TRAVELLING FELLOWSHIP

APPENDIX NO 1

NUMBERS AND TYPES OF HOSPITALS IN THE STATE OF MASSACHUSETTS *

CONTROLLING BODY	TYPE NUMBER	NUMBER OFF		BED NUMBERS		PERCENTAGE BED COUNT	
		1988	1987	1988	1987	1988	1987
STATE	12	22	23	5,802	6,667	)	
COUNTY	13	6	6	638	638	) 23.83	25.25
CITY	14	13	13	2,488	2,676	)	
CHURCH	21	14	14	3,030	2,958	8.1	7.5
OTHER	23	96	96	20,705	21,542	55.27	54.5
CORPORATION (FOR PROFIT)	33	17	18	1,666	1,759	4.44	4.45
ARMY	42	1	1	68	68	0.18	0.17
VETERANS ADMINISTRATION	45	4	4	2,980	3,148	7.96	7.97
OSTEOPATHIC (NON-PROFIT)	63	1	1	83	63	0.22	0.16
	TOTALS	174	176	37,460	41,640	100 %	100 %

* INFORMATION TAKEN FROM THE AMERICAN HOSPITAL ASSOCIATION GUIDE TO THE HEALTH CARE FIELD FOR 1988

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APPENDIX NO 2

KING'S FUND NHS TRAVELLING FELLOWSHIP

DETAILS OF HOSPITALS VISITED IN MASSACHUSETTS AND NEW HAMPSHIRE

NR	HOSPITAL	HOSPITAL CLASSIFICATION			BED NUMBERS
		SERVICE	CODE	CONTROL	
1	St John's Hospital, Lowell	10S	21	YA	254
2	Tewksbury Hospital, Middlesex County	48L	12	STATE	730
3	Massachusetts General, Boston	10S	23	VHA	1082
4	Brigham & Womens Hospital, Boston	10S	23	?	720
5	Beth Israel Hospital, Boston	10S	23	PHA	472
6	Veterans Administration Medical Centre, Boston	10S	45	VA	616
7	Worcester State Hospital, Worcester	12L	12	STATE	418
8	Baystate Medical Centre, Springfield	10S	23	AHS	741
9	Springfield Municipal Hospital, Springfield	48L	14	CITY	438
10	St Joseph Hospital, Nashua, New Hampshire	10S	21	CHURCH	218

* INFORMATION TAKEN FROM THE AMERICAN HOSPITAL ASSOCIATION GUIDE TO THE HEALTH CARE FIELD FOR 1988

KEY

HOSPITAL CLASSIFICATION

SERVICE

10 - General Medical and Surgical

12 - Hospital with Unit for Mentally Retarded

48 - Hospital for Chronic Diseases

S - Short Stay (all patients stay less than 30 days or over 50% of patients admitted stay less than 30 days)

L - Long Stay (all patients stay over 30 days or over 50% of patients admitted stay 30 days or more)

CONTROL

YA - Yankee Alliance

VHA - Voluntary Hospitals of America

PHA - Premier Hospital Alliance

VA - Veterans Administration

UHC - University Hospital Consortium

AHS - American Health Care Systems

APPENDIX NO 3

ORGANISATIONS VISITED AS PART OF THE PROJECT IN ADDITION TO THE HOSPITALS SHOWN AT APPENDIX NO 2

1 Massachusetts Hospital Association
Burlington, MA

2 Applied Management Systems Inc
Burlington, MA

3 The Commonwealth of Massachusetts Rate Setting Commission
Boston, MA

4 The Fallon Community Health Plan
West Boylston, MA

5 Cogeneration Management Company Inc
Boston, MA

6 Joint Apprentice Training Committee for the Sound, Communications and Telephone Contracting Industry of Greater Boston
Newton Centre, MA

