

Sustainable Design Concepts of Hospital Standardization in U.K.

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I. Introduction

Background

- **sustainability: a most important key word in architectural field.**
- **a chance to study about standardized hospitals in 1997 under the advice of Professor Rosemary Glanville in MARU.**
- **a series of standardized hospital systems in 1970s: worthwhile to be recollected.**

Aims

- **to find the sustainable concepts from the hospital standardization in U.K.**
- **to be referred & applied when briefing and designing the new hospitals.**

Major contents

- **sustainability and hospital design.**
- **outlines of hospital standardization.**
- **developments of standard hospitals.**
- **conclusion.**

Research method

- **reviewing the concept of sustainability.**
- **analyzing the theoretical materials together with related drawings, documents & pictures.**

II. Sustainability and Hospital Design

- **Sustainable development:**

a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but in the indefinite future.

- **Maximum sustainability in hospital design:**

core elements may be the possibilities of growth & change and the reduction of initial & operational costs.

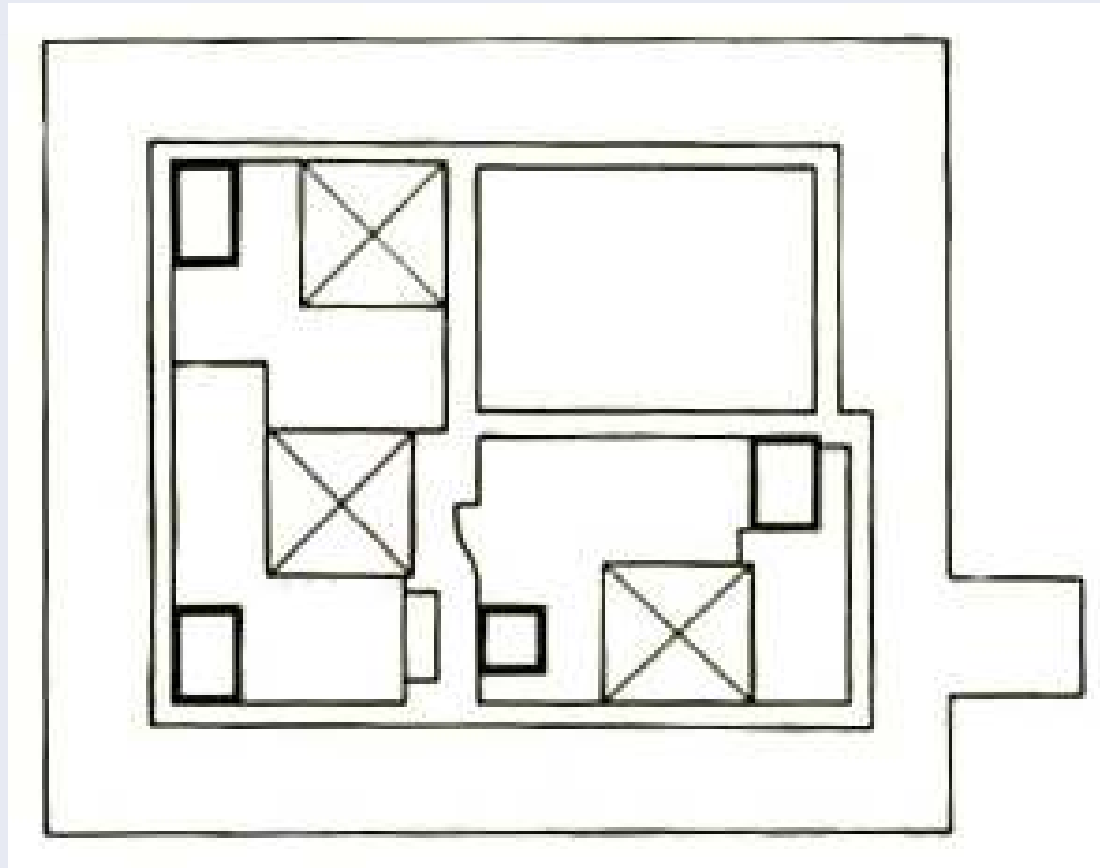
III. Outlines of Hospital Standardization

- **Beginning of standardization:**

Brunnel packaged and exported a 2,200-bed pavilion hospital for Florence Nightingale at Renkioi during the Crimean War in 1855.

- **MOH's research and development:**

Greenwich district general hospital was born as the first one. The hospital had such characteristics as 800 beds in size, 3 clinical floors, simple rectangular shape, interstitial service floor, long spans of 19.5m, and air-conditioning of all building. Rapid horizontal movement between departments echoed in later general hospital design in U.K.



2nd Floor Plan Diagram of Greenwich Hospital

- **Standard hospitals:**

Best Buy Hospital, Harness System, and Nucleus System, low-rise and horizontal concept, reflecting the economic and social circumstances of U.K.

- **Advantages of hospital standardization:**

a reduction in time for delivering individual projects, the effective use of scarce planning and design skills, a means to control standard, quality & costs.

- **Disadvantages:**

availability of skill & cost of setting up standardization programs, reviewing and updating the required skills of people using the programs, the difficulties of applying standard plans to existing sites, and availability of "green field site".

IV. Developments of Standard Hospitals in U.K.

1. Best Buy Hospital

2. Harness System

3. Nucleus System

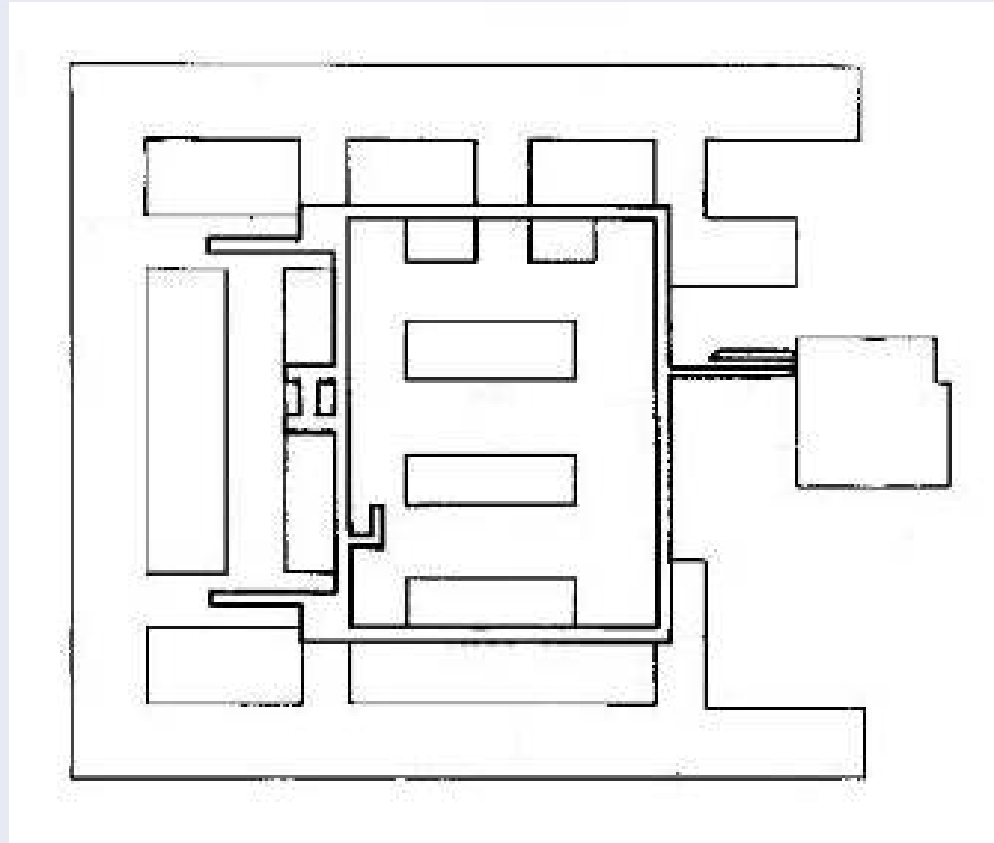
1. Best Buy Hospital

Outline of the System

- The term “Best Buy” appeared in 1967.
- The brief: utmost economy with maintaining acceptable medical and nursing standards, and a proper balance between capital and running cost.
- Reduction in overall size of the hospitals: essential "industrial" services (laundries, pharmacies, sterile supply departments etc) were organized on an area basis serving several hospital facilities, conveniently located on "industrial" sites away from the hospitals.

