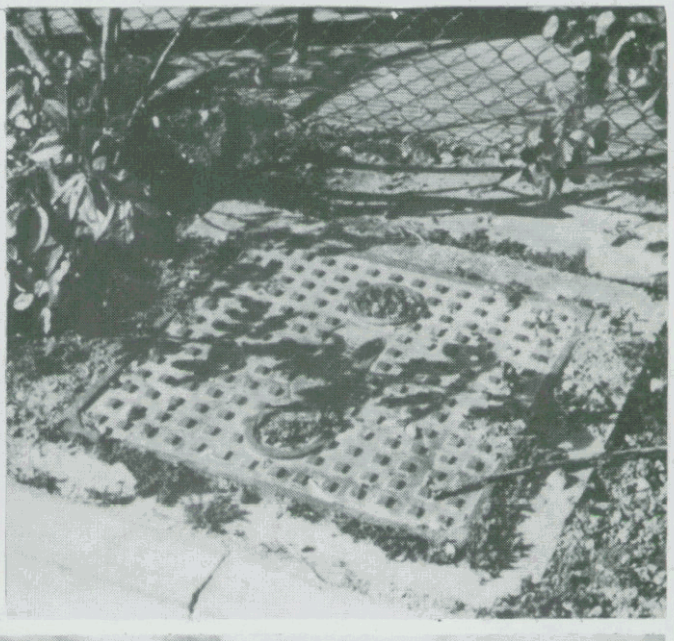
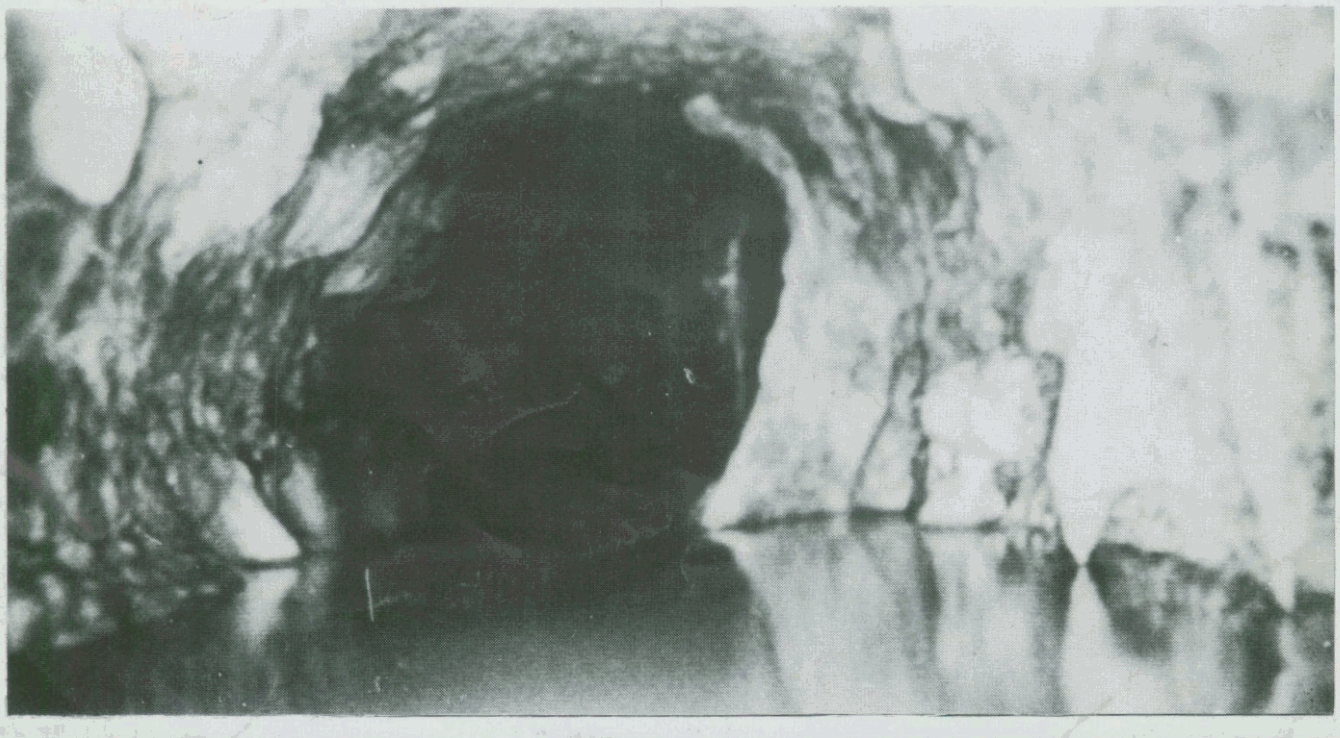
The Journal of the Institute of Hospital Engineering August 1983

HOSPITAL ENGINEERING





Trouble: Some observations on Drainage and Sanitation

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Editor
Christopher Tanous TD

Advertisement Manager
Kate Trombley

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The Institute of Hospital Engineering
20 Landport Terrace
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Telephone:
Portsmouth (STD 0705) 823186

Secretary
J. E. Furness MBE VRD*

Hon Librarian
D. L. Hall Esq., FIHospE MIPlantE
MRSH MBIM LHA
49 Fitzroy Avenue
Harborne
Birmingham B17 8RL
Tel: 021-554 3801, ext. 4838 (Office hours)

HOSPITAL ENGINEERING

The Journal of the Institute of Hospital Engineering

Contents

Volume 37 No. 6 **August 1983**

Front Cover: Trouble with drainage and sanitation needs prompt action — see Rolf Payne's article on pages 10-14.

Institute News

Britain to get Engineering Assembly

The Engineering Council, established to promote and develop the profession and its application throughout industry, put out a consultative document on a proposed Engineering Assembly late in June.

The proposed two-day Assembly will give a nationwide platform for 'grass roots' engineers to voice their views on Council policies and engineering matters generally.

The main representatives to the Engineering Assembly would be elected from the Chartered Engineer, Technician Engineer and Engineering Technician categories on a regional basis. It is also proposed that these representatives would be grouped locally in some 20 regions throughout the United Kingdom.

The job of the regional bodies would be to cultivate links with local communities, employers, industry, academic institutions and local Government.

Interested bodies in the industrial, education and Government fields would be invited to the Assembly as observers.

The Engineering Council has sent its draft document to all the professional institutions and to a number of other bodies for their reaction and comments.

Engineers Will Vote on Unity

More than 50,000 chartered engineers are to be asked to vote on whether their professional institutions should merge.

Talks between the 165-year-old Institution of Civil Engineers and the Institution of Municipal Engineers, founded in 1873, have been lengthy because, while the benefits to present and future members and the profession were apparent, care has been taken to avoid the risk of any group losing its identity in the joint body.

In June both councils adopted a document setting out the proposed basis for unification and a message from both presidents explaining the merger to members. The next stage will be a ballot later this year of the Corporate members — 42,000 and 8,000 respectively, although many belong to both.

The joint body, (it is proposed) will be called the Institution of Civil Engineers but an Association of Municipal Engineers will be created within the Institute and constitutional changes will ensure that the Association has due authority.

For further enquiries: Angus Thomson. Telephone 01-222 7722.

Branch Officers 1983/4

Southern Branch

Chairman: S. O. W. Snow Esq.
Hon Secretary/Treasurer: R. P. Boyce Esq, 35 Newport Drive, Fishbourne, Nr. Chichester, West Sussex PO19 3QQ.

London Branch

Chairman: W. A. Askew Esq.
Honorary Treasurer: W. P. Lawrence Esq.
Honorary Secretary: P. C. Vedast Esq, 59 Oakfield Gardens, Edmonton, London N18 1NY.

Mid Scotland Branch Officers 1983/4

Hon Chairman: Mr. P. Carson.
Hon Secretary: Mr. Stanley Roberts, 4 Cattofield Place, Aberdeen. TN Aberdeen (0224) 29901.

CEI Guidance on Professional Engineers and Trade Unions

The CEI booklet, *Professional Engineers and Trade Unions* has been substantially revised to take account of major changes in Industrial Relations legislation in the last four years.

The 3rd Edition outlines the implications for professional engineers of the 1980 and 1982 Employment Acts, the new Codes of Practice on Closed Shops and current proposals on industrial democracy. The factors influencing an engineer's decision whether or not to join a trade union are discussed in the light of these changes, and criteria are proposed by which the suitability of a union for professional membership may be judged.

Engineers who are already Trade Union members (about 45% of Chartered Engineers) are asked to work through their unions to increase understanding of the professional Code of Conduct — particularly where there is a conflict between this and union rules — and advice is given to engineers and their Institutions on the practical steps they should take to resolve such conflicts at an early stage.

The booklet concludes that, while a single union representing professional engineers and technologists would be desirable in the long term, the establishment of a forum drawn from those unions with substantial numbers of professional engineers in membership is now a possibility and presents the best opportunity for engineers to participate in the formulation of policy at trade union level.

Copies of the booklet may be obtained from CEI, 2 Little Smith Street, London SW1P 3DL, price 50p.

British Standard Tests for Industrial Laundry Machines

BSI entered a new field in June with the publication of the first two Parts of a standard for industrial launderers. Rapid technical development of laundry machinery and changes in purchasing methods led to an urgent need for a standard means of assessing the effect of machine performance on textiles. This is provided in BS 6246 *Industrial laundry machinery* which will also enable users, many of whom are expected to be in the health service and hotel industry, to re-assess the capabilities of their machinery. The background work leading to the development of the methods described in the standard was in fact carried out by a group set up by the DHSS — the Machinery Standards Advisory Group.

The published Parts are Part 2 *Methods for the assessment of the effect of extracting machines on textiles* and Part 4 *Methods for the assessment of the effect of batch drying tumblers on textiles.* Two further Parts will deal with rotary washing machines and flatwork ironing machines, and a fifth Part on shaped article finishing machines will probably be added.

Part 2 described methods of testing the effect of textiles processed on extracting machines (excluding washer extractors) in which water is removed mechanically from articles in their wet state after washing. In the case of batch extraction machines, only those with a load capacity exceeding 7 kg of air dry textile articles are covered.

The Part relates to the assessment of the performance characteristics of extracting machines which are units in the laundering process.

Part 4 describes methods of test that together provide a procedure for evaluating the effects on textiles processed on cylindrical, rotating, drying tumblers and similar machines in which the damp washing is loosened and partially or completely dried by heated air and mechanical energy.

The Part relates to the testing of such machinery either within an operating laundry or any premises where the required services are available. Machines used for purposes below a rated capacity of 10 kg are excluded. The test results provide an indication of a machine effect in terms of energy consumption and an output rating independent from operator efficiency.

In both Parts any information considered necessary on the required number and qualification of personnel is given as an appendix.

The standard enables users to compare the basic effects of one machine with another, and similarly a machine against a performance specification quoted in a contract. The tests can be conducted at any location where the necessary services are available.

BS 6246 is of major importance not only to users, but also to industrial laundry machinery manufacturers.

Copies of BS 6246: Parts 2 and 4 may be obtained from the Sales Department, (new address) British Standards Institution, Linford Wood, Milton Keynes MK14 6LE. Price: Part 2 £14.00 (£7.00 to BSI subscribing members) Part 4 £8.70 (£4.35 to BSI subscribing members).

One-day Symposium — Wednesday 5th October, 1983

"THE EFFICIENT USE OF THE NHS ESTATE"

The Institute of Hospital Engineering
The Barbican Centre, London (Cinema 2)

The Secretary of State requires Health Authorities to continue to reduce the cost of existing services and so release further resources for improvements and new developments. This Symposium affords the opportunity to examine the contribution which Authorities and their managers can make to the release of resources by getting better value from the £21,000m NHS estate.

PROGRAMME

10.00 Coffee

10.30 OFFICIAL OPENING

CHAIRMAN for the day:
D. N. IDRIS PEARCE Esq CBE TD FRICS
Partner — Richard Ellis, Chartered Surveyors
Member of the Ceri Davies Enquiry

10.40 UNDERUSED AND SURPLUS PROPERTY
Speaker: CERI DAVIES Esq DipArch RIBA
Assistant Director of Works Operations, DHSS
Chairman — Ceri Davies Enquiry

11.30 PROPERTY MANAGEMENT IN THE PRIVATE SECTOR
Speaker: PAUL R. DRAPER Esq FRICS
Group Property Adviser
Imperial Group plc

12.10 ESTATE CONTROL PLAN
Speaker: DR. M. F. GREEN BSc PhD CEng MICE MIMechE
Professional and Technical Officer
Department of Health and Social Security

12.45 Lunch

14.00 FUNCTIONAL SUITABILITY
Speaker: D. W. HANSON Esq BArch ARIBA FCIOB Assoc IHospE
Regional Works Officer, South Western Regional Health Authority

14.40 CONDITION APPRAISAL
Speaker: W. UPTON Esq CEng FIMechE FCIBS FIHospE
Engineering Consultant

15.20 ENERGY MANAGEMENT
Speaker: DR. DEREK CROOME MSc PhD CEng FCIBS FIOA MInstP MASHRAE
Reader, School of Architecture and Building Engineering, Bath University. Partner, Buro Hoppold

16.00 OPEN FORUM

16.30 Close

Reduced Rate Rail Fares and Hotel Accommodation — Substantial rail fare reductions are available for delegates attending this Symposium. The following are examples of second class fares to London (for first class add 50%) Grampian Region — £49; Glamorgan — £19; Cornwall — £30; Oxfordshire — £7.

Forum Hotels in London are prepared to offer delegates a reduction on their normal rates.

Application forms to obtain these reductions may be obtained only from The Institute of Hospital Engineering.

N.B. Please note that tickets are available ONLY from The Institute of Hospital Engineering (Tel. Portsmouth (0705) 823186).