INFORMATION HAS BEEN RECEIVED FROM THE FOLLOWING ORGANISATIONS

1 American Hospital Association
Chicago, IL

2 Joint Commission on Accreditation of Healthcare Organisations
Chicago, IL

3 Yankee Alliance
Andover MA

4 Catholic Health Association of the United States
St Louis, MO

5 State of New Hampshire Department of Health and Human Services, Division of Public Health Services
Concord, NH

6 Health NorthEast
Manchester, NH

7 Commonwealth of Massachusetts, Department of Labor and Industries, Division of Apprentice Training
Boston, MA

COST PROJECTIONS TO YEAR 2000 BY AGE GROUP
NH ACUTE CARE HOSPITAL DISCHARGE DATA

AGE GROUP	1987 PROJECTED POPULATION	2000 PROJECTED POPULATION	1987 DISCH	2000 PROJECTED DISCH	1987 MEAN CHARGE $	2000 PROJECTED MEAN CHARGE $	1987 TOTAL CHARGES (millions) $	2000 PROJECTED TOTAL CHARGES (millions) $	1987 MEAN LENGTH OF STAY
0 - 4	79,026	86,648	20,964	18,960	1,355	4,461	28.4	84.6	3.4
5 - 19	231,506	278,349	9,546	8,633	2,443	8,044	23.3	69.4	3.4
20 - 29	172,267	174,253	21,437	19,388	2,475	8,149	53.1	158.0	3.8
30 - 39	187,037	240,920	17,402	15,738	3,050	10,042	53.1	158.0	4.5
40 - 49	115,157	250,157	10,942	9,896	3,864	12,723	42.3	125.9	5.4
50 - 59	96,755	174,725	11,277	10,199	4,655	15,327	52.5	156.3	6.3
60 - 69	87,188	103,209	15,894	14,374	5,333	17,559	84.8	252.4	7.5
70 - 79	59,112	79,464	17,574	15,894	5,736	18,886	100.8	300.2	8.6
80+	28,952	52,170	12,708	11,493	5,412	17,819	68.8	204.8	9.7
STATE	1,057,000	1,439,895	137,744	124,575	3,681	12,120	507.0	1,509.8	5.7
ANNUAL GROWTH RATE		2.4%		- 0.77%		9.6%			

SOURCE: NEW HAMPSHIRE HEALTH SERVICES PLANNING AND REVIEW BOARD ANNUAL REPORT, NOVEMBER 1989, EXHIBIT NO 6

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APPENDIX NO 4

Plant, Technology, and Safety Management (PL)

Standard **Circle One**

PL.1 There is a safety management program that is designed to provide a physical environment free of hazards and to manage staff activities to reduce the risk of human injury.* 1 2 3 4 5 NA

Required Characteristics

PL.1.1 The governing body strives to assure a safe environment for patients, personnel, and visitors by requiring and supporting the establishment and maintenance of an effective safety management program.* 1 2 3 4 5 NA

PL.1.2 A safety officer appointed by the chief executive officer or his designee and qualified by experience and/or education is responsible for the development, implementation, and monitoring of the safety management program.* 1 2 3 4 5 NA

PL.1.3 The safety management program is based on monitoring and evaluation of organizational experience, applicable law and regulation, and accepted practice and includes* 1 2 3 4 5 NA

PL.1.3.1 policies and procedures for safety in all departments/services;* 1 2 3 4 5 NA

PL.1.3.2 a risk-assessment program that evaluates the impact on patient care and safety of the buildings, grounds, occupants, and internal physical systems; and* 1 2 3 4 5 NA

PL.1.3.3 policies and procedures for the timely reporting and resolution of situations that pose an immediate threat to life, health, and/or property.* 1 2 3 4 5 NA

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*The asterisked items are key factors in the accreditation decision process. For an explanation of the use of the key factors, see "Using the Manual," page ix.

		Circle One
	PL.1.3.3.1 The policies and procedures are approved in writing by the chief executive officer and the chief officer of the medical staff.*	1 2 3 4 5 NA
PL.1.4	The safety officer manages an ongoing hospitalwide process to collect and evaluate information about hazards and safety practices that is used to identify safety management issues to be addressed by the safety committee; the information collection and evaluation system includes	1 2 3 4 5 NA
	PL.1.4.1 documented surveys, at least semiannually, of all areas of the facility to identify environmental hazards and unsafe practices;*	1 2 3 4 5 NA
	PL.1.4.2 a system for reporting and investigating all incidents that involve patient, personnel, or visitor injury, occupational illness, or property damage; and*	1 2 3 4 5 NA
	PL.1.4.3 summaries of actions taken as the result of other hospitalwide monitoring activities, including quality assurance and risk management.*	1 2 3 4 5 NA
PL.1.5	There is a safety committee, appointed by the chief executive officer or his designee, composed of representatives of administration, clinical services, and support services.*	1 2 3 4 5 NA
	PL.1.5.1 The safety committee meets at least every other month to analyze identified safety management issues and to develop recommendations for resolving them.*	1 2 3 4 5 NA
PL.1.6	The safety officer works with appropriate staff to implement safety committee recommendations and to monitor the effectiveness of the changes.*	1 2 3 4 5 NA
	PL.1.6.1 The results of monitoring are reported to the safety committee.*	1 2 3 4 5 NA
PL.1.7	Identified safety management issues and summaries of safety committee activities are communicated at least quarterly to the governing body, chief executive officer, directors of all departments/services, and those responsible for other monitoring activities, including quality assurance and risk management.*	1 2 3 4 5 NA
PL.1.8	All new personnel are oriented to the safety management program, and all personnel participate in continuing safety education and training.*	1 2 3 4 5 NA
	PL.1.8.1 The orientation and continuing education and training address general safety management issues, departmental safety plans, special hazards related to assigned duties, and changes in the safety management program derived from safety committee activities.*	1 2 3 4 5 NA
PL.1.9	The objectives, scope, organization, and effectiveness of the safety management program are evaluated at least annually and revised as necessary.*	1 2 3 4 5 NA

*The asterisked items are key factors in the accreditation decision process. For an explanation of the use of the key factors, see "Using the Manual," page ix.