Aims of the System

- **Function, Economy, Efficiency, Quality, Environment, Speed**
- **These aims had largely been achieved in the two Best Buy hospitals in operation. The favorable reception of these two hospitals had led to the evolution of next standardized hospitals.**



2nd Floor Plan Diagram of Best Buy Hospital

Overall Concept

- **Hospital form: compact and low-rise(2 story) design concept, and horizontal principle.**
- **Concentration of D&T services: a peripheral "band"(ward) + a "core"(D&T).**
- **Environmental consideration: human scale, enclosing landscaped garden, and natural lighting & air.**

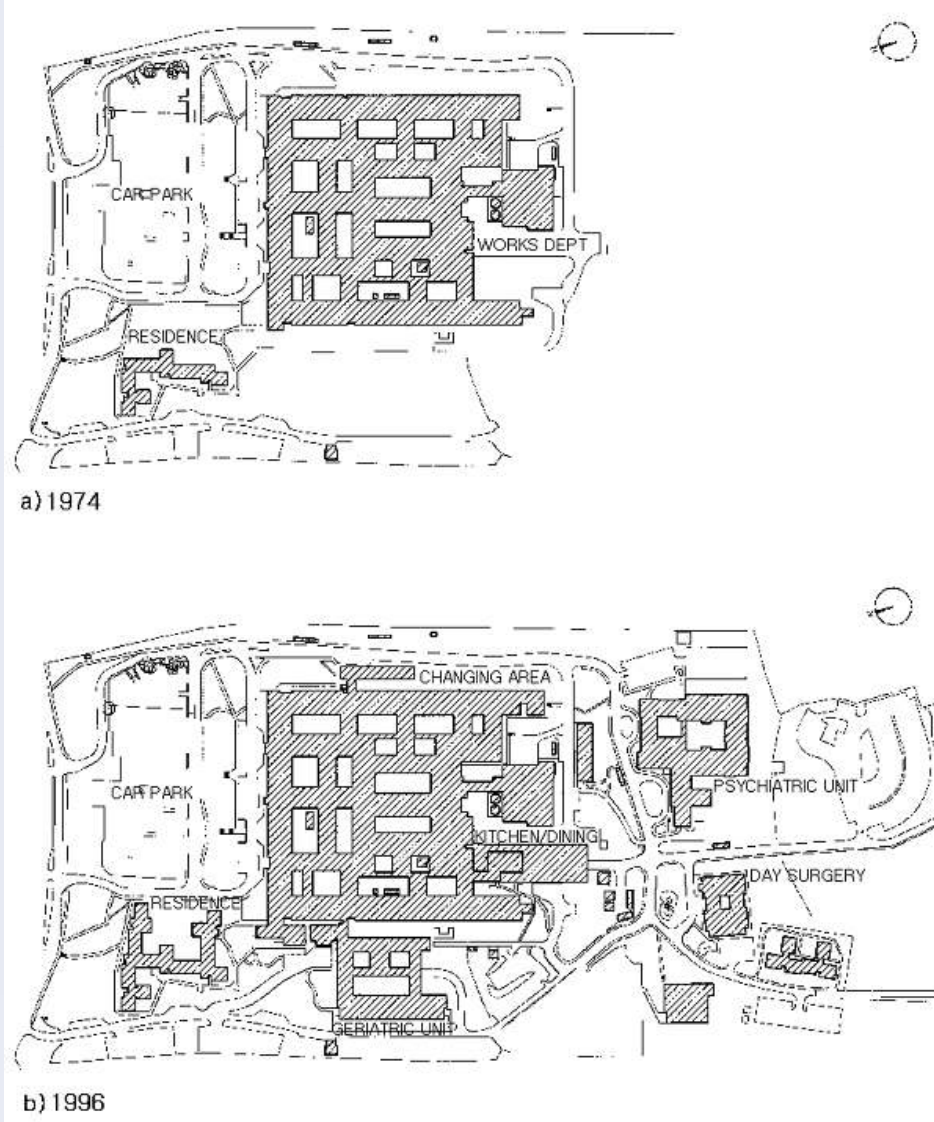
Evaluation of the System

DHSS and HDP evaluated 2 Best Buy hospitals

- **Function: successful to a certain extent.**
- **Economy: completely unsatisfactory due to enormous maintenance and operation costs.**
- **Efficiency: Departments were functionally located except for the internal design of outpatient department.**
- **Quality: Staffs and patients were generally satisfactory**
- **Environment: more homelike by the well-lighted interior, clean air, comfortable furnishings and well-designed garden.**
- **Speed: successful in the respect of speedy design and construction. But excess of construction cost, low performance of structure and inflexibility of plans were pointed as disadvantages.**

Sample Hospital

- **Name of Hospital: West Suffolk Hospital, Bury St. Edmunds**
- **Number of Beds: 670 Beds(excluding Psychiatric ward and Day ward)**
- **Completion: 1974**



Site Plan of West Suffolk Hospital

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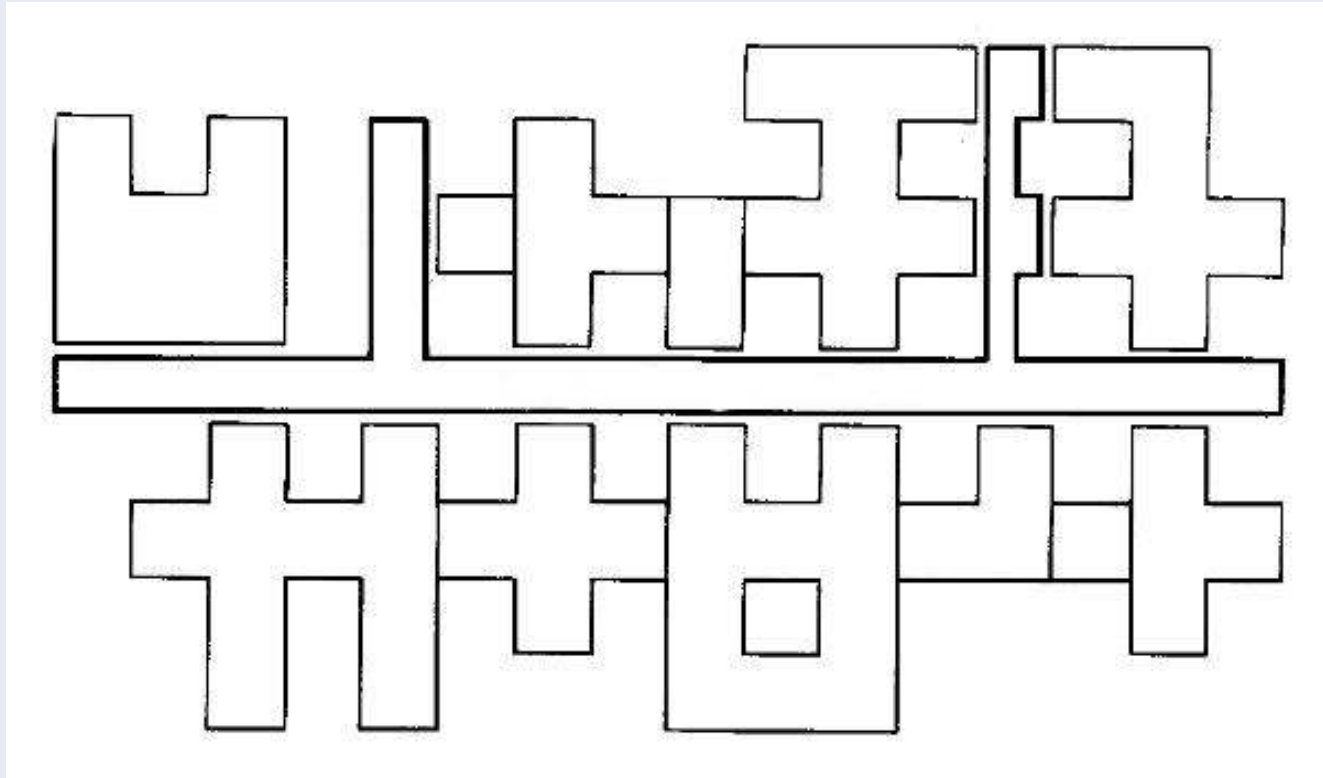
2. Harness System