New Members of the Institute

Fellow

AINSCOUGH, Harry Mason, *R. R. Jennings and Partners.*
BOWEN, James Harry, *Allenby Design Associates.*
BOYES, Stanley, *Leeds Western Health Authority.*
CARTER, David John, *Mott Hay and Anderson.*
CLAYRE, Iain Findley Charles Stuart, *Clayresearch International Ltd.*
HANNIS, Geoffrey Edwin, *British Embassy Jeddah.*
HOWLETT, Robert Mark, *R. M. Howlett Ltd.*
HUBBARD, Derek, *C. J. Jefferies Ltd.*
ODOFIN, Adekunle Boye, *City Services & Development Agency, Nigeria.*
PICKUP, David Peter, *West Midlands Regional Health Authority.*
REAY, John Malcolm, *Oxford Regional Health Authority.*
SPYROU, Spyros P., *Higher Technical Institute, Nicosia.*

Member

ALLAN, Malcolm McMillan, *South East Kent Health Authority.*
AMAYANUBO, Kingsley Ifaluyi, *University of Benin Teaching Hospital.*
BAIN, Ernest Gilbert, *Lothian Health Board.*
BLAIR, James, *Ayrshire & Arran Health Board.*
BOTHAM, William, *South Manchester Health Authority.*
BOYLETT, Ian Charles William, *Haringey Health Authority.*
BURNS, Philip Joseph, *Cramp and Frith.*
CARTER, John David, *Hertfordshire Health Authority.*
CHAPMAN, Ian Robert, *Cambridge Health Authority.*
CLIFFE, Geoffrey, *Pashler and Partners.*
COOK, Robert Vincent, *East Yorkshire Health Authority.*
COUPE, John Derrick, *Taylor Marren & Haslam*
CUNNINGHAM, Allan, *Northern Health District.*
DAWSON, John, *Camberwell Health District.*
DICKIE, William, *Greater Glasgow Health Board.*
FERGUSON, Alastair George, *Donald Smith Seymour and Rooley.*
FRY, Anthony Lewis, *W. F. Johnson and Partners.*
GEENS, Andrew John, *City and Hackney Health Authority.*
GIBSON, Kenneth George, *Northern Regional Health Authority.*
GILLESPIE, Charles, *IAL Medical Services.*
GODDARD, Norman Lamech, *Mid Glamorgan Health Authority.*
HALL, Kenneth George, *Northern Regional Health Authority.*
KIDD, Geoffrey, *North West Herfordshire Health Authority.*
HARGREAVES, Stephen James, *Blackburn Hyndburn & Ribble Valley Health Authority.*
HARRIS, Christopher Alphonso, *Central Birmingham Health Authority.*
HARRISON, Keith Raymond, *Bradford Health Authority.*
HEBDON, Eric, *Taylor Marren and Haslam.*
HOPKINS, Kenneth, *South Glamorgan Health Autority.*
JONES, Keith, *South Glamorgan Health Authority.*
KIDD, Geofrey, *North West Hertfordshire Health Authority.*
LANG, Stephen David, *Building Design Partnership.*
LAWSON, David, *Solihull Health Authority.*
McCAGUE, Michael John, *East Anglian Regional Health Authority.*
MILNE, Alexander, *Grampian Health Board.*
BUKHARI, Muhammad A. I., *Min. of Public Works & Housing, Dubai.*
MURPHY, Colin George, *Varming Mulcahy Reilly Associates.*
OATES, James Henry, *Gloucester Health Authority.*
PATTERSON, Alexander John, *Northern Regional Health Authority.*
PINSENT, Robert Victor, *Leicestershire Health Authority.*
ROBINSON, Michael Desmond, *North Western Regional Health Authority.*
STEPHENS, William Alan, *Pembrokeshire Health Authority.*
TONKS, Malcolm John, *Wolverhampton Health Authority.*
TSANG, Pui-sum Samson, *Hong Kong Government.*
VAUGHAN, Paul Anthony, *McAuslan and Partners.*
WEBSTER, Brian Robert, *Lothian Health Board.*
WEBSTER, David Colin, *BOC Medishield Pipelines.*
WILLIAMS, William Robert, *Methyr and Cynon Valley Health Unit.*
WILSON, John, *Greater Glasgow Health Board.*
WILLIAMS, Peter Kent, *Maurice Baguley & Partners.*

Graduate

CHEETHAM, David, *Rochdale Health Authority.*
DEWAR, Neill Kennedy, *Hampstead Health Authority.*

Student

ROBINSON, Charles Melbourne, *Salisbury Health Authority.*

Upgradings/Regradings

To Fellow

RUSSELL, Kenneth George, *Department of Health and Social Security.*
HOOD, George William, *Sunderland Health Authority.*

To Member

RYAN, Peter Gerard, *Mid Western Health Board.*
STEPHENS, John Nigel, *South West Hertfordshire Health District.*
JONES, Joseph Michael, *Clwyd Health Authority.*

Associate

BARR, Keith Henry, *South Manchester Health Authority.*
CHARTER, Clyde, *General Hospital, Trinidad.*
CORK, Eric, *South Manchester Health Authority.*
JANARDHANAN, Pariyarth, *Government of Dubai.*
KING, Roger Berry, *Ministry of Health, Barbados.*
NADA Ali El-Sayed, *Public Works Dept., Abu Dhabi.*
NAIR, Chemmanoor Aravindakshan, *Rashid Hospital, Dubai.*
SANGWAN, Ram Phal, *Government of Sultanate of Oman.*
SAVAGE, Gordon Roy Patrick, *Bexley Health District.*
SEDDON, Michael John, *Clayton Thermal Products Ltd.*
SHELDRAKE, Kemal Arnold, *Richmond Twickenham & Roehampton Health Authority.*
SHUFFLEBOTHAM, Roy, *Cornwall and Isle of Scilly Health Authority.*
WRIGHT, Phillip John, *Cramp and Frith.*

Forthcoming Branch Meetings

Southern Branch *Hon Sec R. P. Boyce Chichester (0243) 781411*

10th September	*Recent Advances in Renal Dialysis Techniques*	St. Mary's Hospital Portsmouth

East Anglian Branch *Hon Sec. M. Brooke Great Yarmouth (0493) 50411*

17th September	*Heat Recovery from Ventilation Systems*	Norfolk and Norwich Hospital

Midlands Branch *Hon Sec. W. Turnbull Birmingham (021) 378 2211 ext 3590*

28th September	Visit to the Priory, Private Hospital	Edgbaston

Those wishing to attend any of the above meetings please contact the relevant Hon. Branch Secretary.

This paper was given at a Works Consultants Conference held at the Regional Conference Centre, North Western Regional Health Authority on 18 April, 1983.

The Conference, opened by Sir John Page, OBE, Chairman, North Western Regional Health Authority, was organised by Frank Parsons, Regional Works Officer, and attended by District Works Officers from within the Region and representatives of private practices.

'The 1983 Estate — Taking Stock' was the title chosen for the conference, the purpose of which was to provide a general review of the Works Contribution to the North Western Regional Health Authority since 1974.

The author recently became President of the Institute.

Working for the National Health Service — The Private Sector View

LAWRENCE G. HADLEY, CEng FInstE FCIBS ACIarb MConsE FIHospE

Introduction

I must first clarify my position in that I intend to be absolutely neutral. You kindly asked me, as a practising Building Services Engineer, outside your Region, to offer a view on how the private sector looks at the work it carries out on behalf of the National Health Service.

I must be careful therefore, not to blot my copybook, but this does give me an opportunity of making some observations on how I believe the private sector professional team views the work it carries out for the Regions. Let me hasten to say that everyone — Architects, Structural and Services Engineers, Quantity Surveyors and Landscape Architects, all in private practice — has valued working for the Region.

Many of those — and I am thinking particularly of Architects and Quantity Surveyors — might often think of the Engineer and, in particular, the Services Engineer, as the man who takes an extraordinary large proportion of the financial cake, to install equipment occupying large plant rooms at excessive oncosts, only sometimes to create a lot of noise at the end of the day!

Surely that is not true! (If, indeed, it ever was).

We are, after all, seeking a common objective to carry through a project correctly, with an agreed time scale, and for it to be handed over in acceptable working order at the end of the day, at an acceptable final cost. The client must be satisfied and all of us must remain solvent.

An ideal situation — perhaps. But need it be? Ought it not be the common norm by which all projects are judged? All too often we hear of the jobs that run into trouble through defects or excessive costs or time over-runs, but we seldom hear of the jobs that go right. They are not news, any more than good news hits the newspaper headlines.

Recently, the Association of Consulting Engineers decided that there was enough gloom about on such matters, and issued a press release on jobs that had, in fact, been finished satisfactorily on time and within the cost limit. I believe there is now a concerted effort within all the professions to make the most of this good publicity, because our work can be done and is being done in an acceptable

and client satisfied way most of the time.

I had occasion recently to look through the House of Commons' 17th Report from the Committee of Public Accounts on the Financial Control and Accountability to the National Health Service. Many of you will have seen that document. It was interesting to note that on something like £3,000 million worth of building construction work on hospitals over a ten year period, problems had arisen on relatively few schemes, to the extent of about 1% of the capital value. Hospitals must surely be put into the same context as other buildings, for example housing.

On the whole, hospitals have a good track record for building standards and quality but, unfortunately, when something does go wrong, it often does so with a great deal of adverse national publicity.

Early Hospital Planning and Services

Let me first say a few words about early hospital planning and services. Sound principles for the planning, construction and ventilation of hospitals were being propounded as early as the 18th century, when it was believed that some connection existed between the spread of disease and the foul air present in hospitals. The Military Physician, Sir John Pringle, who was a stalwart supporter of the need for adequate ventilation, is quoted as having said: "The best rule is to admit so few patients into each ward that a person unacquainted with the dangers of bad air might imagine there was room to take double or triple that number".

But for many reasons mechanical ventilation did not succeed and, even now, many still oppose the use of mechanical ventilation or air conditioning.

According to Douglas Galton, improved hospital construction in England may be said to date from the Report of the Royal Commission on the Sanitary State of the Army of 1857 which, in his words, "For the first time laid down those principles, without the observation of which, no hospital can be kept thoroughly clean and healthy". This was the commission to which Florence Nightingale gave evidence. In Galton's book, published in 1869, he described in detail the form and distribution of the various parts of the hospital which will achieve the best results. He concluded that many errors were committed in the design of hospitals, and gave the following advice:

"The Architect should make his whole design subservient to the principles of hospital construction; he should be permeated by them; his watchwords should be — light, air, speedy removal of refuse, and great facility of cleansing. The smallest number of parts compatible with the requirements of the hospital should be arranged in the simplest form, and solely with reference to the wants of the patients, and to the way in which the service can be carried on with the smallest number of attendants.

"The architecture should be an expression of the need, and nothing more. Any sacrifice of sanitary requirements to architectural features is wrong; it adds uselessly to the cost. Ornament means too frequently the creation of corners and projections, which delay and stagnate the air, and form receptacles for dirt; it means present outlay and continual cost in repairs.

"While so much suffering remains unprovided for in the world, it is melancholy to see a large portion of the money which has been gathered with so much difficulty for the relief of that suffering diverted from its main object, in order to create a monument of the architect's taste."

Hospital Planning — Cruickshank

The basis of the National Hospital Building programme was laid out in the Government's publication, 'Hospital Plan of 1962', which set out the theme for providing a network of District General Hospitals, each serving a catchment population of around 150/250,000 people.

The Cruickshank Report of 1973 on the 'Planning, Design and Construction of Hospital Buildings for the National Health Service', was a review of the first ten years or so of the hospital plan. This Report highlighted a number of features which were then considered unsatisfactory in the design and construction process and which, subsequently, led to a number of significant changes in the philosophy and procedures on hospital planning, tender documentation and contract methods.

Cruickshank emphasised and brought to the front the scope and role of the Building Services Engineer. Many have always realised the role the Engineer could play in the early stages of hospital planning and design, bearing in mind that, in new buildings, the mechanical and electrical services can account for between 35/40% of the total hospital project and, in some cases, as much as 45/55%. Cruickshank emphasised that the work of the Engineer, directly responsible for design, involves the integration of all the mechanical and electrical services, each to performance standards, within an architectural concept of the building as a whole.

He continued:

"Indeed, the Engineer should no longer work in isolation and the integration of his design work with others in the building team, particularly in relation to dimensional sizing and programme, is critical. Nor does it stop there. The completeness of the Engineer's design before going out to tender; the forward planning and the ordering of the equipment and supplies; the ability and resources of the chosen Mechanical and Electrical Services Contractors, all influence the main building contract and its successful completion and, consequently, the commissioning and environmental quality of the building".

Cruickshank then gave special attention to procedures for planning, designing, constructing and maintaining the mechanical and electrical services for the hospital building programme, and it is interesting now, in 1983, to look back on those recommendations and see how that part of his Report has stood the test of time.

He made seven specific M. and E. recommendations:

a. The Departmental guidance M. and E. services to be classified as either 'mandatory' or 'recommended'.
b. Firm arrangements to be made for provision of this guidance to private consultants.
c. Mechanical and Electrical Consultants to be appointed at the same time as Architect and Structural Engineer.
d. Architect, Structural Engineer, and Mechanical and Electrical Services Engineers to work more closely together during design stages, possibly in the same office.
e. Mechanical and electrical component in Budget Cost to be broken down into elements as standard practice.
f. Progress to be made towards preparation of complete co-ordinated installation drawings.

g. Tenders for Mechanical and Electrical Services to be obtained before those for the Main Contract.

Cruickshank also made a number of recommendations on research and development, and some on building procedures and collaboration.

Building Procedures:

a. Area and cost allowance in Capricode to be re-assessed.
b. Capricode guidance on On-Cost Height Allowance to be reviewed.
c. Capricode procedure to be reformed.
d. Client brief to be frozen at the end of Stage 2. Variations arising from Client requirements thereafter to be assessed by reference to their impact on the design and construction programme.
e. A single design professional to be made accountable for achievement of work during Stages 3 and 4.
f. Proposal to N.H.S. Re-organisation Management Study Group for the co-ordination of work at all stages on behalf of the Regional Hospital Authority endorsed.
g. Study to be made of methods of evaluating new buildings.
h. Examination to be made of the possibility of setting up multi-disciplinary training courses.

Collaboration with Industry, including the Professions:

j. A series of top level conferences to be arranged at which the Department, R.H.A., and representatives of Consultants and Contractors can discuss matters relating to the future building programme.
k. Consideration to be given to the establishment of an Advisory Committee on Building.

Not all of these recommendations were eventually adopted but some ten years have elapsed since Cruickshank's Report was published, and the N.H.S. and the professions have gained a wealth of experience and knowledge with the result that hospital design and building is now a much more accurate and precise activity.

It was around this time that we faced a variety of new terms. We had already become familiar with the 'Greenwich' approach and interstitial floors, 'Standard Departments' and 'Best Buy', and then followed the 'Oxford Method', the early 'Harness' projects of Dudley and Stafford, and then later 'Harness' schemes. Now, we currently have 'Nucleus' and the L.E.H. (Low Energy Hospital).