Circle One

PL.1.10 There is a hazardous materials and wastes program, designed and operated in accordance with applicable law and regulation, to identify and control hazardous materials and wastes; the program includes* 1 2 3 4 5 NA

PL.1.10.1 policies and procedures for identifying, handling, storing, using, and disposing of hazardous materials from receipt through use and hazardous wastes from generation to final disposal;* 1 2 3 4 5 NA

PL.1.10.2 training for and, as appropriate, monitoring of personnel who manage and/or regularly come into contact with hazardous materials and/or wastes;* 1 2 3 4 5 NA

PL.1.10.3 monitoring of compliance with the program's requirements; *and 1 2 3 4 5 NA

PL.1.10.4 evaluation of the effectiveness of the program, with reports to the safety committee and to those responsible for other appropriate monitoring activities.* 1 2 3 4 5 NA

PL.1.11 There is an emergency preparedness program designed to manage the consequences of natural disasters or other emergencies that disrupt the hospital's ability to provide care and treatment; the program includes* 1 2 3 4 5 NA

PL.1.11.1 a description of the hospital's role in communitywide emergency preparedness plans;* 1 2 3 4 5 NA

PL.1.11.2 information about how the hospital plans to implement specific procedures in response to environmental or man-made events;* 1 2 3 4 5 NA

PL.1.11.3 provisions for the management of space, supplies, communications, and security;* 1 2 3 4 5 NA

PL.1.11.4 provisions for the management of staff, including distribution and assignment of responsibilities and functions;* 1 2 3 4 5 NA

PL.1.11.5 provisions for the management of patients, including scheduling of services, control of patient information, and admission, transfer, and discharge;* 1 2 3 4 5 NA

PL.1.11.6 staff training in their roles during emergencies;* and 1 2 3 4 5 NA

PL.1.11.7 semiannual implementations of the plan, either in response to an emergency or in a planned drill.* 1 2 3 4 5 NA

PL.1.11.7.1 The hospital's performance during implementations of the plan is evaluated, documented, and reported to the safety committee through the hospitalwide information collection and evaluation system (*see* PL.1.4).* 1 2 3 4 5 NA

*The asterisked items are key factors in the accreditation decision process. For an explanation of the use of the key factors, see "Using the Manual," page ix.

Standard		Circle One
PL.2	There is a life safety management program designed to protect patients, personnel, visitors, and property from fire and the products of combustion and to provide for the safe use of buildings and grounds.*	1 2 3 4 5 NA

Required Characteristics

PL.2.1	Each building in which patients are housed overnight or receive treatment is in compliance with the appropriate provisions of the 1988 edition of the *Life Safety Code*® of the National Fire Protection Association (NFPA), or equivalent protection is provided and documented. *†	1 2 3 4 5 NA
	PL.2.1.1 A comprehensive Statement of Construction and Fire Protection, submitted to the Joint Commission, describes the structural features of fire protection of the facility.*	1 2 3 4 5 NA
	PL.2.1.2 When requirements of the *Life Safety Code*® and these standards or their equivalents are not met, a comprehensive plan of correction is developed.*	1 2 3 4 5 NA
	PL.2.1.3 When requirements for fire protection or environment and grounds safety are affected by construction, the hospital institutes and documents interim life safety measures to temporarily compensate for the hazard posed by existing life safety deficiencies.*	1 2 3 4 5 NA
	PL.2.1.4 The interim life safety measures are continued and documented so that the level of life safety is not diminished in any occupied area and a safe environment and grounds are maintained throughout construction of and/or alteration to buildings and/or grounds.*	1 2 3 4 5 NA
PL.2.2	There is an ongoing program designed to assure that the buildings and grounds are suitable to the nature of the services provided and the ages and other characteristics of the patient population served.*	1 2 3 4 5 NA
	PL.2.2.1 New construction provides for the safe and convenient use of buildings and grounds by physically disabled individuals.*	1 2 3 4 5 NA
	PL.2.2.2 The hospital has specific policies for the maintenance, supervision, and safe use by patients of all grounds and equipment, including special activity areas.*	1 2 3 4 5 NA
	PL.2.2.3 Emergency departments/services are readily identifiable and easily accessible.*	1 2 3 4 5 NA
	PL.2.2.3.1 There are policies that address vehicular access to the emergency care areas.*	1 2 3 4 5 NA

*The asterisked items are key factors in the accreditation decision process. For an explanation of the use of the key factors, see "Using the Manual," page ix.

†The Joint Commission references the 1988 edition of the *Life Safety Code*® (NFPA 101®) of the National Fire Protection Association. As of January 1, 1989, all Joint Commission-accredited facilities are being surveyed for compliance with the 1988 *Life Safety Code*®. The "code effective date" is January 1, 1989. Buildings for which plans were approved after that date are considered "new construction" for purposes of determining compliance with the 1988 *Life Safety Code*®.

Life Safety Code® and 101® are registered trademarks of the National Fire Protection Association, Inc, Quincy, Massachusetts.