Outline of the System

- **Harness system: set up in 1973 by the DHSS, the most ambitious standardization hospital program in U.K.**
- **Harness: its name from a car's wiring system, a central corridor which carries people, goods and services, feeding them into surrounding departments.**
- **Standard plans: for nearly every department of district general hospitals in various sizes.**
- **Standard plans of every department: exchangeable and economical in initial and operational cost.**
- **Computerization: enormous data in standardizing the whole hospital planning.**

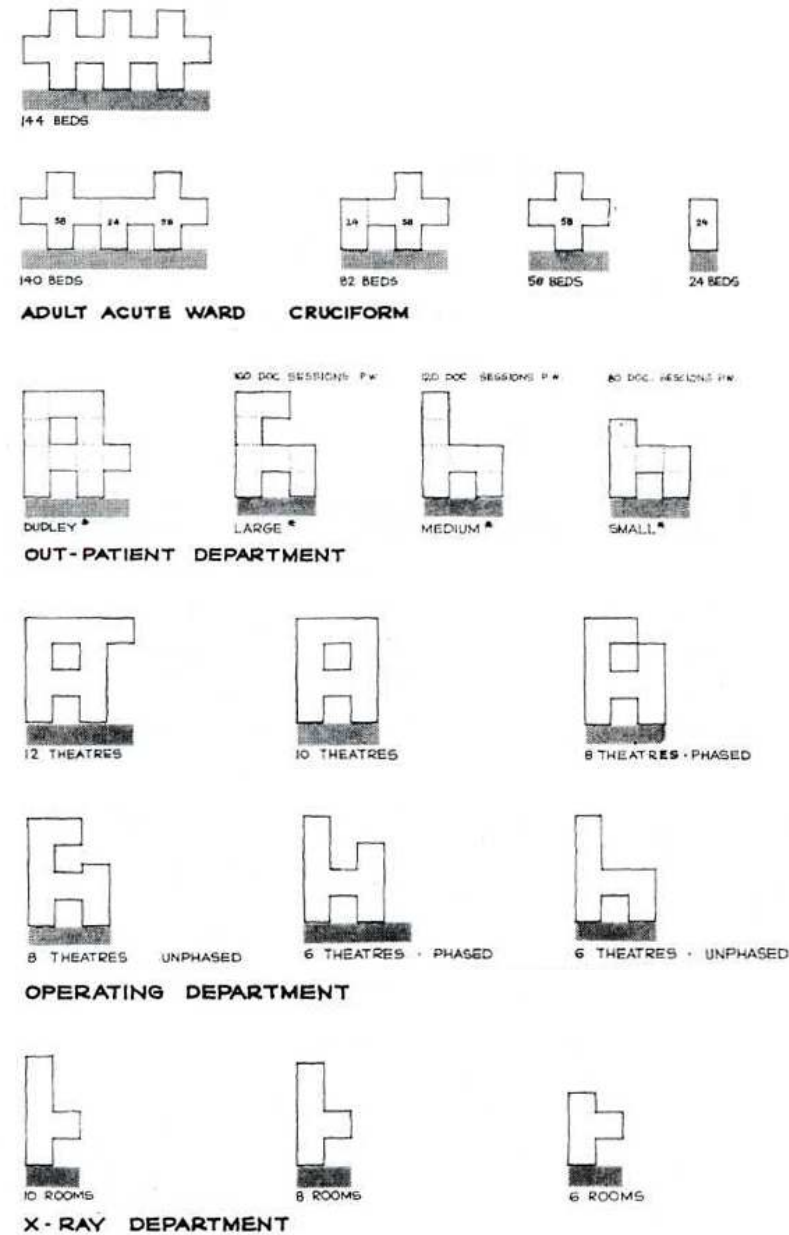
Aims of the System

- To economize on planning resources**
- To provide the flexibility for the design**
- To reduce the period of briefing and design**
- To provide the basic materials and guidelines for hospital renovation.**



Conceptual Diagram of Harness System

Standard Departments of Harness System



Overall Concept

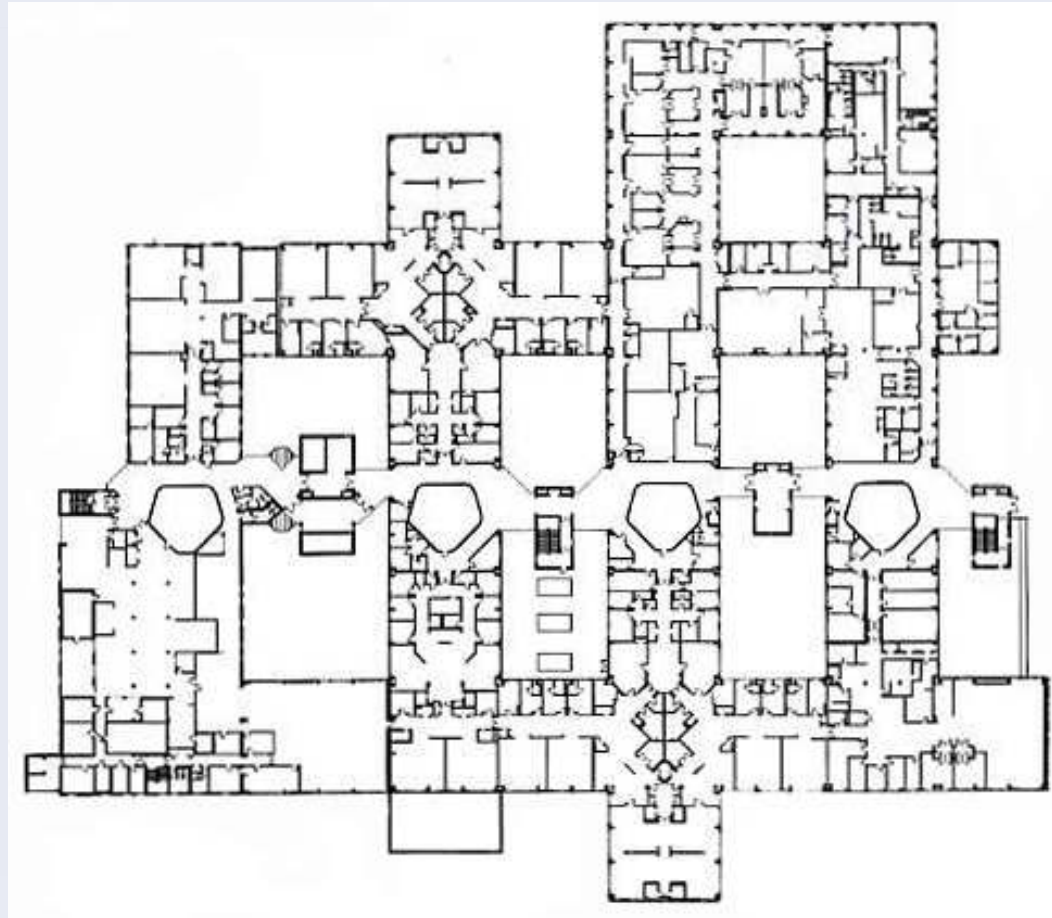
- **Configuration of system: 3 components, standardized plans for functional units by various sizes, Harness plans for people, goods and technical service, and non-standardized plans for some supplying units.**
- **Subjects of application: DGH(district general hospital) of 600 to 1,100 beds, a series of standard designs to provide a homogeneous whole hospital.**
- **Floor plans of hospital: All departments were different in size but dimensionally related to a 15m clear square grid.**
- **Hospital form: low-rise(maximum 4 stories & minimum construction cost), natural light and ventilation, close connection, project development in phases, integrate with the community in visual aspect**