Guidance Material

I think we would all agree that the departmental guidance material is of first class standard, and has proved to be of immeasurable help to designers and the general acceptance of standards nationwide. Many of the earlier Hospital Building Notes are now much out of date, and we all look forward to the new series of Health Building Notes, which are now beginning to be issued. (My, how inflation has affected printing costs — the early Building Notes were priced at something like 1/- to 1/6 (or, perhaps, 5-8p), the current ones are now in the realms of £3/4.) But this information published by the Department is often augmented by Practice or Procedural Notes, issued by a Regional Health Authority, and it is, at times, perhaps a little disconcerting to find that various Regional Health Authorities do not always have the same scope of supplementary data or interpretation of standards. To some extent, this also arises in the architectural field, but, certainly on engineering matters, the engineer has to be very careful to make sure that he is right up-to-date with a particular Regional Health Authority's requirements and briefing procedures.

I would say, however, that having looked through many of the current N.W.R.H.A. Practice Notes, I am much impressed by their presentation and the clarity of the instructions and guidance given.

Costing Procedures

Let me now turn, for a moment, to costing procedures. The Cruickshank Report commented favourably on the contribution which the National Health Service Capital Projects Code (Capricode) has made to the planning and building of hospital projects.

Since first published in 1967, the Capricode procedures have been revised and refined, and the current issue of April 1974, is the one which is now generally followed. On the whole, I believe the system has shown itself to be a very good discipline within which to develop the system of costing and cost control.

The basic structure of Capricode has, without any doubt, developed a much greater awareness and control within professional Design Teams, and estimates are discussed and analysed in a far more frank and positive way than might have been the case before the introduction of the system. It is common sense to evolve a scheme from concept to tender by estimating the variables realistically as early as possible, and then testing the design solution proposed against the cost allocation for standard accommodation as soon as possible.

The whole framework of Capricode has proved invaluable but, like all standard references, it can tend to become so refined that it leaves little room for flexibility and manoeuvre.

Is it, I wonder, too efficient? Would the client's interests be better served if there were more flexibility in the use of the final approved sum of money in trade-offs? The procedure does not, at all times, operate too well when, during the course of detailed appraisal, the designers may want to make changes. I would question whether the present system inhibits the designers and, perhaps, provides such a rigid system of cost control that there is little incentive for designers to offer solutions or choice of materials which might offer worthwhile economies, not only in first cost, but as a cost-in-use.

But if the Design Team discover, during detailed design, that the budget cost is inadequate, may I suggest, that long term cost effectiveness may be better achieved by adjusting the budget cost at this later stage, rather than insisting on its rigid application at the expense of acceptable design solutions?

Could there be a more flexible and realistic approach to the necessity, on occasions, of accepting tenders in excess of the final cost plan? And a $2^1/_2\%$ contingency sum is really much too small an allowance. It ought to be at least double this, even if part of the sum is allocated as a design reserve for approved use in the detailed development of the design of the schemes.

It does seem to me that too much reliance is placed on the budget cost which, once approved, becomes the cost limit. A rigidly applied budget cost may appear inadequate as the design progresses and, in these circumstances, the Design Team may feel obliged to resort to a lowering of standards in order to maintain the functional requirements of the scheme within a pre-determined cost envelope. This cost pressure on the Design Team may, therefore, lead to a substandard provision, and this is unlikely to be acceptable to clients in the long run.

Cost reduction exercises should, of

course, be avoided if at all possible, but everyone must remember that neither estimating nor tendering are exact sciences.

I understand that there are now moves afoot for certain changes in emphasis of the Capricode principles and procedures, many of which, I am sure, will take into account the foregoing observations, and this must be an improvement on the present situation.

Of course, the present tendering climate can cause havoc with the best prepared estimates and cost control. I believe it is, however, an unhealthy climate for everyone when tenders are submitted which clearly are far below realistic costings. This does not auger well for the Client, nor the Designer, nor the Contractor.

Selection of Materials

When I had the opportunity of first meeting Mr. Parsons (R.W.O., N. West RHA), he told me, during the course of our discussion, that he was a third generation Architect, in that his father was an Architect, and his grandfather was also an Architect.

He said that his father had given him one very useful piece of advice during his early years, and that was never use a new material unless it had been in use and proven itself for at least 30 years.

Now that, I suggest, is jolly good and safe advice.

But these days, we are all under great pressure to keep up-to-date with the ever increasing changes in technology and materials, and none more so than Architects or Engineers.

Sometimes, new materials might be considered in an effort to save cost, speed time in installation, or to reduce subsequent maintenance. But there is, unfortunately, a disastrous history of building failures, many of which can be traced back to an unsatisfactory use of a product.

The professional man, whether Architect or Engineer, and indeed Client, should really question hard the necessity to use a new material. Is it perhaps because of shortage of conventional materials? How long has it been used, in either this country or elsewhere, and under what conditions?

The professional man must, these days, review any departure from established practice with great caution, particularly in the areas of the availability of spares for servicing, for maintenance, the availability of new installation skills which might be necessary, and in the liability of the professional man to his Client. This topic alone is sufficient for a whole day's discourse, and I will say no more on it other than the increasing concern that all professionals have in the present legal climate and the uncertainty and differing interpretations of the law as it stands at present.

However, on the subject of new materials, I believe that there could be a much greater participation between the professional designer and his Client. If a new product, or a new application, is considered worthwhile investigating, then is there not scope whereby both Client and designer can go hand in hand, so that any risk can be properly known and responsibilities decided and agreed well beforehand? I suspect that, if this were the case, then many of the pitfalls that have arisen, and which have caused great problems in the past, might well have been avoided or, at least, appreciated at a much earlier stage, and steps taken to reduce or eliminate the risk.

This matter is very closely linked with the whole Capricode procedure of budget costs and cost limits. A rigidly applied budget cost might appear to be inadequate as the design proceeds. So what happens? In the circumstances, the Design Team might then resort to a lowering of standards in order to promote the functional requirements of the scheme within a pre-determined cost envelope. Such cost pressure on the Design Team can lead to sub-standard provisions and, on occasions, the introduction of new products.

Appointments

One significant step forward in the whole sphere of Design Team working has been the introduction of the Supplementary Annexure for Engineers to bring their professional service more in line with that of the Architect and Structural Engineer. The Supplementary Annexure developed the theme of several of Cruickshank's recommendations, particularly on the adoption of co-ordinated drawings.

This I believe, has been a big step forward but has, in turn, necessitated a much more rigid discipline between team members in the whole design and production process. The Engineer can only produce co-ordinated drawings of services providing the Architect and Structural Engineer are similarly appointed, and arrange their programmes so that all the Team members can be provided with the necessary information at the right time. The Supplementary Annexure spells out, in some detail, the intention and scope of the phrase 'Co-ordinated Drawings' and the scale on which such drawings are to be prepared. Many schemes have now reached an advanced stage of installation on site where Co-ordinated Drawings have been produced and, without doubt, have shown their worth in all cases.

One danger is, perhaps, that Contractors may now become so accustomed to receiving every item of information (apart from such things as shop manufacturing drawings), that they literally require to be hand fed with information and guidance on every single item, and this could well be counter-productive.

The number of drawings now necessary at the pre-tender stage has increased enormously. The pre-tender design time has also increased by virtue of the need to produce more drawings though all present indications are that the overall time for design and construction is shorter. After all, that is one of the objects of the exercise.

One important development in the past few weeks has been the re-establishment of a working group comprising representatives of the Association of Consulting Engineers on the one hand, and the DHSS and the Regional Engineers' Association on the other, to review the overall terms and conditions of engagement of Engineers for Health Service work.

Previously, the Agreements and Annexures had been drawn up primarily between the ACE and the DHSS, and it was left free for the Regions to adopt them as they considered appropriate. This introduced, in some instances, an area of differing interpretations and caused disagreement, for example, in the definition of 'Cost of the Works', which clearly raised problems up and down the country.

The present Committee now incorporates representatives from the Regional Engineers' Association, and so this should ensure a greater acceptance of the final outcome of these current deliberations. This must be good for the future.

The RICS have recently updated their Conditions of Engagement for Quantity Surveying Commissions in the NHS and, I understand, the

Architects are now similarly engaged in parallel discussions, and so eventually, we should have the three prime professional groups, Architects, Engineers and Surveyors, with updated Conditions of Engagement all relevant to the present and future needs of the NHS.

The items which the Working Group are exploring cover such matters as:

a. The ACE/RICS/RIBA Conditions of Engagement document and their compatibility for team working on hospitals.
b. Cost of feasibility studies at the beginning of the project.
c. Scope of work to be clearly defined.
d. Reducing claims.
e. Ensure design for most economical solution.
f. Energy economic design.
g. Approval of drawings.
h. Engineering Bills of Quantities.
j. Cost planning.
k. Site supervision and attendance at meetings.
m. Site testing and setting to work.
n. Commissioning and phased handovers.
o. Provision of Record Drawings and Operating Instructions.
p. Provision of calculations.
q. Co-ordination.
r. Negotiations with supply authorities.
s. Defining the cost of the works.

That may read as a formidable list, but each and every one is of great importance.

Team Effort

May I make a plea that before changes are made to Design Team/Contractor relationships, consideration should be given to this by all disciplines.

Building and, in particular, building hospitals is very much a team effort. All participants can learn from each other as is, perhaps, often evidenced by the success of certain firms operating frequently together and, thereby, overcoming many of the communication problems that could occur in new associations.

But the Project Team for a hospital is much wider than just the Architect, Engineer and Surveyor. It embraces Hospital Administrators, Planners, Medical and Nursing Personnel, and it is not uncommon to find main Project Team meetings comprising some 20/30 persons.

The frequency of such meetings, and the voluminous paperwork produced, can be a serious drawback to the smooth passage of any project. Another plea I would make is for the Client to be represented by much smaller numbers of people, and for those peoples views to be channelled through one single Client's representative, who would have the power and authority to enforce a Client's view, and to channel it back through the Design Team. (Incidentally, another of Cruickshank's recommendations).

However, I wonder if this is an issue the new Districts could grasp? Their resources for briefing may be less than at Regional level, and some streamlining in Project Team numbers, coupled with a quick and direct routing of instructions, could be of great advantage to both sides.

This approach works in so many other fields but, for various reasons, has not always achieved the same degree of success in the hospital field.

Provision of Information at Tender Stage

With the Contractor/Design Team relationships that exist in a highly competitive field, and the contract conditions now in common use, it is desirable to provide as much or, preferably, all of the information required at Tender Stage. Has the Design Team the right to constrain the Contractors in any way in performing their work, because the Design Team choose to decide to make information available according to their views? The only penalty is time, and time can be money, but then contractual claims mean money — a balance is required but, in my view, time spent earlier is cheaper than if spent later.

The current hospital tendering procedure now normally requires the Design Team to provide all information at Tender Stage and this, as already mentioned, implies full drawings, documentation and co-ordinated drawings, (coupled with a signed Certificate of Readiness). Apart from this being another Cruickshank recommendation, the need for better and improved standards of drawings and the accompanying documentation has been highlighted in another Government Report, issued in 1978, by the Project Information Group of the Department of the Environment, entitled 'Project Information'. That survey pinpointed project information as a priority area for attention, and the Standing Committee on Computing and Data Co-ordination arranged for the major interested Institutions to discuss the feasibility of putting futher effort into the subject and, in particular, to achieving greater co-ordination between Bills of Quantities, Specifications and Drawings, and improving their content.

There can be no doubt that improvements in Project Documentation are needed, as can be seen from any analysis of the amount of site queries which result from information prepared for communication from designers to site. For example:

a. Unco-ordinated — conflicting information from different sources.
b. Of poor quality — insufficient detailed explanation.
c. Incorrect — errors in items of information.
d. Missing — accidental omission of information.
e. Not distributed — information available but not sent to site.

Surely, this is an appalling list but, nevertheless, there may well be some truth in each and every item.

However, following the Report, the RIBA, RICS and the NFBTE and, later, the ACE, formed the backbone of a Co-ordinating Committee, which has set up four working groups, as follows:

A Common Arrangements Study — CCPI;
Standard Method of Measurement — NFBTE and RICS;
Code of Procedure for Drawings — ACE, NFBTE, RIBA and RICS;
Code of Procedure for Specifications — ACE, NFBTE, RIBA and RICS.

I mention this matter in some detail as it is the first time in the Industry's history that four responsible organisations have come together with a view to aiming at an improved and co-ordinated standard of information to Contractors in drawings, documentation and measurement. I believe this will eventually have an effect on Health Service work and, indeed, the Regional Engineers' Association have already expressed interest in, and possible participation with, the Working Group covering Specifications. The work programme is now well under way, and it is anticipated that the recommendations under each of these headings will be published by the first quarter of 1985.

Responsibilities

George Stevenson once wrote that the duties of an Engineer (and I include the Architect in this sense) are twofold — to design the work, and to see that the work is done.

But, whereas Stevenson was a Designer and a Contractor, building today involves administrators, the client, the many professionals and specialists, the contractors and sub-contractors, suppliers, supervisors and inspectors, testing and commissioning teams, and so on.

One responsibility I would, however, like to touch is that of checking calculations.

Members of each profession have a responsibility to each other and, for a successful working together, there must be a certain give and take and, in some cases, a willingness to compromise.

Some while ago, the Institution of Civil Engineers held on informal discussion on checking of designs and professional responsibility. It was then suggested that the fundamental basis of design, and the accuracy of its detailed realisation, could be achieved by observing one or other of the two following methods:

a. A review of the completed design by a separate organisation.

b. A dialogue between the Reviewing body and the Designers during the design process.

Clearly, the second procedure has many advantages when applied to hospital work. A Regional Health Authority represents the professional client laying down the brief related to a series of standards or norms.

The Design Team then develop their design solution against that brief. I suggest there could be a much closer liaison between the professionals on the client's side, and the corresponding opposite numbers with the Design Team, to periodically review together the design development and solutions.

To some extent, this does happen but, I believe, it could be made a more formal arrangement to the benefit of both sides and, certainly, without taking away from the Architect or Engineer his responsibility for design.

Flexibility in Hospital Planning

I made reference earlier to the complex nature of hospital planning, which must always be related to the ever changing needs of medicine and science.