Circle One

PL.2.2.4 Compliance with the requirements of the program is documented.* 1 2 3 4 5 NA

PL.2.3 There is an ongoing program designed to establish and maintain fire safety.* 1 2 3 4 5 NA

PL.2.3.1 The program is established through the following:

PL.2.3.1.1 Procedures to identify and maintain all applicable required features of fire protection to *Life Safety Code®* standards.* 1 2 3 4 5 NA

PL.2.3.1.2 Procedures for inspecting, testing, and maintaining fire-alarm and fire-detection systems, including quarterly testing of all circuits and annual preventive maintenance of all components.* 1 2 3 4 5 NA

PL.2.3.1.3 Procedures for inspecting and testing all automatic fire-extinguishing systems annually.* 1 2 3 4 5 NA

PL.2.3.1.4 Procedures for the management of portable fire extinguishers, including guidelines for their identification, placement, and use; a quarterly inspection program; and a regular maintenance program.* 1 2 3 4 5 NA

PL.2.3.1.5 Procedures to review proposed acquisitions of bedding, window draperies and other curtains, furnishings, decorations, wastebaskets, and other equipment to identify issues related to fire safety.* 1 2 3 4 5 NA

PL.2.3.2 The program is maintained through the following:

PL.2.3.2.1 As appropriate to occupancy classification, a fire-alarm or fire-detection system that upon activation minimizes smoke transmission through control of designated fans and/or dampers in air-handling and smoke-management systems.* 1 2 3 4 5 NA

PL.2.3.2.2 A fire plan that addresses appropriate staff response to a fire emergency and appropriate education and training for all personnel in all elements of the fire plan.* 1 2 3 4 5 NA

PL.2.3.2.3 For all personnel on all shifts in all patient care buildings, quarterly conducting and evaluation of fire drills that test staff knowledge of the use and function of the fire-alarm systems, transmission of alarms, containment of smoke and fire, transfer to areas of refuge, fire extinguishment, assignment of specific duties, and preparation for building evacuation.* 1 2 3 4 5 NA

PL.2.3.2.4 Dissemination and enforcement of a hospitalwide smoking policy that discourages the use of smoking materials.* 1 2 3 4 5 NA

PL.2.3.2.4.1 Where smoking is permitted, there are policies to control the use of smoking materials.* 1 2 3 4 5 NA

PL.2.3.3 Compliance with the requirements of the program is documented.* 1 2 3 4 5 NA

*The asterisked items are key factors in the accreditation decision process. For an explanation of the use of the key factors, see "Using the Manual," page ix.

		Circle One
PL.2.4	The documentation of the life safety management program is analyzed, and summaries are reviewed by the safety committee and other appropriate staff.*	1 2 3 4 5 NA
	PL.2.4.1 When problems are identified in the life safety management program, actions are taken to resolve them.*	1 2 3 4 5 NA
	PL.2.4.1.1 The actions are documented.*	1 2 3 4 5 NA
	PL.2.4.1.2 The actions are evaluated for effectiveness.*	1 2 3 4 5 NA
	PL.2.4.1.2.1 Once an action is proved effective, the need for continued monitoring of the problem is evaluated.*	1 2 3 4 5 NA
	PL.2.4.2 As a part of the hospitalwide information collection and evaluation system (*see* PL.1.4), appropriate information from the hospital's life safety management program is referred to the safety committee for review, analysis, and, as appropriate, action.*	1 2 3 4 5 NA

Standard

PL.3	There is an equipment management program designed to assess and control the clinical and physical risks of fixed and portable equipment used for the diagnosis, treatment, monitoring, and care of patients and of other fixed and portable electrically powered equipment.*	1 2 3 4 5 NA

Required Characteristics

PL.3.1	Written criteria, which include characteristics of equipment function, clinical application, maintenance requirements, and equipment incident history, are used to identify equipment to be included in the program.*	1 2 3 4 5 NA
	PL.3.1.1 Before a piece or type of equipment is used, it is evaluated for inclusion in the program, and the evaluation is documented.*	1 2 3 4 5 NA
PL.3.2	A current, accurate, unique inventory is kept of all equipment included in the program, regardless of the equipment's ownership or purpose.*	1 2 3 4 5 NA
	PL.3.2.1 Each piece or type of equipment listed in the inventory has written equipment-testing procedures and user-training programs designed to manage the clinical and physical risks.*	1 2 3 4 5 NA
	PL.3.2.1.1 Each piece of equipment is tested prior to initial use and at least annually thereafter; such testing is documented.*	1 2 3 4 5 NA
	PL.3.2.1.2 Orientation and at least annual continuing education of individuals who use and/or maintain the equipment are documented.*	1 2 3 4 5 NA

*The asterisked items are key factors in the accreditation decision process. For an explanation of the use of the key factors, see "Using the Manual," page ix.