Others

- The database of the system looked to try to standardize too wide range of alternatives in order to provide the flexibility for the plan and to be able to develop the project by phases.
- As the oil crisis came after two hospitals were built, the system was regarded as too uneconomical and so discarded.

Sample Hospital

- **Name of Hospital: Stafford Hospital, Stafford**
- **Number of Beds: 460 Beds(Opening 320 Beds)**
- **Completion: 1982**



2nd Floor Plan of Stafford Hospital

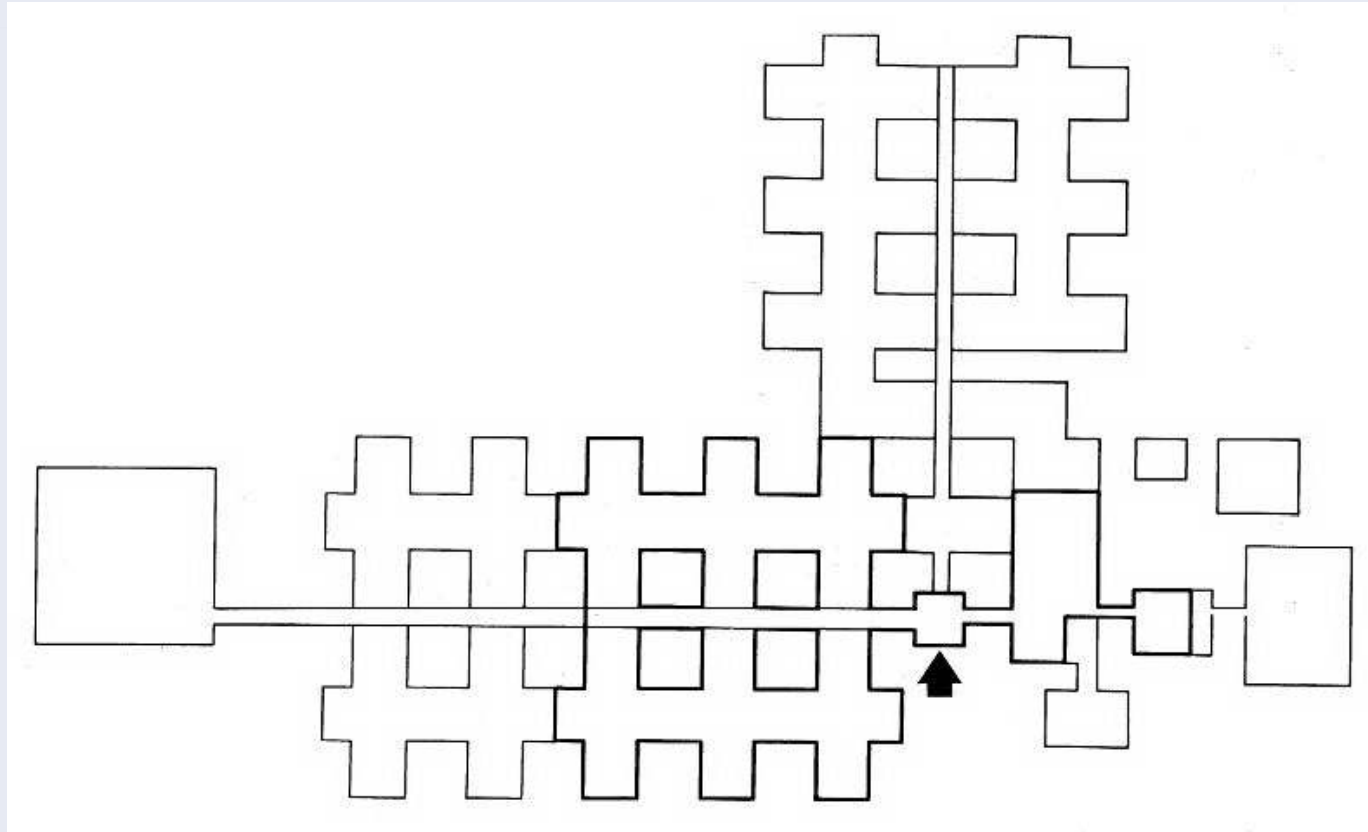
3. Nucleus System

Outline of the System

- **Before completing a few Harness hospitals, oil crisis of 1974 and resultant international financial crisis needed a rapid re-look at running cost.**
- **Nucleus program: a reduced capital investment program, about 300 beds with the ability to extend at later stages.**
- **The briefing and planning system of Nucleus: fulfillment of over 20 years' systematic research and experience, NHS, U.K.**

Aims of the System

- **To produce designs for a first phase Nucleus hospital of about 300 beds with capability for growth and change up to 600 beds.**
- **To provide sufficient but limited choice of contents so that first phase might be tailored to different service planning priorities.**
- **To seek the utmost economy in capital and running cost, with acceptable clinical and service standards.**
- **To limit provision in the first phase that needed to sustain the service provided in that phase.**
- **To achieve multi-use of space by good functional relationships and clustering of departments.**
- **To cater for a reasonable range of sites including sloping sites, to plan for two stories preferably but with the maximum of three.**