We all know of deep planned hospital buildings containing densely packed multiple rooms with interconnecting corridors, all virtually forming an inner maze, often to suit a medical planning function or planning requirement of a particular medical man, and which results in a layout that may not lend itself to any other use in the future.

I remember, some time ago, working with an Architect on some major redevelopment work at the Imperial College of Science and Technology in London. One building had about 30 highly specialised laboratories and accommodation for various aspects of engineering work. Each man in charge of a Department was convinced that his area alone was of prime importance, and should achieve maximum priority in terms of space, facilities of services, and resources for expansion. It was always expansion, never contraction or acceptance that another science might be on the horizon, which might make his particular field of activity obsolete or, at least, of lesser importance.

The problem that faces every Architect and Design Team is how to match the many conflicting requirements. This Architect's approach was to offer a solution which, in effect, was no more or less than Alex Gordon's theme of 'Long Life, loose Fit and Low Energy'. Long life in that the building had an adequate, well built, low maintenance, outer structure, with loose fit in the flexibility in the column spacing and in the wall structure, so that spaces could be easily changed and added to or reduced, without affecting the whole, and service requirements could be altered with minimum inconvenience and cost. Buildings designed for long life and loose fit invariably have a low energy need. Are not hospitals very similar?

Recently, many of you will have seen reference to a major report that most British offices are totally unprepared to cope with the installation of advanced electronic office equipment. It stated that the lack of preparedness for the electronic future means that many office buildings may become prematurely obsolete. So, at the dawn of information technology, we have offices which are totally unprepared for the challenge. This is because they would not be easy to modify in order to cope with the direct and indirect effect of information technology. In some cases, the cost of renovating some buildings for information technology is stated to be equal to the cost of constructing new offices, and the study argued that most of the equipment that would have the greatest effect on the office environment already exists, so present experience of information technology by advanced users is a good basis for judging future building requirements. Is there not a parallel here which applies in the hospital and health care field? Nucleus standards and the work recently completed (and some still to be planned) on the Low Energy Hospital approach indicate that simple planning layouts and flexibility in the design and servicing can go a long way to achieving this kind of flexibility. Has it gone far enough?

Summary

Let me draw to a close my brief overview of what, I hope, has identified some of the areas I believe of interest and concern to the private sector in working for the National Health Service.

With projects in the industrial, commercial and education sectors so drastically reduced, particularly in this area, hospital work is indeed vital to help the construction services, and nowhere more so than in the north-west.

The NHS estate is now, I believe, valued at about £20 billion. There are something like 2,800 hospitals, and it should be remembered that 75% of these were built before the 1914-18 war, and 20% were built before 1861. The recent Ceri Davis Report suggested that the cost of the work required to bring properties in England alone to the level regarded by Health Authorities as the minimum acceptable standard would-be in the order of £2 billion. Clearly, there is a large backlog of maintenance work.

The current annual capital expenditure on new works is about £400 million, with a further £250 million being spent on the operation and maintenance of engineering and building.

Clearly, there is much work to be done and whether future work is in new buildings or in the renovation and upgrading of existing, you can be assured that the private sector is ready, willing and, indeed, I suggest, eager to help and participate.

I am reminded of an engraving on a tombstone which read 'Work for the Lord' and, underneath, someone had put some graffiti saying, 'The pay is not good, but the fringe benefits are out of this world'.

Trouble: Some observations on drainage and sanitation

ROLF PAYNE, HNDip FIHospE FIOP

Introduction

Among the many and varied problems that beset the works staff of any large building complex — but in particular a large district hospital, drainage too often is a constant source of trouble, particularly as it may have connotations of a risk to the health of the patients, staff and visitors through the release of pathogens.

For more years than I care to remember I have been making a good living out of such trouble, both within and outside the health service, and it is with considerable sadness that I note that despite all the good information readily available the same old problems are occurring within our new hospitals as are occurring within the old buildings erected before and just after the 1939/45 war.

The Problem

The problem can be roughly divided into two parts, that caused by surface water leaking into the roof space or structure, and blockages within the pipework systems..

Both these problems can cause damage to the building, a risk to the health and welfare of the inhabitants, the disruption of the smooth working of the staff and a *mess to clean up!*

The cost implications of a defective drainage system are insidious, as they are usually difficult to identify and isolate, but over a period of time — possibly the life of the building — can be considerable.

It is interesting to note that when discussing drainage problems with works staff I get two types of reaction.

Firstly, and the most usual, is a slight twitch that develops in the eye of the officer, who freely and vocally admits that he is beset by such problems.

The other reaction is — "what problems? We have heard of them, but don't get any here..."

Surface Water

Surface water falls from the sky as rain or snow and as such runs off hard surfaces or percolates through porous surfaces and should end up in surface water or combined drains, ponds, ditches, streams or rivers - not within our buildings.

If the waterproof membrane of the roof fails and in consequence allows water to leak into the fabric of the building appearing through the ceiling or damaging the structure, the cost of remedial work is always high.

This type of calamity may mean that the inhabitants of the building will have to be moved into other accommodation and can result in loss or damage to expensive equipment.

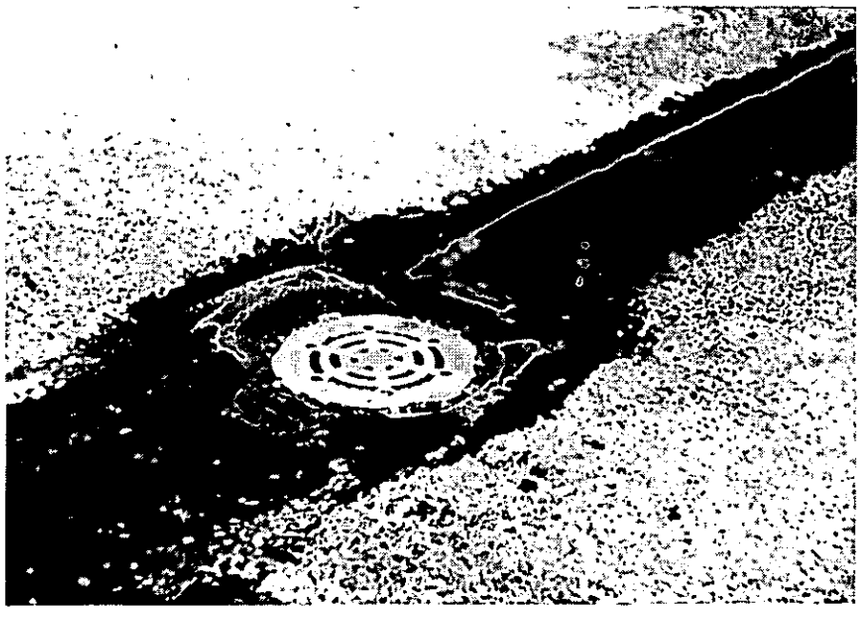


Figure One: Settlement damage to the roof membrane.

An example of roof failure is shown in *Figure One* where the outlet had been pushed up, damaging the felt work and allowing water penetration. The cause of the damage was that no expansion coupling had been provided below the roof structure in the vertical stack, so that when the building settled — as all new works are apt to do — the stack stayed fixed and pushed up the outlet by 15mm, breaking the weatherproof finish.

Car parks are often designed to drain to road gullies scattered over the surface area; again when the surface settles — or on some clay soils heaves — ponding will occur; never where a gulley is situated.

The consequential standing water may damage the surface finish; it will gather detritus which will encourage vegetation, the roots of which will damage the surface. The situation will become a hazard to pedestrians, particularly at night in winter, when snow can mask the ice below.

Car parks should always be graded in one direction and the run off collected in grated channels which will require planned maintenance at set intervals.

Damaged, defective or blocked gutters may allow water to enter the fascia or structure. Water in

Figure Two: Ponding in a car park.

prolonged and repeated contact with timber or stonework will cause extensive damage usually requiring the use of scaffolding — in itself an expensive item.

Theses are but three of the many examples of the drainage problems dealt with recently, caused by surface water.

The first would not have happened if a correctly sited expansion coupling had been designed in, and installed at the time the drain stack was erected.

The second could have been overcome if the designer understood how car park surfaces behave and in consequence used a channel collection system.

The third shows a lack of planned maintenance.

Blockages

Blockages occur in both foul and surface water drainage systems either within or outside the perimeter of the building.

In this paper I also regard surcharging of the pipework as a blockage as it has the same effect. It prevents the discharge from an appliance freely draining away.

An example of surcharge recently investigated was in a factory where the designer of the system had shown six vertical 150mm rainwater stacks discharging into a single 150mm horizontal drain. When a storm broke, the first manhole cover on the underground drain was lifted into the air by the force of the vertical surcharged stacks: the factory was flooded.

Blockages are caused by either a single factor or combination of the factors listed below:

i. Poor design; coupled with
ii. The specification of unsuitable material
iii. A lack of adequate site supervision
iv. Misuse
v. Change of use
vi. Old age

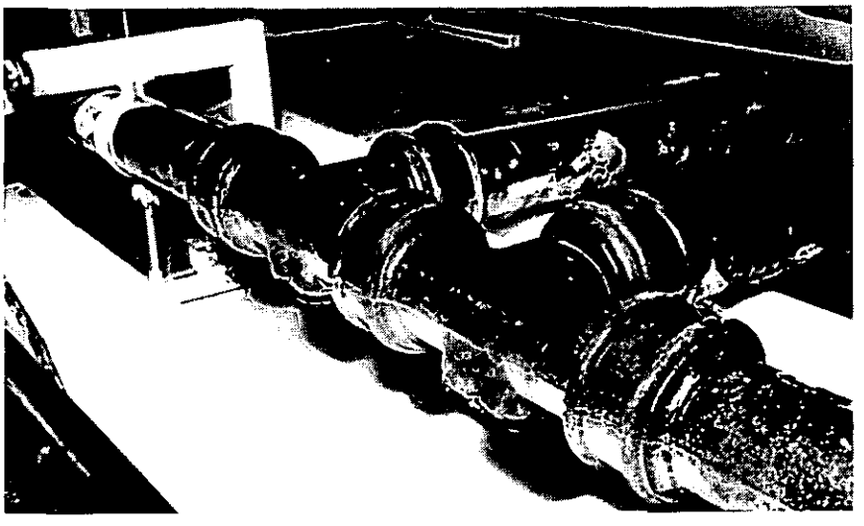
Figure Three: Blocked gutter.

Design

Despite numerous technical papers on this subject, many so-called 'designers' of drainage systems do not appear to understand the basic principles of good design or the hydraulics involved. Effluent discharged from a sanitary appliance will only flow down hill under the influence of gravity, the steeper the gradient the greater the velocity of flow. Anything that impedes the flow may cause a blockage to develop, either quickly by catching and holding the solids, or slowly by inducing the solids to settle out.

To assist the flow, all junctions must be oblique to the direction of the flow — or well radiused internally, particularly when used in the horizontal plan.

Figure Four: Right-angle junctions impede flow.



All bends must be of large radius, preferably a combination of two 135° angles, if rough bore pipework is specified.

An adequate support system is essential to ensure that the pipework is fixed and kept at the designed gradient.

The gradient is not too important if all the design and material criteria are met.

It is the quality of the design, installation and materials that really matters.

The use of cast iron multibranch junctions should not be tolerated as they are well known and notorious precipitators of blockages.

The effluents that are likely to be discharged from appliances within a large hospital may be Pathogenic, Radioactive, Corrosive or Toxic. They will always be messy, so that the maintenance of such a system will be fraught with danger.

It is therefore essential that the designer provides sufficient cleaning and maintenance access, i.e. rodding points, manholes, etc., where they can be easily and quickly used.

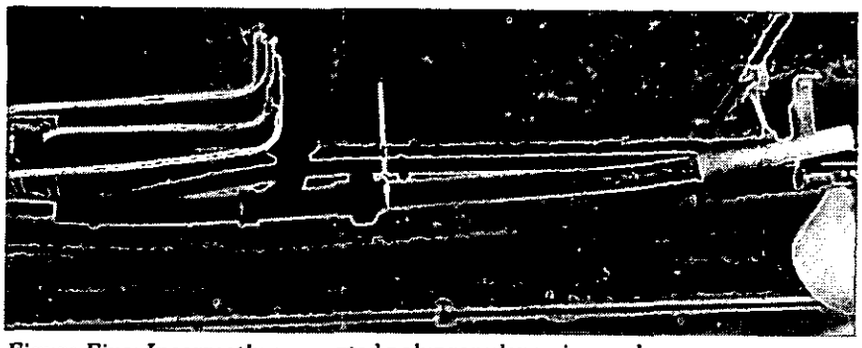


Figure Five: Incorrectly supported polypropylene pipework.

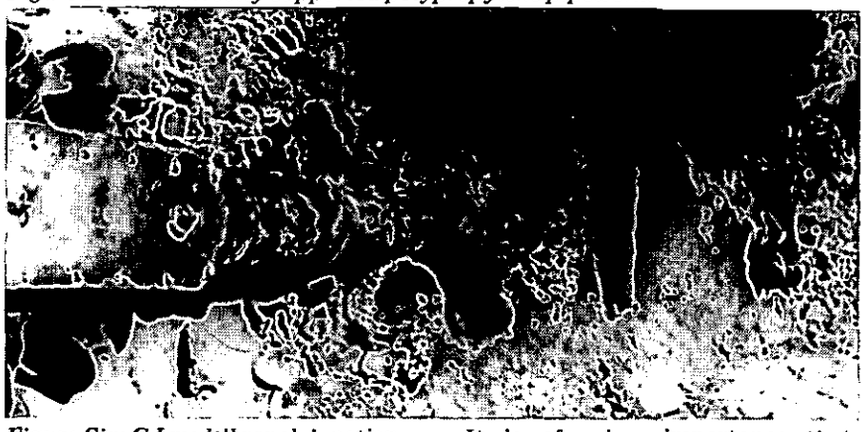


Figure Six: C I multibranch junction.