Circle One

PL.3.3 The equipment management program is used to identify and document equipment failures and user errors that have or may have an adverse effect on patient safety and/or the quality of care.* 1 2 3 4 5 NA

PL.3.3.1 Summaries of equipment failures and user errors and relevant published reports of equipment hazards are reviewed by the safety committee and other appropriate staff to identify equipment performance and/or use problems.* 1 2 3 4 5 NA

PL.3.3.2 When problems are identified, actions are taken to resolve them.* 1 2 3 4 5 NA

PL.3.3.2.1 The actions are documented.* 1 2 3 4 5 NA

PL.3.3.2.2 The actions are evaluated for effectiveness.* 1 2 3 4 5 NA

PL.3.3.2.2.1 Once an action is proved effective, the need for continued monitoring of the problem is evaluated.* 1 2 3 4 5 NA

Standard

PL.4 There is a utilities management program designed to assure the operational reliability, assess the special risks, and respond to failures of utility systems that support the patient care environment.* 1 2 3 4 5 NA

Required Characteristics

PL.4.1 Written criteria, which include utilities for life support, infection control, environmental support, and equipment support elements, are used to identify utilities to be included in the program.* 1 2 3 4 5 NA

PL.4.2 There is a reliable, adequate emergency power system to provide electricity to designated areas during interruption of the normal electrical source.* 1 2 3 4 5 NA

PL.4.2.1 As required by occupancy classification, the emergency power system provides electricity to at least the following:

PL.4.2.1.1 Alarm systems;* 1 2 3 4 5 NA

PL.4.2.1.2 Blood, bone, and tissue storage units;* 1 2 3 4 5 NA

PL.4.2.1.3 Obstetric delivery rooms;* 1 2 3 4 5 NA

PL.4.2.1.4 Egress illumination;* 1 2 3 4 5 NA

PL.4.2.1.5 Elevators (at least one);* 1 2 3 4 5 NA

PL.4.2.1.6 Emergency care areas;* 1 2 3 4 5 NA

PL.4.2.1.7 Emergency communication systems;* 1 2 3 4 5 NA

PL.4.2.1.8 Illumination of exit signs;* 1 2 3 4 5 NA

PL.4.2.1.9 Medical air compressors;* 1 2 3 4 5 NA

PL.4.2.1.10 Medical/surgical vacuum systems;* 1 2 3 4 5 NA

*The asterisked items are key factors in the accreditation decision process. For an explanation of the use of the key factors, see "Using the Manual," page ix.

		Circle One
	PL.4.2.1.11 Newborn nurseries;*	1 2 3 4 5 NA
	PL.4.2.1.12 Operating rooms;*	1 2 3 4 5 NA
	PL.4.2.1.13 Postoperative recovery rooms; *and	1 2 3 4 5 NA
	PL.4.2.1.14 Special care units.*	1 2 3 4 5 NA
PL.4.3	A current, accurate, unique inventory is kept of all equipment for utilities systems included in the program.*	1 2 3 4 5 NA
PL.4.4	Utility system operational plans are written to help assure reliability, control risks, reduce failures, and train users and operators of the systems.*	1 2 3 4 5 NA
	PL.4.4.1 The hospital develops procedures and establishes intervals for the testing and maintenance of equipment for utilities systems included in the program.*	1 2 3 4 5 NA
	PL.4.4.2 Tests and inspections that support operational reliability and manage risks are documented.*	1 2 3 4 5 NA
	PL.4.4.3 Orientation and at least annual continuing education for individuals who use and/or maintain utility systems are documented.*	1 2 3 4 5 NA
PL.4.5	There is a current, complete set of documents that indicates the distribution of and controls for partial or complete shutdown of each utility system.*	1 2 3 4 5 NA
	PL.4.5.1 Where provided, emergency shutoff controls are labeled.*	1 2 3 4 5 NA
PL.4.6	The utilities management program is used to identify and document utility problems, failures, and user errors that are or may be a threat to the patient care environment.*	1 2 3 4 5 NA
	PL.4.6.1 Summaries of utility problems, failures, and relevant published information of utility system hazards are reviewed by the safety committee and other appropriate staff to evaluate utility system performance.*	1 2 3 4 5 NA
	PL.4.6.2 When problems are identified, actions are taken to resolve them.*	1 2 3 4 5 NA
	PL.4.6.2.1 The actions are documented.*	1 2 3 4 5 NA
	PL.4.6.2.2 The actions are evaluated for effectiveness.*	1 2 3 4 5 NA
	PL.4.6.2.2.1 Once an action is proven effective, the need for continued monitoring of the problem is evaluated.*	1 2 3 4 5 NA

*The asterisked items are key factors in the accreditation decision process. For an explanation of the use of the key factors, see "Using the Manual," page ix.

The "Plant Technology, and Safety Management" chapter becomes effective for accreditation purposes on January 1, 1989.

Chapter Four: **Utilities Management**

The management of utilities has become a complex and expensive challenge. "Smart" utility systems now use sensors and computers to make decisions and take actions previously carried out by humans. Increasingly, health care organizations are being forced to provide closely controlled environments to ensure proper performance of the exotic new biomedical devices they have acquired and to support specialized care environments.

To evaluate the management of this environment, the Joint Commission on the Accreditation of Healthcare Organizations has developed a standard that requires identification of critical operating controls. The standard concentrates on the interaction between patients and/or staff and utility systems. It is expected that accredited organizations will study and control the performance of utility systems to reduce the risk of patient injury during normal equipment operation and during any periods of equipment malfunction or disruption.

The degree to which these expectations are met will be measured through review of paperwork and interviews of appropriate staff to determine their operating knowledge. In addition, the usefulness of information about utility system performance in safety management, risk management, and quality assurance functions will be assessed.