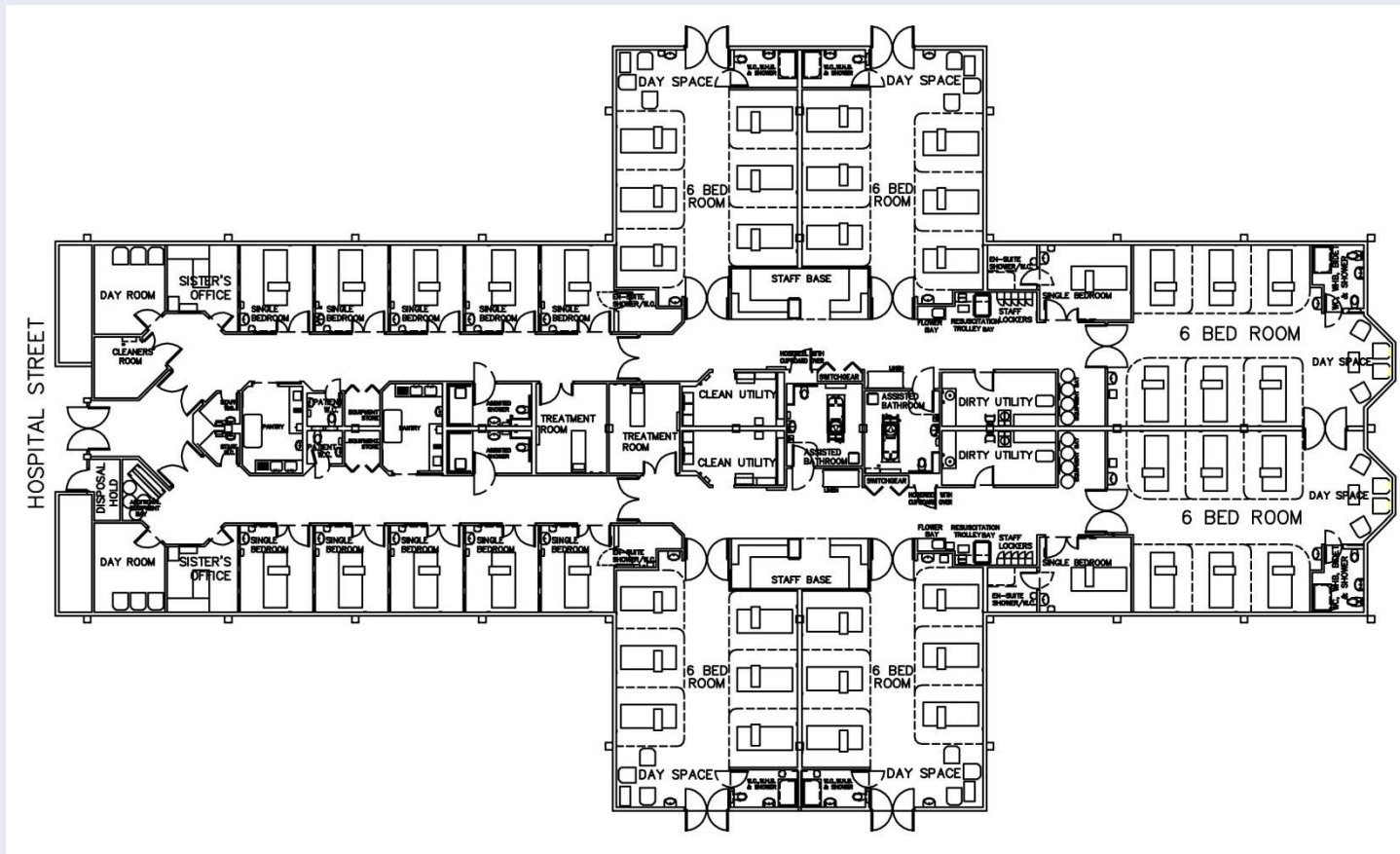
Conceptual Diagram of Nucleus System

Advantages of the System

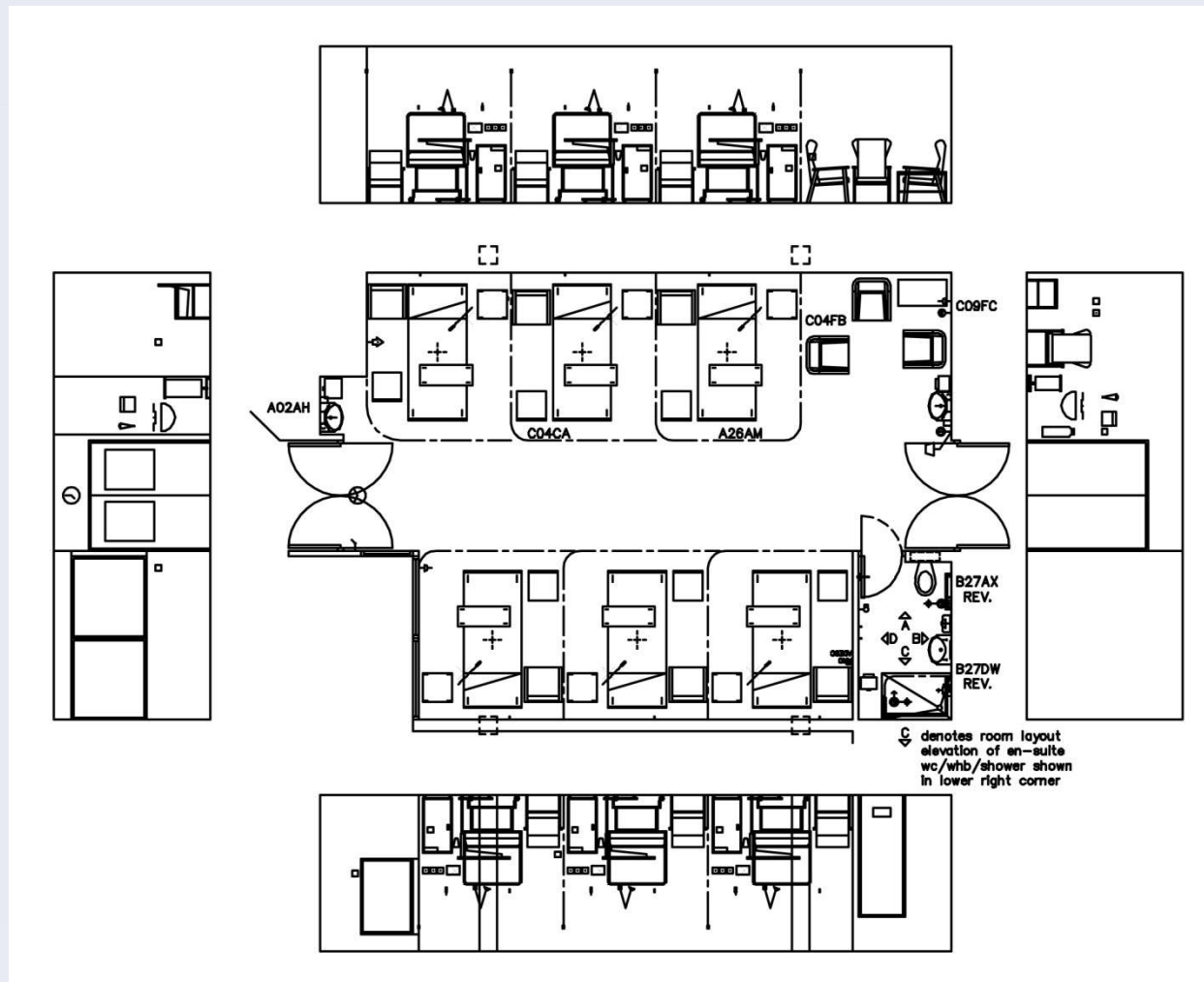
- **Time saving in design and construction**
- **Buildability:**
inherently easy to build because of its low-rise, courtyard, & repetitive construction.
- **Reduction in running cost:**
Nucleus cases against local and national averages on cost per case, cost per day, and length of stay. All the factors of Nucleus seemed to be advantageous.