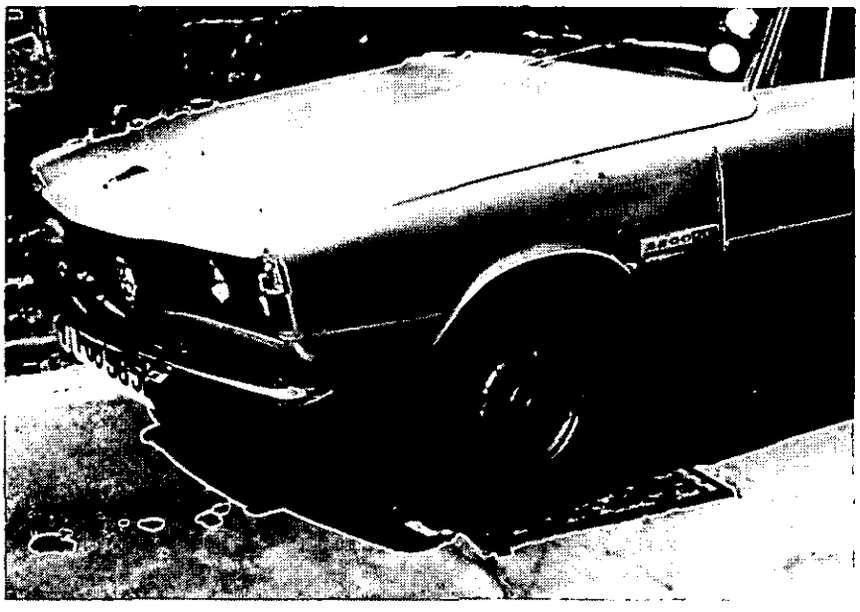


Figure Seven: Car parked on manhole access point, note the double yellow lines.

All pipework within manholes should be of the sealed access type as research has demonstrated that open channel chambers are much more likely to block.

Access that is below the flood level of an appliance should be of the sealed type to prevent spillage and in critical clinical areas such as operating theatres, blockage warning devices may be considered necessary.

An essential part of the responbility of a designer is the provision of an adequate specification covering in detail the works, and also the cleaning and protection of the works during and after the installation process.

It is of prime importance that builders rubbish is totally excluded from the systems at all times.

Materials

Many a well designed, detailed and installed system has failed in use regularly because it has been installed in an unsuitable material. The ideal material for any drainage system is one that is of smooth internal bore: polished would be fine.

For specific areas it must be capable of carrying without degradation, acids, alkalis and hydrocarbons.

In particular the fittings must be internally smooth and well radiused and the jointing system between fittings should allow a degree of flexibility, differential movement, and must not restrict the bore of the pipework.

PVC is ideal for most situations — borosilicate glass is useful for chemical effluents.

Some plastics are flammable, and may be attacked by hydrocarbons.

Supervision

Good, knowledgeable site supervision is as important as a good workable design because however skilled the designer may be the whole concept can be nullified by ham-fisted workmanship.

It is a sad fact of life that the standard of installation of drainage systems — particularly below ground — has reached an all time low (perhaps it can go even lower).

Slap it in and cover it up appears to be the criteria of some ground works contractors, and therefore vigilance is the essence of the Clerk of Works. You won't see what goes on sitting in the warmth of your office drinking tea!

Not only must you ensure that the design is followed to the letter, but also that the pipework is protected at all times *(See Figure Six)*: open ends allow the ingress of rubbish — a known cause of blockages months after hand-over.

All design variations must be handled with caution and referred to the designer if in doubt.

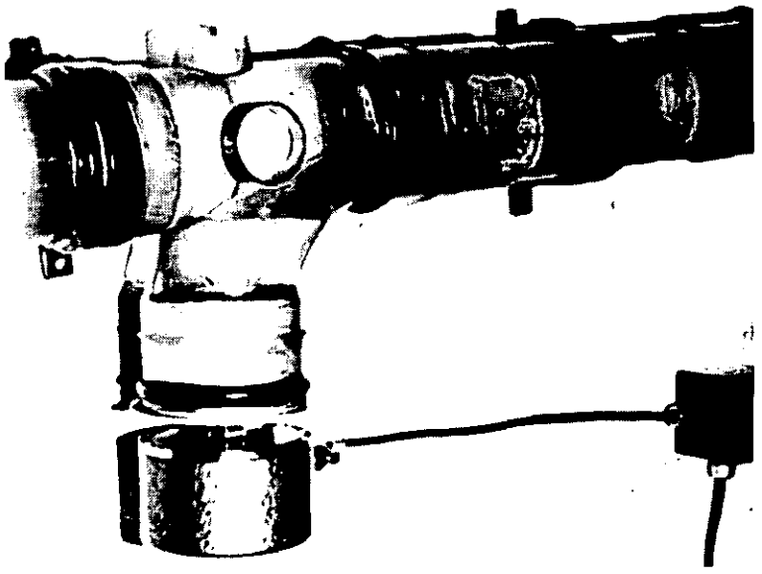


Figure Eight: Drain blockage indicator.

Misuse

Misuse can occur either during the installation stage, or later by the inhabitants of the completed buildings, either patients or staff.

It is so easy to use any convenient sanitary appliance as an ever-open dustbin — but a 'good' system will always take a degree of 'misuse'. Any rubbish that is not stuffed around the bend of a trap — such as a sheet or blanket (yes, it does happen), but is flushed through the trap should find its way through the pipework system.

Change of Use

Many a Health Authority is looking at its old hospital buildings with the view to upgrading them, and it is essential that when carrying out the feasibility study a thorough inspection of the existing drainage system is also undertaken, without it is to be completely ripped out and a new system installed.

All such underground investigations will require a Television Survey to ascertain the quality of the existing systems.

Figure Nine: T. V. identification of broken clay drain.

The size and therefore the carrying capacity of the systems must be carefully checked. Calculations may show that there is plenty of added capacity, but ground water infiltration may be considerable. Don't just look down a manhole on a dry day, check again in winter when the water table rises. Adding to the existing load may work at the point of discharge, but may cause surcharging downstream. Existing drains may be trouble free with the effluent types they are at present carrying, but add a few bedpan disposal units or a kitchen waste disposal unit and then the problems can start. Just changing from roller towels to disposable paper towels may be enough to start blockages developing, and it's no good saying it's the fault of the equipment, or they shouldn't put them down the drain — the designer should provide a system adequate for the function of the building.

Old Age

The problems caused by the ageing of a drainage system are many and varied, particularly when the function or effluent type produced by the building has also changed.

The system may have degenerated to such a degree that it should be replaced or partly replaced.

A recent case was of an outfall from an old hospital that regularly became blocked. A T.V. survey showed that a 10 metre length had subsided causing an inverted siphon. Remedial work rectified the fault and the drain now flows freely.

It is essential that if the whole or part of an old system is continuously causing trouble a full T.V. survey with video recording is undertaken. There is no way of ascertaining the condition of an underground drain from the ground surface or by peering down the various manholes, but a visual inspection of the chambers is useful and must also be undertaken.

All gutters and down pipes must also be inspected — for this work binoculars are useful — in particular the backs of cast iron down pipes that are not held forward on spar lugs must be checked for corrosion cracking.

Old building drainage systems are often fitted with interceptors, a known cause of blockages; they are usually the first thing I recommend for removal.

To properly carry out any survey of an underground system it may be necessary firstly to clean it out. Jetting is an ideal method of removing sedimentary deposits or grease build-up from existing systems.

Jetting can also be used to clean out deposits from vertical cast iron stacks, but the equipment will not negotiate knuckle bends.

Figure Ten: Defective down pipe set in masonry.

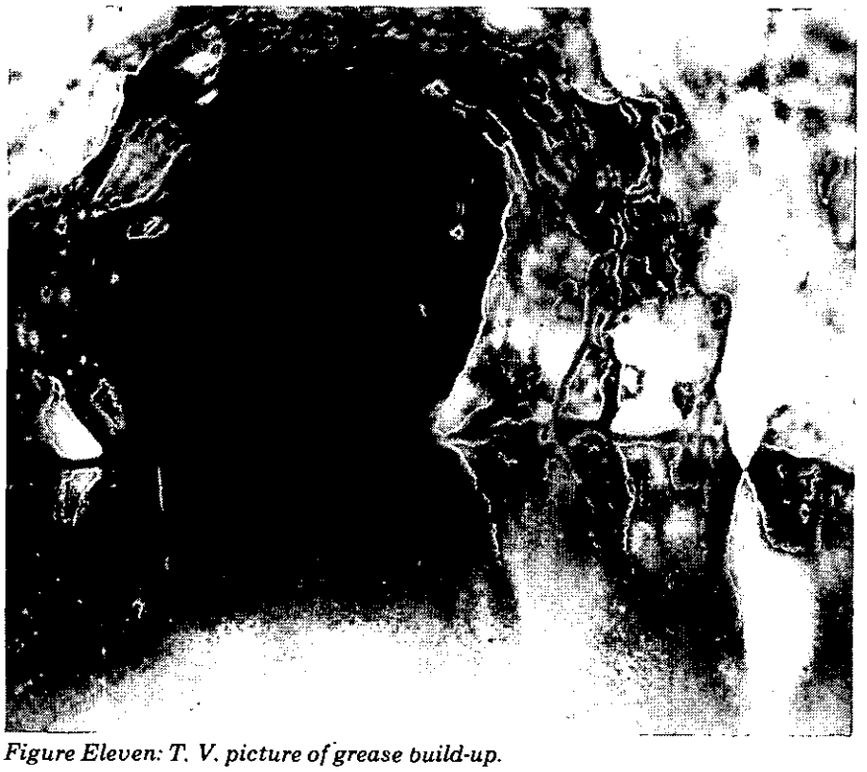


Figure Eleven: T. V. picture of grease build-up.

Maintenance

A well designed and installed drainage system that is functioning as the user requires, including gutters, down pipes and land drains, should continue to work without blocking — except for vandalism — for many years without much maintenance.

It is, however, essential that annual visual inspection is carried out selectively by areas so that the whole of the system is covered completely about every five years.

However, it is essential that maintenance points, gullies and channels etc., are checked and cleaned out on a regular basis.

Mud sumps on land drains will also require planned maintenance.

Gutters may become blocked by leaves, so annual maintenance will be required — after leaf fall — but many

points traditionally requiring maintenance, such as rainwater down pipe gullies can be eliminated by a direct connection.

Information

There is adequate, useful information available on both the design and maintenance of drainage systems.

British Standard Code of Practice CP 301. Building Drainage, although out of date is still a good guide to the design and installation of underground systems.

CP 312. Plastic Pipework, is also a useful document, but the more responsible pipework manufacturers do provide a good technical service.

B.S. CP 5572 (1978) on above ground systems, is useful although it does state that 'This code does not purport to cover any special requirement of buildings such as hospitals...' The Building Research Establishment have recently updated Digest 248 and 249 (May 1981) and they are most informative.

The Building Maintenance cost Information Service Ltd. (B.M.C.I.S.) have produced in collaboration with the DHSS a number of Design/Performance Data Sheets relating to the maintenance of drainage.

Finally, Construction Press published in October 1982, two completely new books on drainage, *Drainage and Sanitation*, a text book for designers, and *Drain Maintenance : Estate Management*, a guide for estate managers, both by Rolf Payne.

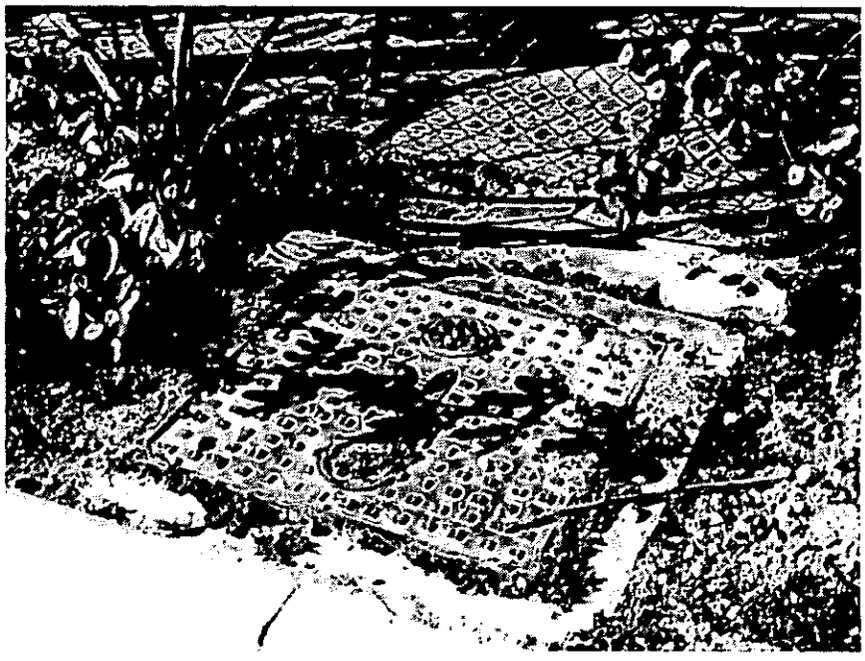


Figure Twelve: Manhole cover requiring maintenance.

A paper given at the Annual Conference in 1982.

The Use of Computers in NHS Works Organisations An Overview

B C OLIVER

Revolution or Evolution

The term revolution has been applied to the use of computers but these machines have been with us for over twenty years, so clearly we are talking of evolution. However, the dramatic price reductions in hardware costs during the last five years have led to a marked increase in the use of computers.

These developments have made many things possible, but new users should be aware of the time lag between the introduction of hardware and the various types of software that are required to operate them, and the comparative escalation of costs associated with software.

This is particularly noticeable with regard to application software which is at the end of the chain and which can only be satisfactorily developed by people engaged in the particular specialisation to which the software will be applied.

Furthermore, in order to evaluate the performance and improve the programs it is necessary to employ

the services of people who are, prima facie, least inclined to use the new technology. These people are the experienced professional and technical staff who are currently employed in these areas and have the wealth of experience and information gained only over a long period in the industry.

Operating Systems

We are often, therefore, dealing with brand new up-to-the-minute hardware. But what of the software? This is either non existent or needs expensive transfer work which may take the programming staff considerable time to recode and debug.

Fortunately, many of the new generation of hardware manufacturers are appreciating the users needs and are supplying standard operating systems and other system software which has been developed by independent software houses and which have now become industry de facto standards like CP/M2 for small 8 bit microcomputers or UNIX for 16 bit computers which enable well used and proven programs to be applied easily and reliably to the new hardware.

Procurement

Procurement is however still very much a minefield to the first time buyer of equipment who is unaware of the interaction between software and hardware.

It is for this reason that the Department has provided guidelines for the purchase of 8 bit microcomputers. (Works Officer letter 81(5) refers).