Utilities Management KIPS

Standard PL.4 There is a utilities management program designed to assure the operational reliability, assess the special risks, and respond to failures of utility systems that support the patient care environment.

NOTE: Utilities include systems for electrical distribution; emergency power; vertical and horizontal transport; heating, ventilating, and air conditioning; plumbing; boiler and steam; medical gas; and medical/surgical vacuum.

	Key Items	Probes	Scoring
PL.4.1	Written criteria, which include utilities for life support, infection control, environmental support, and equipment support elements, are used to identify utilities to be included in the program.	Are there written criteria that identify critical operating components of utility systems that play a role in a. life support systems? b. infection control systems? c. environmental support systems? d. equipment support systems? e. communications systems?	1. a-e 2. a, b, c, e 3. a and d 4. a, b 5. any other

	Key Items	Probes	Scoring
		NOTE: It is acceptable to include all elements of all utility systems in lieu of selecting a limited list based on risk criteria.	
PL.4.2	There is a reliable, adequate emergency power system to provide electricity to designated areas during interruption of the normal electrical source.	Does the emergency electrical system include a. an appropriately sized power source; b. adequate fuel source; c. written PM/Test Inspection Program; d. alarm systems; blood, bone, and tissue storage units; obstetrical delivery rooms; egress illumination; elevators (at least one); emergency care areas; emergency communication systems; illumination of exit signs; medical air compressors; medical/surgical vacuum systems; newborn nurseries; operating rooms; post-operative recovery rooms; and special care units? e. Is education provided for users of the emergency electrical system? NOTE: Item C encompasses all currently required testing and inspection programs for various types of systems including testing of generators for at least 30 minutes per month under full, connected load.	1. a-e 2. a, b, d, e 3. a, b, d 4. a, b 5. other NOTE: For d, surveyor must specify missing areas.
PL.4.2.1	As required by occupancy classification, the emergency power system provides electricity to at least the following:		
PL.4.2.1.1	Alarm systems;		
PL.4.2.1.2	Blood, bone, and tissue storage units;		
PL.4.2.1.3	Obstetrical delivery rooms;		
PL.4.2.1.4	Egress illumination;		
PL.4.2.1.5	Elevators (at least one);		
PL.4.2.1.6	Emergency care areas;		
PL.4.2.1.7	Emergency communication systems;		
PL.4.2.1.8	Illumination of exit signs;		
PL.4.2.1.9	Medical air compressors;		
PL.4.2.1.10	Medical/surgical vacuum systems;		
PL.4.2.1.11	Newborn nurseries;		
PL.4.2.1.12	Operating rooms;		
PL.4.2.1.13	Postoperative recovery rooms; and		
PL.4.2.1.14	Special care units.		
PL.4.3	A current, accurate, unique inventory is kept of all equipment for utilities systems included in the program.	Is there an inventory of equipment included in the program that is a. current within six months? b. verified to be accurate by a random sample? c. separate or separable from other inventories?	1. a-c 2. a-b 3. b, c 4. b 5. any other

	Key Items	Probes	Scoring
PL.4.4	Utility system operational plans are written to help assure reliability, control risks, reduce failures, and train users and operators of the systems.	Are there current, written utility system operational plans including plans for a. management of failure? b. training of users and operators?	1. a, b 2. ----- 3. a 4. ----- 5. none
PL.4.4.1	The hospital develops procedures and establishes intervals for the testing and maintenance of equipment for utilities systems included in the program.	Are there written procedures that include performance standards that address a. test intervals and methods? b. user training?	1. a and b 2. ----- 3. a or b 4. ----- 5. none
PL.4.4.2	Tests and inspections that support operational reliability and manage risks are documented.	Is there documentation for tests and inspections of the current inventory of the critical utility components/systems? NOTE: This includes monthly testing of generators under full, connected load conditions and annual testing of other systems in the utilities management program. Simulated loads for generator tests are not acceptable. For all other systems in the utilities management program, a time frame other than annual may be justified based upon previous experience and safety committee approval.	1. 91%-100% 2. 76%-90% 3. 51%-75% 4. 26%-50% 5. <26%
PL.4.4.3	Orientation and at least annual continuing education for individuals who use and/or maintain utility systems are documented.	Is there training for user/ maintainers of utility systems that a. includes orientation of users to special application or emergency procedures? b. includes annual continuing education? c. includes documentation? d. includes evaluation for effectiveness? e. results in a random sample of staff being able to describe training as documented?	1. a-e 2. a, b, d, e 3. a, b, e 4. a, e 5. any other
PL.4.5	There is a current, complete set of documents that indicates the distribution of and controls for partial or complete shutdown of each utility system.	Are there current documents for utility systems that a. indicate distribution and controls for shutdowns?	1. a-b 2. ----- 3. a and partial b 4. ----- 5. none