Nucleus Data

- **'Data Pack': each pack contained a narrative brief, a detailed description of every room and space in each hospital departments.**
- **Architectural and services engineering layouts together with capital equipment schedules were also included.**



Floor Plan of General Ward



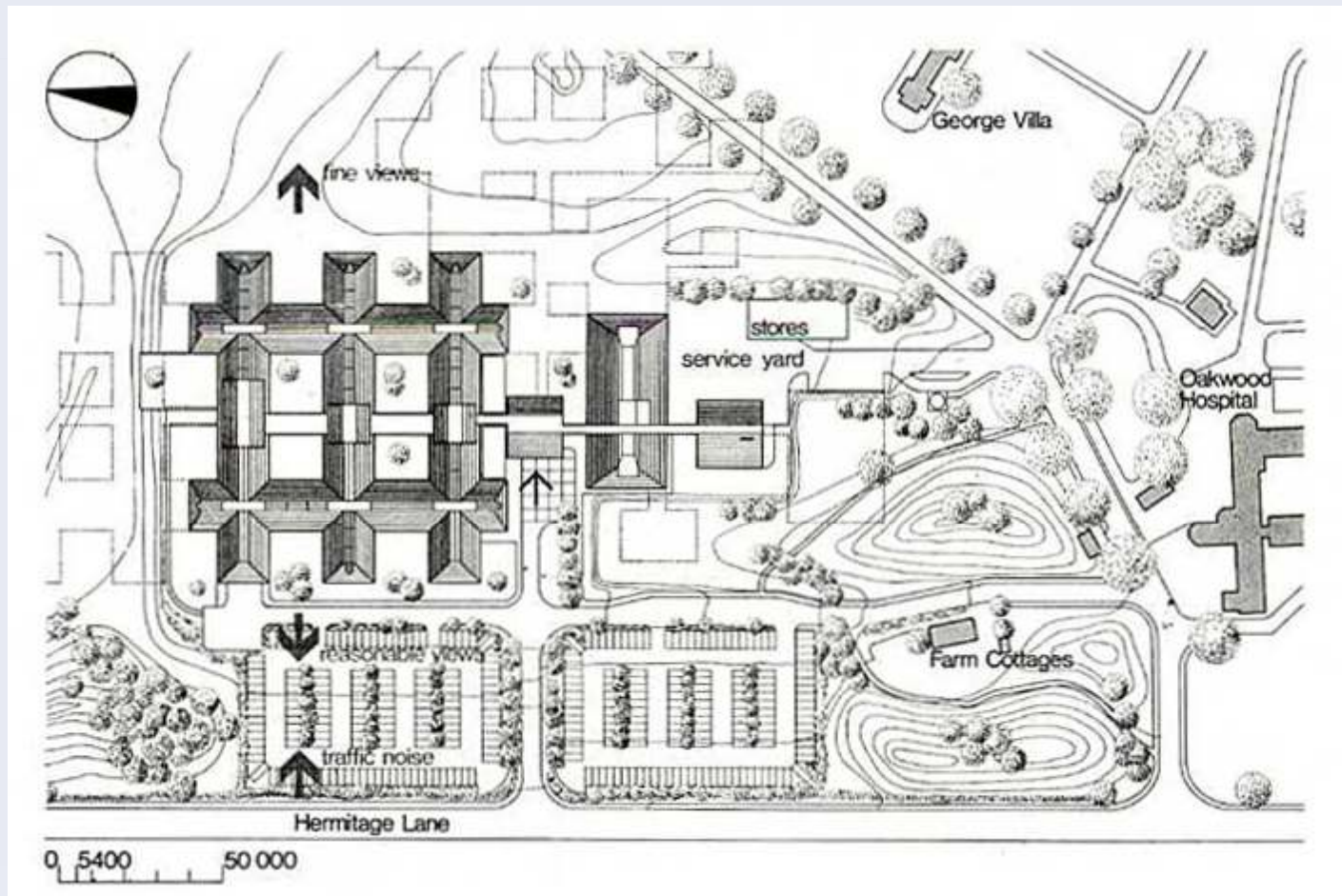
Detail of 6 Bed Room

Others

- **User criticism, highlighted in the MARU study, included lack of storage space in ward, inadequate staff accommodation, poor catering facilities, and lack of sanitary arrangements.**
- **It was pointed that long straight corridors lined with repetitive identical courtyards and hidden staircases made way-finding difficult and boring.**
- **Early fears that the Nucleus system would produce uniform drab hospital buildings throughout the country had largely proved unfounded.**
- **Two Nucleus projects at that time received design awards. Therefore success or failure of hospital design is thought to depend on architect's ability, regardless of standardization.**

Sample Hospital 1

- Name of Hospital: Maidstone Hospital, Maidstone**
- Number of Beds: 400 Beds**
- Completion: 1983**

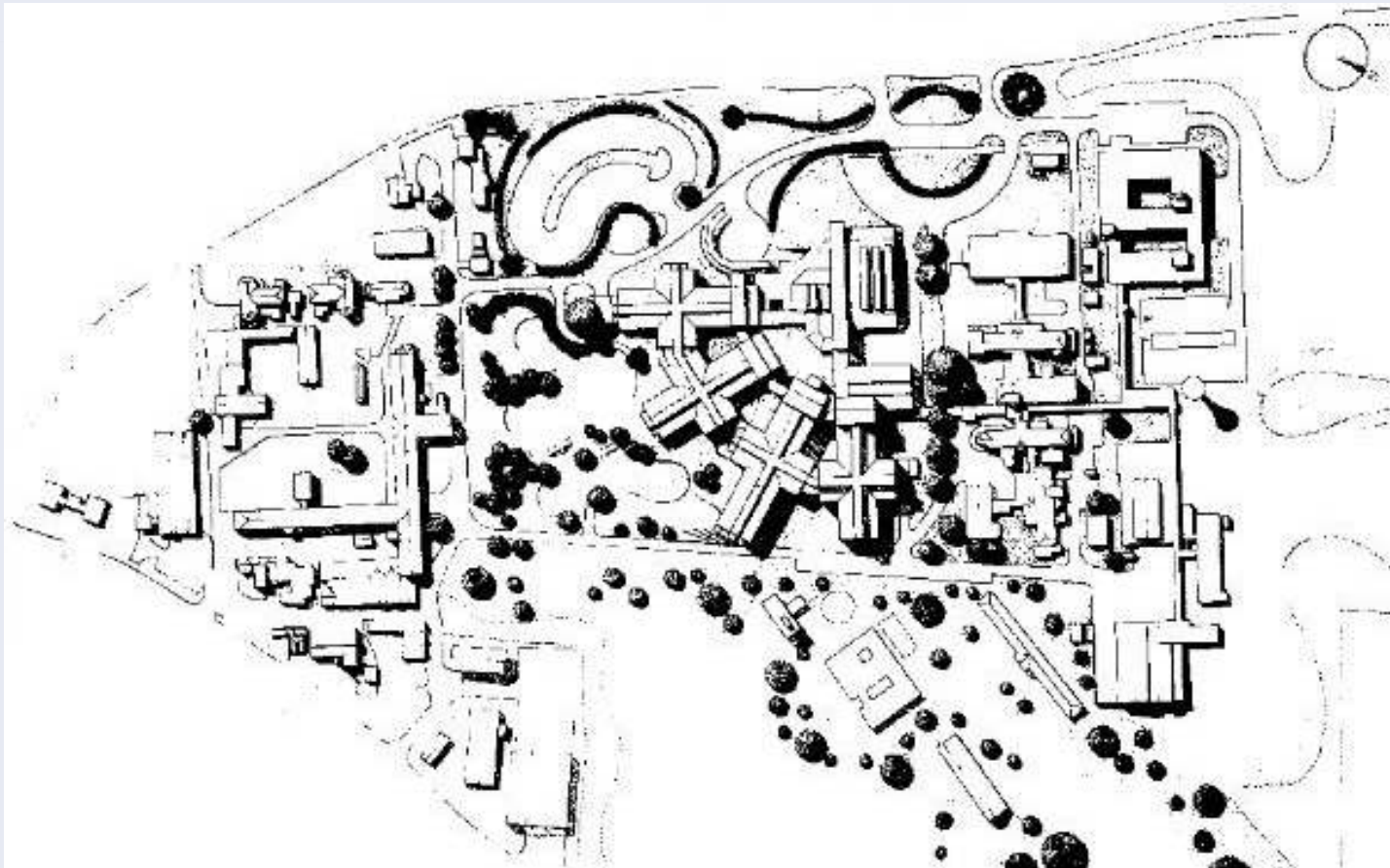


Site Plan of Maidstone Hospital

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Sample Hospital 2

- **Name of Hospital: St. Mary Hospital, Newport, Isle of wight**
- **Number of Beds: 198 Beds(Excluding old hospital 200Beds)**
- **Completion: 1991**