This specification is relatively simple and directs potential purchasers to acquire machines capable of running a standard CP/M2 operating system and, if funds allow, to purchase a computer having two 8 ins. floppy disk drives of which at least one can read and write disks formatted to IBM 3740 single sided single density.

The former requirement is to ensure that software can be transferred on to the machine and can run with a minimum of changes. The second requirement with regard to the 8 ins. disk drives is to enable the transfer of data from one machine to another using the 8 ins. disk for which the only standard is the IBM 3740. There is no accepted common standard for $5^1/_4$ ins. floppy disks. There is, however, one major disability within CP/M2 in that it does not support common device driving software. This means that users of individual computer systems have to tailor their software to meet the requirements of their computer terminal. In order to reduce the problems in this direction to a minimum my personal service advice is that you should purchase a terminal which is relatively unsophisticated.

UNIX

With regard to larger computer systems the Department/Health Service has yet to deliberate on the future direction, and this is made difficult by the lack of software which is running under anything like a standard operating system.

However, it seems likely that the Bell Laboratories UNIX operating system will become the industry de facto standard operating system for 16 bit machines and, given that much of the current minicomputer software can be converted to work under this operating system, then it is likely that this system will become the official recognised standard.

Software and Works Organisations

There are two principal areas of application:

1. Office and works management
2. Computer aided design

Management

The first category covers all areas of management and will eventually result in all managers possessing the all-electronic office with its gradual reduction of paper and the much improved clerical performance which is urgently required within all facets of public and private enterprise. These systems will also include sophisticated communications equipment.

Typical general applications include:
Accounting packages;
Report writers;
Office file management;
Etc. etc.

Estate Management
Before this is commonplace we will see a good deal of discreet growth in such areas as estate management.

Plant Management and Control.
We shall also see the more rapid introduction and use of plant management and control systems although this development in the low price range will be controlled by the speed at which digital telephone systems are introduced.

System Requirements
Generally, such systems as these demand nothing very special in terms of computer hardware, but their scope will be limited by the amount of off-line storage available. As these systems get more established in use we will see a growth in machine size and particularly in the amount of data storage available to the system. Already many systems are utilising Winchester hard disk to increase the capacity. Typically these are 13-20 megabytes in capacity.

On the communication side there are already many cheap multiplexing modems available operating with the standard serial V24/RS23SC interface, and using simple 2 wire or coaxial connections.

Computer Aided Design

In CAD, however, aside from the many small analytical programs that are available on both small and large computers there is an undeniable need for graphic capability which demands facilities over and above those needed for alpha numeric processing.

Integrated System

At the DHSS we have for some years adopted a policy which recognises the need to develop towards an integrated approach even though this is impractical as a first step.

Principally, the strategy recognises that the capability to describe and model the building is of paramount importance and that the transference of information from this and other application programs, whether it be for cost planning, performance calculation or producing drawings, is essential.

To achieve this and maintain the maximum amount of transportability between Health Authorities it is imperative that sooner rather than later we all develop and operate software which runs under a common operating system such as UNIX. If CP/M is proving of considerable value in enabling us to coordinate microcomputer programs within the Health Service then without doubt UNIX will be of even greater value in assisting us to meet the future need for computer aided design programs, the software for which is of an order of magnitude more complex than ordinary data processing.

A paper given at the 1982 Annual Conference of the Institute at Stratford upon Avon.
Mr Brooke is Regional Works Officer for the Mersey RHA.

Alternative Contract Methods in use in the NHS
Management Contracting

Gordon Brooke MSc(Eng) CEng FICE FBIM FIHospE

Introduction

In this paper on Management Contracting I shall limit myself to our experience in Mersey RHA.

The paper is in two parts, the first describing the background, concept and definition of Management Contracting, and the second relating this conceptional framework to our use in Mersey.

Let me start with credits and acknowledgements to my own staff — George Wadham, our Quantity Surveyor, Eric Stentiford, Regional Architect and Jim Flynn, Regional Engineer, who have the task of converting my judgements and enthusiasm into practical operating realities, and to Keith Hudson in particular who has always been the bridgehead for our assaults on Departmental orthodoxy when we have been selling our ideas to the Department.

Some of the material I shall draw on for the wider concepts is drawn from the University of Manchester Institute of Science and Technology, who are carrying out a study for the Construction Industry Research & Information Association (CIRIA) into Management Contracting. This is not the study the Department has set up into Management Contracting, which is programmed to last 6 years. The CIRIA study will be available later in 1982.

Management Contracting — The Concept

Management Contracting to me is simply 'Contracting Out Management'. In orthodox contracting, 'Management' is what the Contractor uses to co-ordinate and direct his resources to his objectives. We have too often seen that those objectives are not those of the client.

A Contractor's prime objective is to produce a return on capital invested for his shareholders. To achieve that objective he may meet my objective as Client. But he may also sacrifice my objectives to his and he may direct his management resource away from my objective to his. Thus he may squeeze his management effort and labour and material element to preserve his margin.

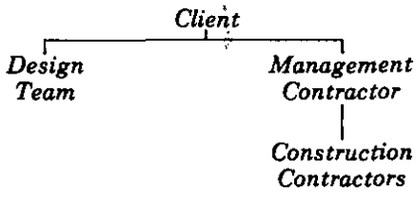
You can start varying the contribution of management you buy in as and when you think fit. It could manage the design process as well as the building process, or it could be restricted to the building process.

The point which I wish to make is that you have a basis for flexibility of Client decision rather than the harsh cut-off of the orthodox Lump Sum Contract, by buying in an *uncertain* amount of management at a notionally defined stage — that is the break between the design process and the build process you are identifying and separating out a discrete and separate package of Management to meet your needs.

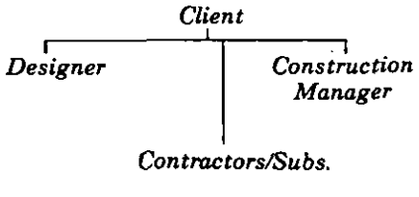
Having developed the concept of buying in Management there is another option open to me — which is: 'Construction Management'.

In essence the Construction Manager offers a 'purer' form of management expertise because he stands outside the contractual line between supplier and client — he is free of all risk.

Management Contracting



Construction Management



I draw this distinction at this stage to introduce the concept of RISK and where this RISK should rest which I will develop later in my paper.

If you look at the Construction Management relationship you will see that in essence this is what a District Works Officer does now in much of his minor works refurbishing contract. In essence he is the in-house Construction Manager.

At the other end of the scale in say major civil works or North Sea developments where the financial risks are possibly too great for any one organisation to take, we get the dominant influence of **Construction Management**. Firms such as Brown & Root, Kellog etc. offer this service to Shell or the big oil companies. They co-ordinate contracts for the platform, the production/topside works, and the pipeline, etc, whilst the contractual costs and hence the risk of variation are laid off with the Client.

Management Contracting then is essentially a professional service by virtue of the following features:

payment mechanism = Cost reimbursement plus fee;

Conditions of Contract and Employment:

Risks Limited, roles and relationships defined to fit Client objectives.

Firms selected by their expertise, staff qualities, experience and record.

Recognising this professional service element influences the way you select and retain your Management Contractor.

I have defined the beast I am looking for and who I want to harness. When do I use him?

When to use the management contractor

The circumstances which favour the use of Management Contracting are:

When the project is complex and there is need to co-ordinate a considerable number of specialist suppliers and sub-contractors;

Where the design process could be complex and lengthy and a queuing sequence between design and build is not in the Clients interest;

Where there is benefit from an early start on site, and an early completion;

Where the Client does not have his own expertise in-house to manage the whole project process.

A feature I would like to stress is the potential for flexibility in the arrangement. For example the need for an early start on site may be in conflict with any uncertainty about the design. The flexibility is undoubtedly greater in the Management Contract than in orthodox Lump Sum Contract. This is the feature that makes the Management Contract and indeed the Construction Management Contract useful in the Mega Contract of North Sea work or some civil engineering contracts.

Management contracts — The Processes

Having described the main features I would like to examine the process of

Selection;
Conditions of Contract;
Risk Allocation;
Relationships.

Selection

At the end of a briefing phase you are in a position to draw together the basic data on which the Management Contractor can be invited to bid. This data comprises

description of the project;
site information;
block plans;
the elemental cost plan;
an approximate programme of working on the design and construction phases;
an explanation of what you, the Client, is looking for.

Here you can bring out your needs in the design management phase, and the amount of time and resource you are looking for in identifying potential suppliers. How you want the Bill of Quantities to be assembled and for example the role you see for the Management Contractor in the plant commissioning phase.

At this stage you may leave the detail of contract form loose for two reasons:

First there is no standard form of contract although the JCT are currently drafting one;

Secondly, it is worthwhile listening to the Contractors for their views on the draft form. An initial round of meetings with perhaps 6 to 8 contractors is the first step in producing an effective and competitive short list. Ask them to attend.

with their potential project manager;
press them on their experience;
the number and calibre of their staff they would deploy;
their views on programme;
number of sub-contract packages

They envisage their methods and attitudes to industrial relations problems;

It is a salutary experience. Some firms are distinctly sloppy about the sort of staff they would put up, their attitudes to programming and their views on sub-contractor selection, appointment and control.

From this initial round a short list of serious bidders can be drawn up and the best ideas you have heard can be incorporated into your firm contract.

Conditions of Contract

Setting aside all the legal jargon the essential bones of the Management Contract require a statement of duties split into.

The design/tender stage — these include:

the production of the project master programme, covering the design team activities and resource schedules;
role in advising the designers on the selection of material;
the contractor's expected comment and advice on feasibility of proposed architectural and engineering detailing and the allocation of these proposals into effective and viable sub-contractor packages;
advising the Quantity Surveyor and assisting the production of a Cost Plan.

The construction phase — this makes the Management Contractor responsible for the construction of the works including:

the sub-contract form agreed with the client. This form is important to identify where Risk rests.
The programming and letting of the sub-contract packages which influences design team programme;
demonstrating the competitiveness of all the sub-contracts following the receipt of tender and Client approval;
letting the sub-contract and ensuring the delivery of the required works.

The design management phase is paid for on a per diem rate for selected staff set against a budget sum. This expenditure is kept separate to afford the opportunity of a break clause between the next phase — the contract management phase.

The stage two construction management fee is quoted as a fixed percentage of the gross value of the sub-contractors' work. All the work is of course carried out by competitive sub-contract.

The two fess can be rolled up into one total fee as a percentage or lump sum to ensure a tight package is offered.

Risk Allocation

I referred to risk earlier in my talk and let us now see how this is reflected in the contract. The allocation of risk is a key matter in the relationships and a significant factor in the price quoted.

The more risk the client passes to the Management Contractor the more you move to the adversarial role between Client and Management Contractor. If you ask him to stand a higher risk than the other professionals in your construction team then he will ask for a higher price to compensate. But if you remove all risk entirely you lose some incentives, and the cutting edge of competition.

What are the key areas of risk? Two examples:

Defective workmanship

Who accepts the risk for defective workmanship by the sub-contractors and who remedies this deficiency? The Management Contractor has selected the sub-contractors and reasonably the risk and remedy rests with him at no cost to the employer.

Completion delays

If the delays are due to the management contractor then it is right that he takes the risk and prices his fee accordingly. If he is over-conservative and insists for example that all sub-contractors must stand the risk of delay that is over-conservative and will result in a risk premium built into the sub-contractors prices.

Relationships

The balance of relationships changes through the phases of the project.

In the early pre-construction phase the Management Contractor is the new professional in the construction project team.

In the post contract phase there must be a re-adjustment of those relationships to give the Architect and the Engineer and the Quantity Surveyor appropriate opportunity

and protection to exercise their duties.

I have so far talked about the generality of Management Contracting. In the second part of my paper I will explain these general concepts in the particular context of the way we in Mersey have used Management Contracting.

To do this I must give some of the background which led us to the decision we took to use Management Contracting.

The Mersey RHA Capital Strategy

In the hiatus of the 1974 reorganisation the strategic programme had lost momentum and the Authority was concentrating on finishing the last of the old dinosaurs of single phase major DGHs, namely the Liverpool Teaching Hospital and 900 bed DGH at Arrowe Park.

A policy review identified two priorities:
First — Finish off the Royal Liverpool.
Second — Resolve major acute service deficiencies in the Districts of Chester,
Macclesfield,
Southport.

I will concentrate on the Royal Liverpool first and then return to the Chester/Macclesfield/Southport problem.

In 1975 when I joined the Regional Health Authority the Royal Liverpool Teaching Hospital was like a great festering whale. Rotting from the inside and about to blow its putrescent over anyone standing near — you didn't need to throw anything into the fan.

I believe the main curse of the problem was the Lump Sum form of contract. All the risks of a major scheme had been laid off onto a contractor who had underpriced the risk and been driven into bankruptcy.

The essence of the problem was thus:
1. The Board of Govenors at Departmental insistence had let the contract on a Lump Sum basis to Tersons;
2. the losses had contributed to the bankruptcy of Terson. But Terson had been taken over by BICC, who then used McAlpines as Contractors on a Cost Plus Percentage Fee basis.

So we had a lump sum contract paid on scheduled rates between RHA and Terson who were a shadow for BICC, and a cost plus fee basis between BICC and McAlpine. McAlpines were in a 'no-loss' situation, while the Authority were in a 'no-win' situation.

Question — Were McAlpine's management resources devoted on site to my objectives as Client, i.e. to finish the Teaching Hospital as quickly as possible? Well, the month after I arrived Terson closed down.

There was no way we could shut the site down while we measured and let a competitive lump sum tender. And having seen what a lump sum competitive tender had produced last time who would go through the same valley of the shadow again?

I persuaded the Department to hold the McAlpines contract for 6 months whilst we sorted out the problem. Looking at my criteria for a management contract:

complex;

phasing for occupation important;

timing crucial, i.e. to demonstrate; continuity of working and a commitment to finish;

special management skills were needed, not only for the complex technology of a teaching hospital, but also on-site skills to manage the industrial relations problem.

We canvassed the industry to find a willing list of tenderers and surprisingly enough there were very few takers. The only two were:
McAlpine, who were 'sitting tenants';
Bovis who were trying to break into the public sector market but found their refusal to use lump sum tenders virtually closed that door to them.