	Key Items	Probes	Scoring
		b. describe the operating procedures for key controls including notification of staff in affected areas?	NOTE: Surveyor must indicate systems not covered.
PL.4.5.1	Where provided, emergency shutoff controls are labeled.	Are emergency controls a. labeled for each applicable utility? b. labeled clearly and visibly? c. included in training? d. inspected periodically (typically annually)? e. Is a random sample of appropriate staff able to locate and describe the use of emergency shutoffs or able to state who to contact in the event of an emergency?	1. a-e 2. a-c, e 3. a-d 4. a, b, d 5. any other
PL.4.6	The utilities management program is used to identify and document utility problems, failures, and user errors that are or may be a threat to the patient care environment.	Is all relevant information about equipment failures and user errors reported to at least one of the following a. safety officer? b. quality assurance? c. risk management? NOTE: The review of incident reports often requires various legal processes to be followed to preserve the confidentiality of the material. It is essential that opportunities to prevent future similar incidents or to improve care not be lost as a result. The key principle is that appropriate corrections are made regardless of legal structures. The surveyor should concentrate on outcome rather than process.	1. Yes 2. No
PL.4.6.1	Summaries of utility problems, failures, and relevant published information of utility system hazards are reviewed by the Safety Committee and other appropriate staff to evaluate utility system performance.	a. Are summaries of the relevant principles of failures and errors prepared by the function that receives the information? b. Does the safety committee and other appropriate staff analyze the information to determine the need for changes in activities and/or education?	1. a and b 2. ----- 3. a 4. ----- 5. none

	Key Items	Probes	Scoring
PL.4.6.2	When problems are identified, actions are taken to resolve them.	Does the documentation of identified problems indicate that a. written records exist? b. review and evaluation is on time? c. resolution is formulated? d. action is taken for resolution? e. a random sample of appropriate staff is able to describe changes made to eliminate identified problems?	1. a-e 2. a-d 3. a, b, d, e 4. a, b, d 5. any other
PL.4.6.2.1	The actions are documented.	Are actions monitored for effectiveness, including evidence that the a. actions are documented? b. documentation is reviewed? c. feedback into system is documented?	1. a-c 2. ----- 3. a, b 4. a 5. any other
PL.4.6.2.2	The actions are evaluated for effectiveness.		Not scored.
PL.4.6.2.2.1	Once an action is proven effective, the need for continued monitoring of the problem is evaluated.	Is the need for continued monitoring evaluated and reviewed annually by committee or qualified staff? Is the rationale documented and the action approved by the safety committee?	Not scored.

PERSONAL MEMBERSHIP GROUPS OF THE

AMERICAN HOSPITAL ASSOCIATION

American Academy of Hospital Attorneys

American Society of Directors of Volunteer Services

American Society for Healthcare Central Service Personnel

American Society for Healthcare Education and Training

American Society for Healthcare Environmental Services

American Society for Healthcare Human Resources Administration

American Society for Healthcare Risk Management

American Society for Hospital Engineers

American Society for Hospital Food Service Administrators

American Society for Hospital Marketing and Public Relations

American Society for Hospital Materials Management

Healthcare Information and Management Systems Society

National Society of Patient Representatives

Society for Ambulatory Care Professionals

Society for Healthcare Planning and Marketing

Society for Hospital Social Work Directors

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AMERICAN HOSPITAL ASSOCIATION

CLINICAL/BIOMEDICAL ENGINEERING

AIDS and the Clinical Engineering Professional
Clinical Engineering and Personal Computer Maintenance
Clinical Engineering Effectiveness from the Hospital Administrator's Perspective
Expert Systems and Their Applications: Introduction and Overview
Maintenance Management for Medical Equipment (1988 Edition)
Medical Equipment Maintenance Performance Measures
Training Manual for Biomedical Equipment Technicians, Part 1

CONSTRUCTION MANAGEMENT

Selecting a Construction Management Firm: A Quantitative Approach

DESIGN AND CONSTRUCTION

Director of Planning and Design Professionals for Health Facilities (1990)
The Health Care Mall Design
Health Facility Design Information Checklist
Major Changes Between 1983-84 and 1987 Editions of Guidelines for Construction and Equipment of Hospital and Medical Facilities
Selecting Interior Design Finishes and Furnishings to Create a Successful Health Care Environment

ELECTRICAL SAFETY

Computer-based Equipment in the Hospital Environment
Electrical Distribution System: A Program for Optimal Preventive Maintenance in the Health Care Setting
Ground-Fault Protection: Theory and Practice
Hospital Electrical Standards Compendium
In-House Review of Electrical System Analysis

ENERGY/ENERGY MANAGEMENT

Hospital Energy Investments: A Practical Approach to Financial Analysis
Hospital Engineer Management: Procedures Workbook

ENVIRONMENTAL SAFETY/SAFETY

Asbestos Management
Controlled Air Incineration: Design, Procurement and Operational Considerations
Controlling Ethylene Oxide Air Emissions in Hospitals
Hazardous Waste Management Strategies for Health Care Facilities (MACS Vol. 1)
Infectious Waste Treatment and Disposal Alternatives
OSHA/EPA - Handling and Disposal of Hazardous Materials
OSHA Hazardous Communications and Toxic Substances Standard: Methods for Compliance