Site Plan of St. Mary Hospital



Building Model



Entrance lobby



Staircase in lobby



Courtyard

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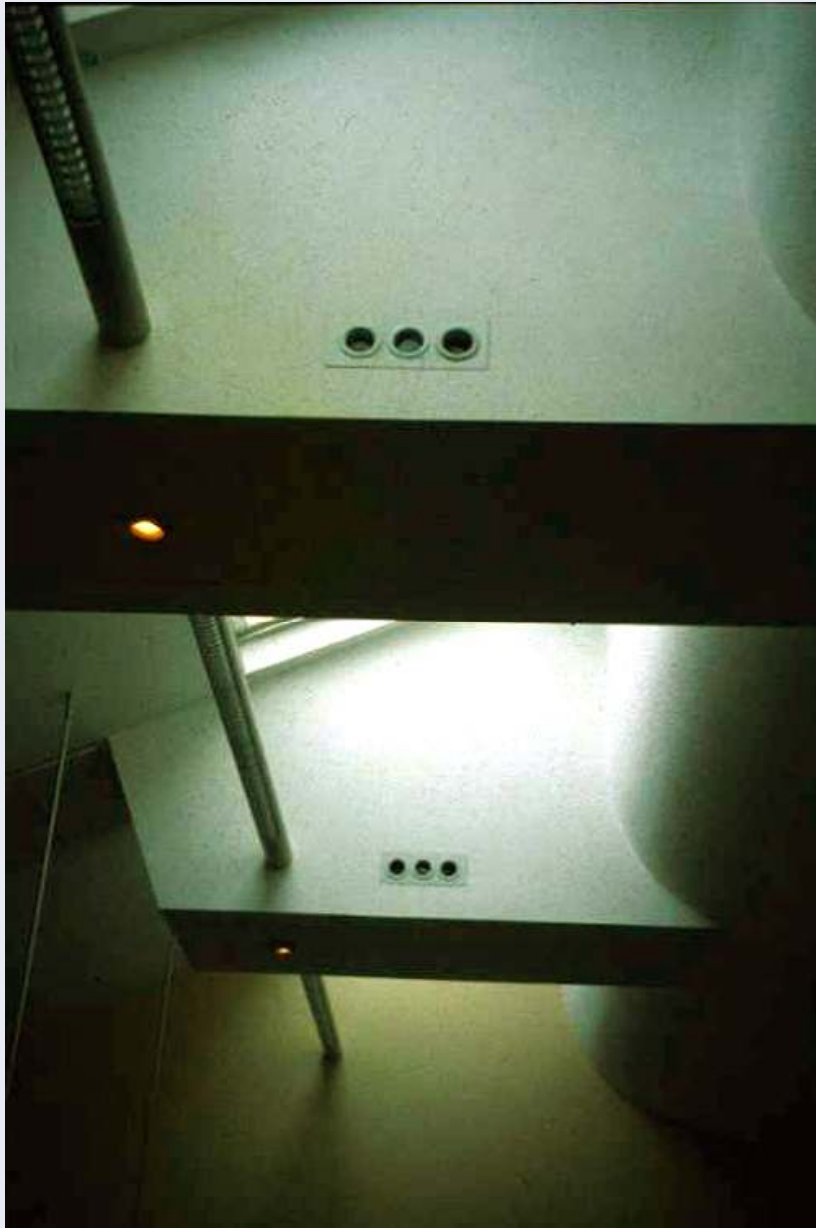