Because the labour was sitting-in on the site we could not use pure Management Contracting whereby you let out the work to competitive bids. But we could use the Bovis Fee System in which they provide some labour, and where the material element and sub-contract element was open to competition.

There was an advantage in using the Bovis Fee System to get some of their labour and foremen onto the site. This was to demonstrate for example that 10 bricks a shift was not an acceptable standard of work.

We therefore asked for bids from Bovis and McAlpine on an estimated bill of outstanding work, priced on an estimated basis by our Quantity Surveyor. Bovis quoted a more competitive Management Fee, but of course more important was a belief they would try to demonstrate a reduction in costs, whereas McAlpines would have to live with their past cost record. We could then draw up a construction programme, relate that back to a required design programme, and direct the skills of the design team to meet that programme. This was a novel experience for them as they had spent the previous 3 years battling out claims, with one eye on their professional indemnity insurance.

In 1976 therefore we set sail to the promised land — and then BANG! The fire precautions standards of the 1974 Act which hadn't existed when the hospital was designed became a required standard we had to build into this partially completed hospital.

All this is well written up in the journals and observations of the PAC. How we actually built a sample of the hospital podium and burnt it down at Cardington just to prove that a $4\frac{1}{2}$ acre podium roof didn't have to be taken off was one of the turning points in fire technology. The point I make is we couldn't have accommodated that change on a lump sum contract.

We finished the hospital in the phased programme way in 1977-1979 and within the costs we had forecast in 1975.

I will now turn to the Chester/Macclesfield/Southport problem. There was little to choose between them in service need, but at the first two it was clear that the development would go on existing sites. At Southport however there was uncertainty about site identification and availability. Our Capital allocation was such that we could not carry 3 projects in parallel at the same time. Too much money would be going into the acute section in 3 districts and such a concentration was not acceptable.

We might carry two schemes but even they would have to be separated by about one year to allow cash management.

The orthodox process of *ab-initio* design would extend the start on site, and at this time the Nucleus concept was becoming available. I felt that the briefing phase could be managed more effectively and controlled by offering Nucleus "You can have any colour you want as long as it is black".

With 3 schemes moving to Nucleus solutions we faced a commitment of about £12M per scheme of £36M involvement.

I was anxious that what we learned on one scheme was passed to the next and it seemed logical that the benefits of the learning curve were better kept in-house rather than dissipated between 3 outside design groupings.

I am now faced with
3 Nucleus first phases;
2 to run close together — Macclesfield and Chester, the third Southport to start after these two;
I want to stagger the design peak on in-house resources and cash flow demand by about 1 year;
I am committing £36M of public money and I want to ensure that the

building design processes are managed effectively and there is internal feedback on the building techniques.

Looking at my criteria I see they fit the need for Management Contracting:

complex projects;
phasing of design/build programme; timing is significant.

How do we convice the Department?

Well you never ask the Department for what you want but if you ask for two you might get one. So we proposed Management Contractors on Macclesfield and Chester. They conceded Chester, but Macclesfield is to be orthodox lump sum.

They imposed certain restraints:

70% of sub-contract packages had to be in a firm tender before starting on site, which loses some of the time flexibility of Management Contracting;
a full study would be carried out by their appointed Consultants to compare Chester and Macclesfield.

We shall have completed our Nucleus before they finish their study but we all recognise the Departmental parachute. This suits us nicely because it now provides the 12 month lead time I have been looking for

Chester first;
Macclesfield second;
Southport third.

Just to keep my Departmental Heads on their toes I persuade them to make Macclesfield contract a little bit different, a little bit special. There are no nominated sub-contractors, let the Main Contractor choose from approved selected trade lists. This proposal also throws a spanner into the departmental study which is supposed to be between Management Contracting and Orthodox Lump Sum Contracts.

How do the two schemes compare?

	Chester	Macclesfield
Appoint Management Contractor	June 1977	
Site Preparation Contract		September 1979
Construction Start on Site	Oct. 1979	March 1980
Completion	Jan. 1982	March 1983

Both have gone exceptionally well and finished ahead of Contract Completion Date. In the duration of the Chester Nucleus Contract there were two interesting developments to demonstrate the flexibility of the Management Contract. The first concerned Chester Nucleus itself.

In September, 1980 the local Consultants in Chester banded together and virtually hijacked the Chester Nucleus. Having got all the bits of paper the PAC requires the local consultants decided they could not after all operate the Phase I without a firm commitment that Phase II would start immediately! They argued that they would be operating on acute services on 3 sites in Chester and they now couldn't do this. There was some substance in their case but no more than when they had agreed the brief in 1977.

We managed to agree a compromise solution. By re-scheduling some capital works we could finance a 120 bed template to extend the Phase I, and this new work became Phase IA. The Consultants would only accept this proposal if work was actually in progress when they moved into Phase I, and if Phase IA was to be completed within a year of their occupation.

Here we see the flexibility of Management Contracting. We could not have produced a design, contract documentation, and let a contract in the time they required for a start on site. But we agreed with the Chester Management Contractor that he would build Phase IA on the same contract basis as Phase I, and that all work could be let by competitive bids on identified sub-contracts. By getting site level and sub-structure going initially, and a contract for framework, we have been able to get work started on site as required. The second interesting use of the Management Contract was to solve an urgent problem 30 miles away at Walton Neurosurgery Block.

This is a typical 1960s high technology 3 storey block with full air conditioning.

In 1979 it was discovered that black fibreglass fibres were being blown into the wards and theatres. Fibreglass is not a preferred additive in most brain surgery. A frontal lobotomy with low heat loss is new medicine.

The problem was traced to deterioration of fibreglass damping material in the 100 mixer boxes. This material had of course been blown through all the ducting. The AWO had the job of taking out and replacing 100 boxes, cleaning out the ducting, and keeping the block in service.

The 3 storeys had to be done floor by floor, and four theatres had to be done in one month of low activity in June. Six months was wasted whilst the AWO convinced his Treasurer and the Department that he couldn't do accurate bills to let a lump sum contract. Then a target cost idea was floated by some committee clerk, and that hare took time to lay!

Almost a year was wasted trying to get a form of contract agreed, and then the matter was referred to Region in December, 1979. The work had to start in January to get experience of the job so that we could be sure we could complete the theatres in June.

We convinced the Department that we had had open competition in the Chester contract, and persuaded them to let us use the whole Chester Contract and Management Fee as the head contact for the Walton Neuro. job.

Bovis were on site in January and the programme drawn up and priced by the month end. Having pre-ordered some mixing boxes as standby we had material to work with, and with tight production control completed the programme in 6 months, and cleaned the theatres as required in June.

The success was due to the availability of well trained and motivated staff who had learnt the intricacies of hospital air conditioning on the Royal Liverpool Hospital and Chester and who could manage the Walton Neuro. contract.

With these successes behind us we have decided to use Management Contracting on our next Nucleus at Southport. Classically, because they have had so much time available, the briefing process has covered every idiosyncracy of any Local Consultant's whim. Naturally it has overrun its programme, and squashed the Design Team's available time into an unacceptably narrow slot. The site problems were difficult — soft alluvium deposits and local authority tips.

To hold our programme and give us the flexibility we require, Management Contracting will let us hit a Summer window on the site-fill and piling contract in Summer next year.

By this time we shall have feedback from about one year's use of the Chester and Macclesfield Nucleus, and I hope make Southport a better job for that.

I think the Management Contract offers benefits when the criteria I have defined are applied. It probably covers two ends of the spectrum. At one extreme the major developments, and at the other end the complex refurbishment which is extensively used by the PSA. But of course what the PSA does today the Department will put off tomorrow.

Product News

Health and Safety Exhibition

The fourth Health & Safety at Work Exhibition will take place on Monday 28th November to December 1st, at the Wembley Conference Centre.

Advice and education on the various aspects of health & safety will again be a major feature of the show. A series of seminars will be staged in the Whitehall Suite throughout the period of the exhibition on the following subjects:

1. How to select respiratory equipment.
2. Bringing toxic substances under control.
3. Radiological protection for workers.
4. Hazard assessment developments.
5. Noise control in theory and practice.
6. Contractors, suppliers and enforcement of the Health & Safety at Work Act.
7. Handling to prevent injury.
8. Visual display units and health hazards.

Tickets are £30 each plus VAT.

With six months still to go before the doors open, half of the available space is already sold out and options taken on most of that remaining.

Admission will be by ticket at £2.00 each and these are available from the organisers, Maclaren Exhibitions, PO Box 138, Token House, Croydon CR9 3SS. Telephone: 01-688 7788 Telex: 946665, contact Andrew Orbell.

Safer Working Conditions in Hospital Laboratory

A unique combination special stains and cover-slipping bench using *Corian*, a man-made stone, for worktops, and using under-bench extraction has been installed in the histology laboratory of the North Manchester General Hospital. The benchtop, completely fabricated from the tough, non-porous man-made stone developed by Du Pont, represents a major design advance.

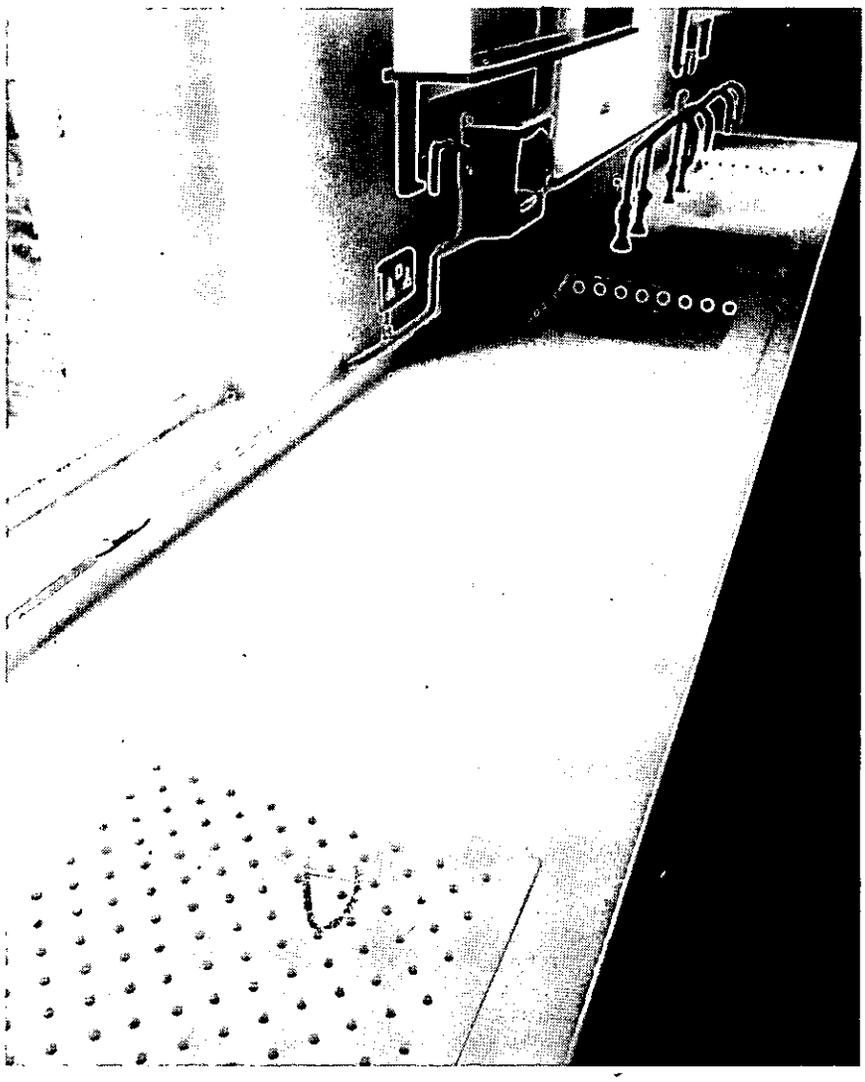
The ability to shape and bond the material was just as important as its capacity to meet all the other HSE requirements. "Trying to work with dissimilar materials means there are always going to be problem junction points. Using one material throughout is much easier.

The design evolved from the experience and ideas gained in the department. Faced with the problem of safeguarding laboratory workers handling volatile toxic liquids (specifically xylene) and other bio-hazardous substances, a worktop was also needed, which would be highly stain-resistant, could provide efficient work flow, and be unaffected by the chemical and cleaners used on it.

The continuous laboratory top incorporates two shallow Corian sinks for slide washing and staining, two removable trays for staining pots with individually controlled extraction beneath, and two flush, perforated section/cover-clipping panels, also removeable with extraction beneath.

All extraction is below-bench with air being drawn off on all four sides of the staining trays, and through the specially phased holes in the perforated cover-slipping panels. Thumb holes permit easy removal of panels and trays for cleaning. The entire benchtop, including the removeable sections and ducting channels below them, have been formed from Corian which

Flush working surface with removable cover-slipping panels and staining-pot trays all fabricated in Corian with under-bench extraction giving safer working environment in the laboratory.



can be cut and shaped like wood.

Corian is available in sheet form, 6mm thick for vertical applications or 13mm and 19mm thick for horizontal use.

Corian is also available in a variety of moulded sinks and basins which can be bonded into sheet material to form worktops with an integral sink or bowl.

The distributor for Corian in the UK is: C.D. (UK) Richmond House, 16 Blenheim Terrace, Leeds, LS2 9HN. Tel: (0532) 439651.

New Colt and Honeywell link

The keys to successful energy saving are effective control and fast payback on the equipment used.

Now Colt International and Honeywell have joined forces to provide heating and ventilation systems with the latest in control technology.

To complement their own energy saving Wastemaster Heating and Ventilation Systems and to improve the performance of existing installations Colt International are now marketing the new Honeywell Micronik 100 Optimiser System. "With 'Wastemaster' already cutting our customers' heating costs in half, the less than two year expected pay back periods and the further energy savings from the Micronik Optimiser mean Colt Systems now make even better business sense" comments Colt Marketing Director, Martyn Wylie.

Centred on a hardworking micro computer which continuously monitors time and temperatures, the Micronik 100 maintains optimum working conditions in offices and factories alike by starting and stopping heating equipment and controlling airflows — exactly when needed.

It learns from experience too — shortening warm-up periods and advancing heating shutdowns to precisely match the weather and thermal characteristics of individual premises. The system can be programmed for up to 12 months with manual override for special requirements — so valuable energy is not wasted on empty buildings.