FACILITIES MANAGEMENT

25th Annual Conference Proceedings (1988)
26th Annual Conference Proceedings (1989)
Building Monitoring Systems for Hospitals
Cost Containment in Linen Service
Developing a Hospital Emergency Preparedness Program (MACS Vol. 2)
Effective Staffing - It Doesn't Happen Overnight
Establishing an Effective Water Treatment Program at the Hospital or Health Care Facility
Financial and Economic Analysis for Health Care Engineers
Health Facility Life Safety Code/Model Building Code Comparison Update
Hospial Rights to Parts and Services
Hospital Waste Management
How to Evaluate Equipment Service Contracts
Incinerator Maintenance Requirements
Lighting for the Future
Maintenance Insurance for Hospital Equipment
Maintenance Management by Computer
Maintenance Management for Health Care Facilities
Management Policies and Procedures for the Physical Plant
Managing Hospital Space as an Asset
Planning and Design Considerations for a Hospital Magnetic Resonance Imaging Facility
Post-Occupancy Evaluation: Closing the Construction Loop
Preventative Maintenance Manual for Small Hospitals
Putting Your Safety Program in Writing
A Quality Assurance Program for a Division of Physical Plant Based on Numbers, Not Guesswork
Quality Assurance for the Hospital Engineering/Maintenance Department
Risk Management Engineering: An Approach to Complying with JCAH Standards
Savings-Based Financing Contracts: Guide to Decision Making
Systematic Savings for Refrigeration Plants

FIRE SAFETY

Estimating the Effectiveness of State-of-the-Art Smoke Detectors and Automatic Sprinklers on Life Safety in Hospitals
Fire Safety and Warning Systems (MACS Vol. 4)

MANAGEMENT AND COMPLIANCE SERIES

Volume 1: Hazardous Waste Management Strategies for Health Care Facilities (MACS)
Volume 2: Developing a Hospital Emergency Preparedness Program (MACS)
Volume 3: Medical Gas and Vacuum Systems (MACS)
Volume 4: Fire Safety and Warning Systems (MACS)

MEDICAL GAS SYSTEMS

Medical Gas and Vacuum Systems (MACS Vol. 3)
Water in Compressed Medical Air Systems

TECHNOLOGY ASSESSMENT

Energy Conservation Potential of Well Water
Heat Recovery Systems
Hot Air Reclaim System
Silver Recovery for Hospitals
Using Medical Device Standards in Hospitals

TELECOMMUNICATIONS

Communications in the Health Care Industry
Developing a Request for Proposal for a Telecommunications System
How to Develop a Policy and Procedure Manual for a Hospital Telecommunications Department
Telecommunications Planning for Hospitals

APPENDIX NO 9

COMPARISON OF HOSPITAL OPERATING COSTS

SAMPLE OF HOSPITALS IN THE NORTHERN REGIONAL HEALTH AUTHORITY (1)

HOSPITAL	TYPE NO	TOTAL OPERATING COST PER £000 PA	BED NO	COST PER BED £/PA
ASHINGTON DISTRICT GENERAL HOSPITAL	1A	12,204	365	33,435
ROYAL VICTORIA INFIRMARY, NEWCASTLE	1A	33,123	505	65,590
FREEMAN HOSPITAL, NEWCASTLE	1A	35,600	696	51,149
NEWCASTLE GENERAL HOSPITAL	2	35,189	745	47,233
SOUTH CLEVELAND HOSPITAL	1A	15,222	402	37,865
NORTH TEES GENERAL HOSPITAL	2	25,112	838	29,966
SUNDERLAND DISTRICT GENERAL HOSPITAL	2	23,801	692	34,394
ST LUKE'S HOSPITAL	12	6,683	315	21,215
GARLANDS HOSPITAL	12	7,232	592	12,216
WINTERTON HOSPITAL	12	12,272	917	13,382

OPERATING COSTS OF HOSPITALS VISITED AS PART OF THE PROJECT (2)

HOSPITAL	TYPE NO	TOTAL OPERATING COST PER $000/PA	BED NO	COST PER BED £/PA
BETH ISRAEL HOSPITAL, BOSTON MA	10.S	189,820	471	251,884
BRIGHAM & WOMEN'S HOSPITAL, BOSTON MA	10.S	299,304	720	259,813
MASSACHUSETTS GENERAL HOSPITAL, BOSTON MA	10.S	334,951	1081	193,658
BAYSTATE MEDICAL CENTER, SPRINGFIELD MA	10.S	152,797	650	149,881
ST JOHN'S HOSPITAL LOWELL MA	10.S	33,542	254	82,534
ST JOSEPH HOSPITAL NASHUA NH	10.S	32,010	218	91,772
VA MEDICAL CENTER, BOSTON MA	10.S	85,160	604	88,125
WORCESTER STATE HOSPITAL WORCESTER MA	12.L	20,723	418	30,985
TEWKSBURY STATE HOSPITAL TEWKSBURY MA	48.L	40,242	754	33,357
SPRINGFIELD MUNICIPAL HOSPITAL, SPRINGFIELD MA	48.L	14,726	438	21,013

(1) Data taken from the NRHA Health Services Costs for 1987/88 (Rainbow Book)

(2) Data taken from the AHA Guide to the Health Care Field for 1988

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