Exterior wall

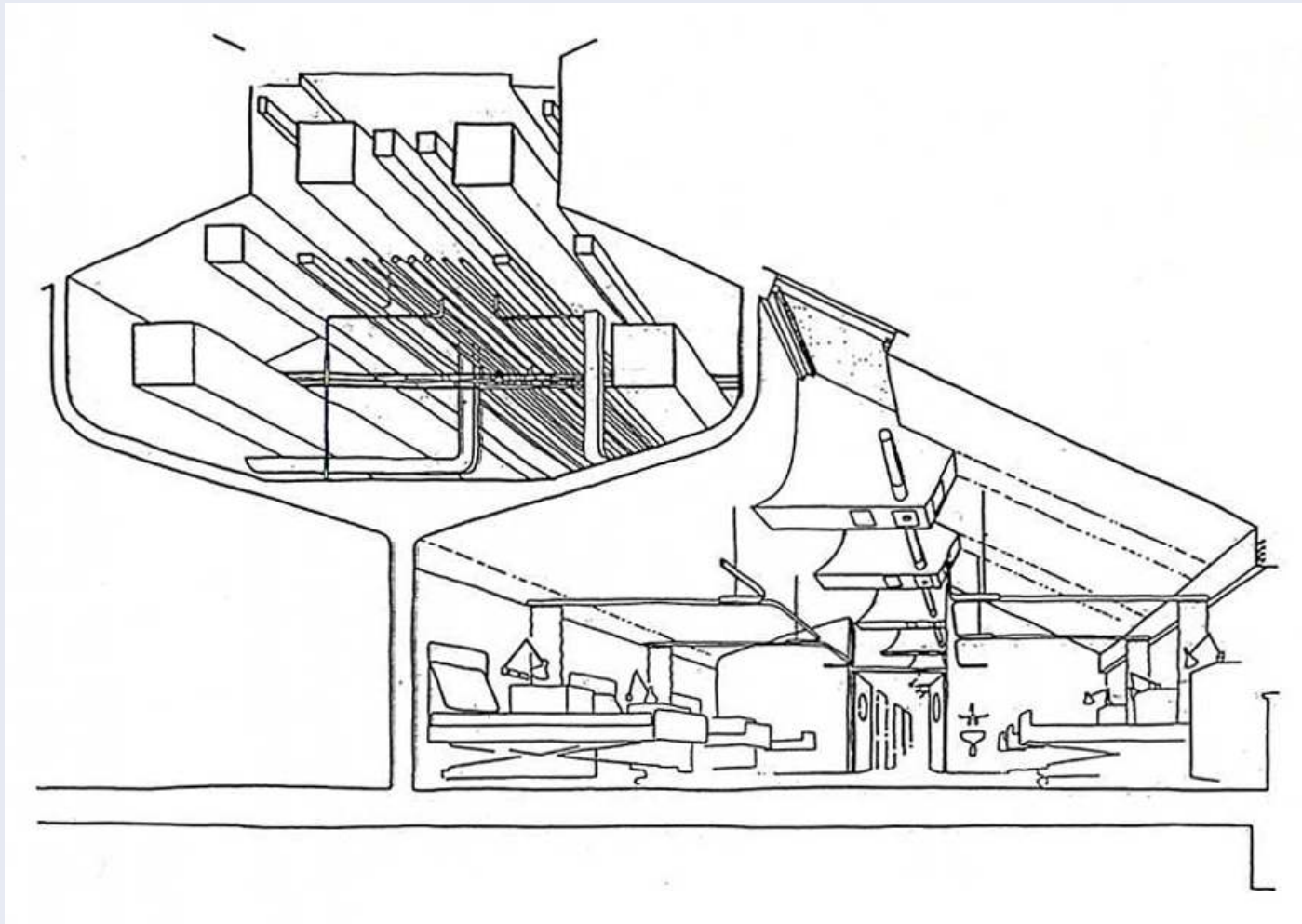


Corridor of ward

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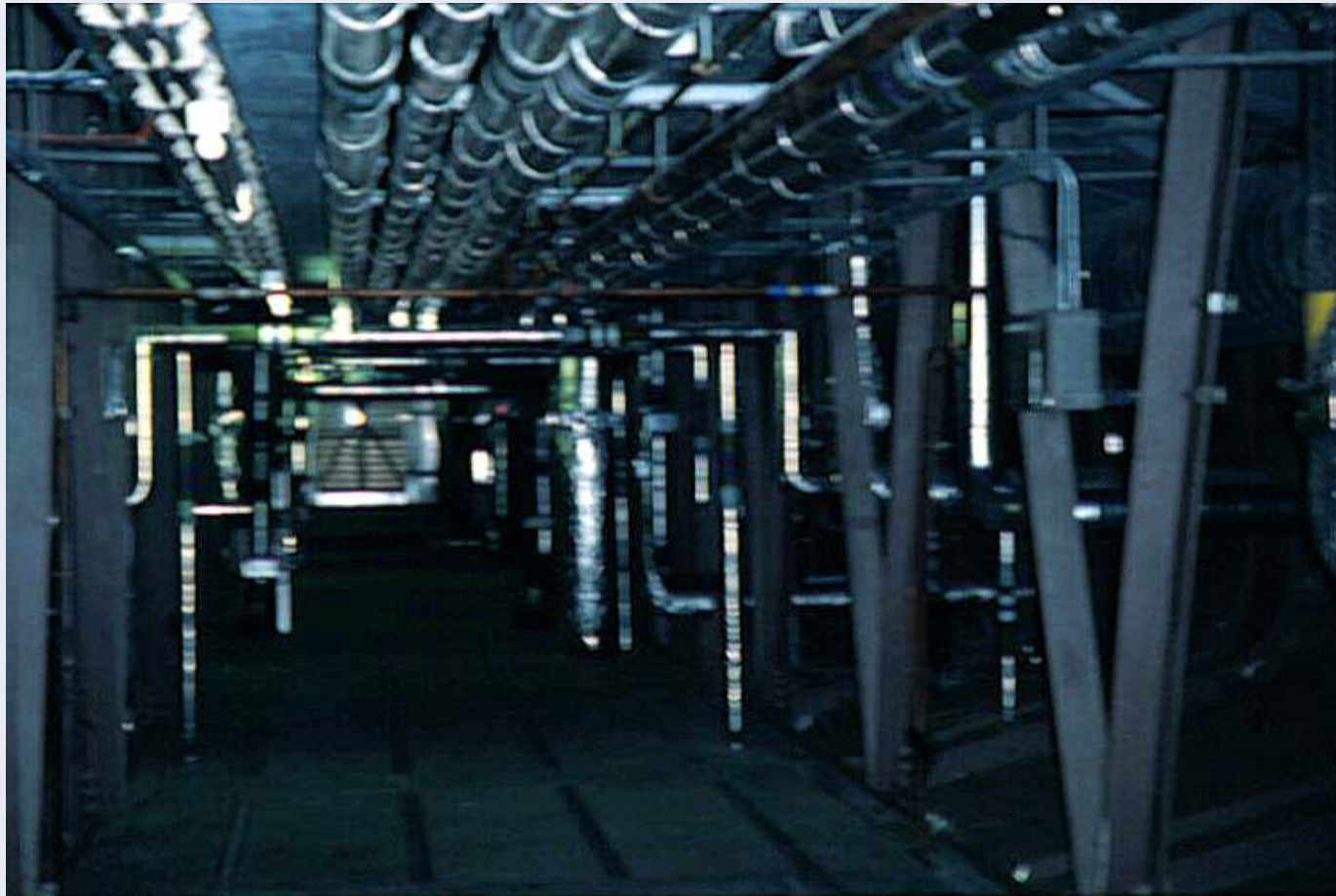


Daylighting from ceiling



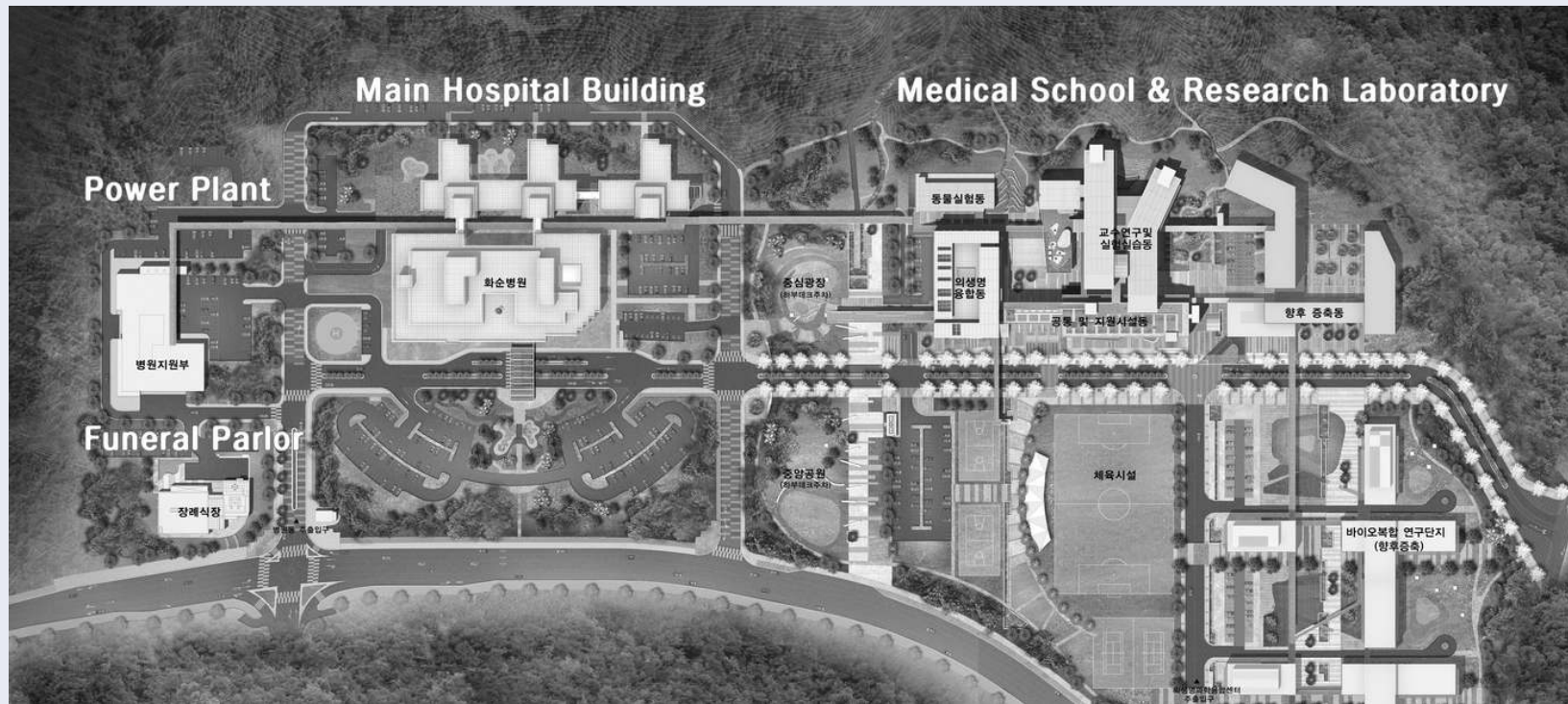
Interstitial and Daylighting System of St. Mary Hospital

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Interstitial space

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Master Plan, Chonnam National University Hwasun Hospital 46



Chonnam National University Hwasun Hospital

V. Conclusion

Sustainable design concepts of standard hospitals in U.K. from this study

- **Compact and low-rise design**
- **Possibility of growth and change**
- **Time saving in design and construction**
- **Enclosed landscaped courtyards**
- **Reduction of capital and running cost**
- **Reduction of visual impact**

Standard hospitals in U.K. are worthwhile to be recollected and applied to new hospitals in terms of sustainability

Thank You

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