The efficiency of boiler systems, warm air heaters, radiant heaters, steam plant and ventilation systems can all be improved by applying the know-how built in to every Colt Wastemaster System. The Company claim that they are able to cut heating bills so as to recover the capital investment within two years for almost all Companies with heated premises.

Further details from H. Cripps, Colt International, New Lane, Havant, Hants PO9 2LY. Tel: Havant (0705) 451111.

Steam Boilers for Hospital Services

Ranges of electric, oil-fired and gas-fired steam boilers, with particular applications in hospital sterilizing, laundry and catering services, are being marketed by Twin Industries Agencies Ltd.

Fulton Type EFS electric flash steam boilers are designed specifically to meet the short period high steam demand of hospitals sterilizing equipment. Supplied as completely packaged units, requiring only connection to services, they are available with ratings of 24kW. 48kW. and 60kW. and steam outputs of 80lb, 160lb. and 200lb. per hour respectively. Design is such that, over short periods, they will meet high-demand steam loads which normally would require installation of much larger and more expensive plant. Heat is stored in the boiler water under pressure. As pressure within the boiler is reduced, the water flashes to steam and thus increases the output of the unit over a short period. Steam recovery rate is extremely rapid. Manufactured in accordance with all relevant British Standards, Fulton EFS boilers are fitted with low kW. density elements with solid state water level controls for long trouble-free service. All models measure only 72 ins. high x 35 ins. wide x 30 ins. deep overall, and have stove-enamelled casings with easily removable panels for access to all boiler parts.

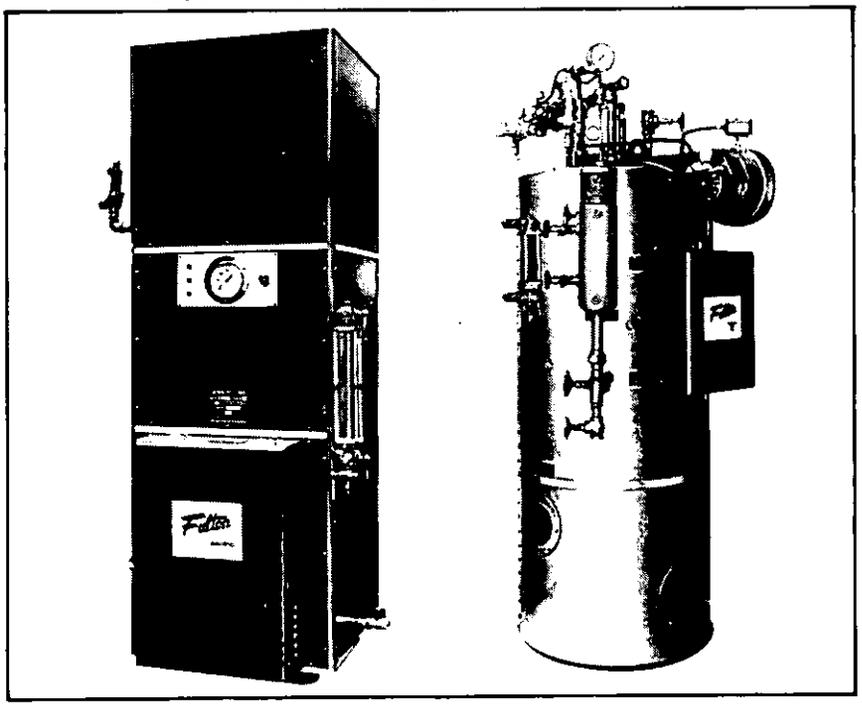
Fulton Series E oil or gas fired steam boilers, for hospital laundry and catering services as well as sterilizing duties, are offered in nine models with steam outputs from 140 lb to 2100 lb per hour at pressures to 125 psig. Fully automatic in operation, these boilers require little maintenance or servicing. They

The boilers have no tubes or coils, the steam-raising vessel consisting of an annular steel ring which contains water and provides steam space above. Water level is controlled automatically to ensure that water is in contact with all furnace surfaces

In operation, the burner sends a slow spiraling flame down the entire length of the furnace, allowing maximum heat absorption. When the hot gases reach the bottom of the furnace, they turn upwards to make a second complete pass around the outside of the shell. Heat remaining in these gases is transmitted by convection and conduction into the pressure vessel, giving such high efficiency that a full head of steam is achieved in 7 to 15 minutes.

Further enquiries: Stoneyard Works, Park Street, Camberley, Surrey. (Tel. Camberley 0276 26152).

Fulton boilers, left, electric fired, right, gas fired.



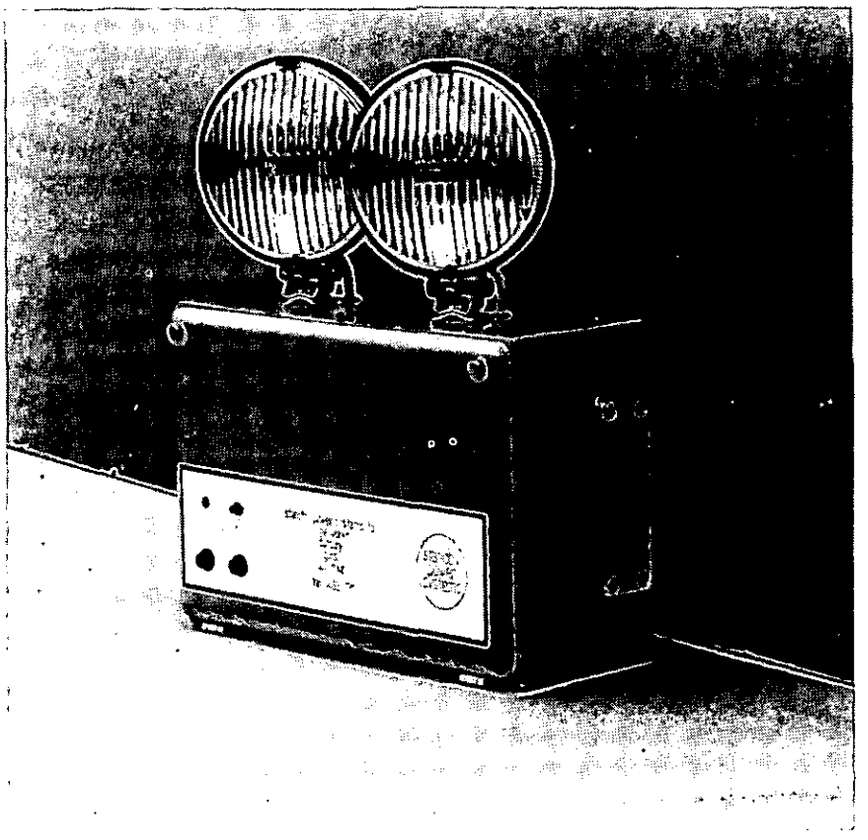
Improved maintenance facilities in emergency luminaire

Standby Power Systems Ltd, a subsidiary of Mawdsley's Ltd, has modified its Hi-Lyta tungsten emergency light to provide improved facilities for maintenance. The Hi-Lyta consists of a power pack with its own in-built charger, and two 24W tungsten spot or fog lamps. It is ideal for premises where exit routes need to be well-lit in the event of a power failure. The Company can also fit 36W tungsten or 55W halogen lamps if required.

The new model has a drop-down front to provide easy access for maintenance, and an integral gear tray which can be easily removed if necessary. It can be mounted direct on to a wall without the need for brackets. A 12V battery will power the lamps for 3 hours.

Where the general lighting is of the MBFU type, a solid state timer can be fitted to the Hi-Lyta so that the lamps remain "on" after the mains has been restored until the general lighting has reached its full intensity.

Further information: Mawdsley's Ltd, Zone Works, Dursley, Glos. Tel: 0453 4131 Telex: 43128.



The improved SPS 2 x 24W HI-Lyta emergency standby luminaire is fitted with a drop-down front cover to increase accessibility and has an easily removable gear tray.

Classified Advertisements

APPOINTMENTS AND SITUATIONS VACANT

UNIT WORKS OFFICER

SCALE 5

Applications are invited for the above post, based at Aston Hall Hospital. The post is restricted to existing National Health Service employees and only ex third-in-line officers or above need apply. Salary: £11,825 – £14,069. The Unit Works Officer appointed to this post will be responsible for the Mentally Handicapped/Community/Local Hospitals, Ambulance Stations and Health Centres, within the Unit. The total weighted volume is 271,500 cubic metres.

Applicants wishing to discuss the post should contact Mr C. Marshall, District Works Officer, telephone (0332) 363971 ext. 221. Application form and further details are available from the District Personnel Officer, Southern Derbyshire Health Authority, "Boden House", Main Centre, Derby, DE1 2PH. Telephone Derby (0332) 363971 ext. 253. Closing date: 26th August, 1983. (Ref. No. 473).

Southern Derbyshire Health Services

East Cumbria HEALTH AUTHORITY

ASSISTANT WORKS OFFICER

Grade 2 (£9,262 – £10,966)

(Open To All Suitability Qualified Engineering Staff In the NHS

The particular responsibilities are operations and maintenance, duties include acting as Sterilizing Engineer, energy management, and the design and execution of minor new works.

East Cumbria Health Authority provides a service to 180,000 people in a geographically large district, with a District General Hospital, Psychiatric Hospital and eight small peripheral Hospitals.

The post is based at Cumberland Infirmary, Carlisle, situated close to the Lake District National Park, with easy access by road (M6) and rail (Inter City) to the main centres in the UK.

For further information, or to arrange an informal visit, contact Mr. W. I. McLauchlan, Works Officer (Units) on Carlisle (0228) 23444 Ext. 448.

Application forms and further particulars from G. M. Blamires, District Personnel Officer, Cumberland Infirmary, Carlisle, Tel. Carlisle (0228) 23444 Ext. 458.

Closing date for complete applications – 26th August, 1983.

CMi

STERILIZER SERVICES

Division of Consolidated Medical Industries Limited

Vacancies exist for experienced Service Engineers to join a hand picked team of top quality engineers, who will maintain the company's high standard of efficiency and reliability in the maintenance of all makes of hospital and industrial Sterilizing Equipment.

Applicants should be resident in the London area, or the Home Counties and have a sound electrical background as well as a practical knowledge of Electro Mechanical Equipment, preferably in Steam Sterilizers.

An attractive salary if offered together with other benefits including sales bonus and PPP membership, also a company car is provided.

For application forms please apply to C.M.I. Tel: 0990 21379. 5 Rise Road, Sunningdale, Ascot, Berkshire. SL5 0BH.

To place a classified or display advertisement in this journal contact:

Kate Trombley

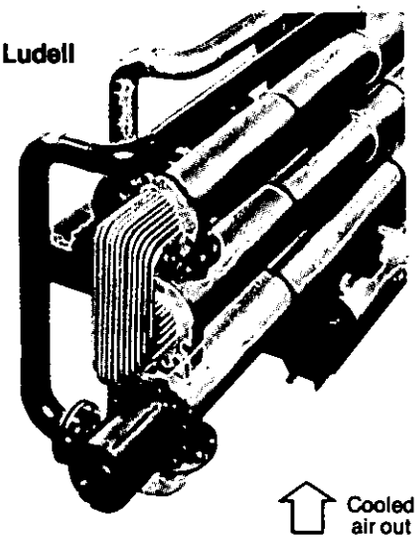
Hospital Engineering, 48 Southwark Street, London SE1 1UN.

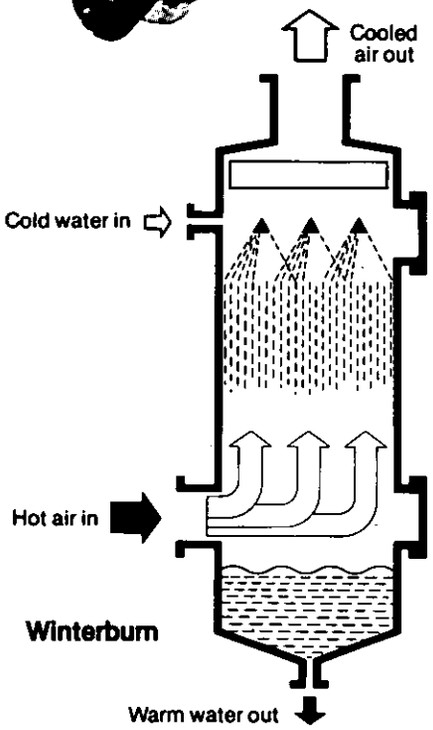
Tel: 01-403 6166

Your first major step in cutting energy costs

Now, more than ever before, saving energy in your laundry is a top priority. Efficient Heat Recovery can cut your energy bill by 40 to 50% – considerably reducing the cost of each piece laundered.

Ludell

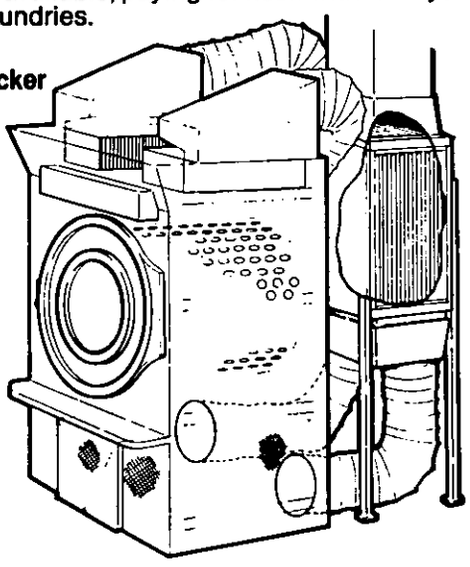




FLS Ludell Waste Water Heat Recovery Systems

- Over 1500 proven installations to date recovering up to 90% of the energy previously going to waste down wash house drains.
- Guaranteed for life against effects of lint and chemicals.
- Self-cleaning twice every hour ensuring maximum efficiency.
- Acknowledged to be the most cost-effective and reliable system available, paying for itself within 1-2 years in most laundries.

Ducker



FLS Ducker Tumbler Heat Recuperators

- Saving up to 40% of steam used by Drying Tumblers and at the same time reducing drying times by 1/3 or more!
- No uprating of fans required due to wide plate spacing.
- Cleaning and maintenance actually reduced compared with unconverted machines.

FLS Winterburn Ironer Economisers

- At last, a low cost and highly efficient spray recuperator recovering around 70% of heat otherwise lost to the atmosphere from the ironer exhaust.

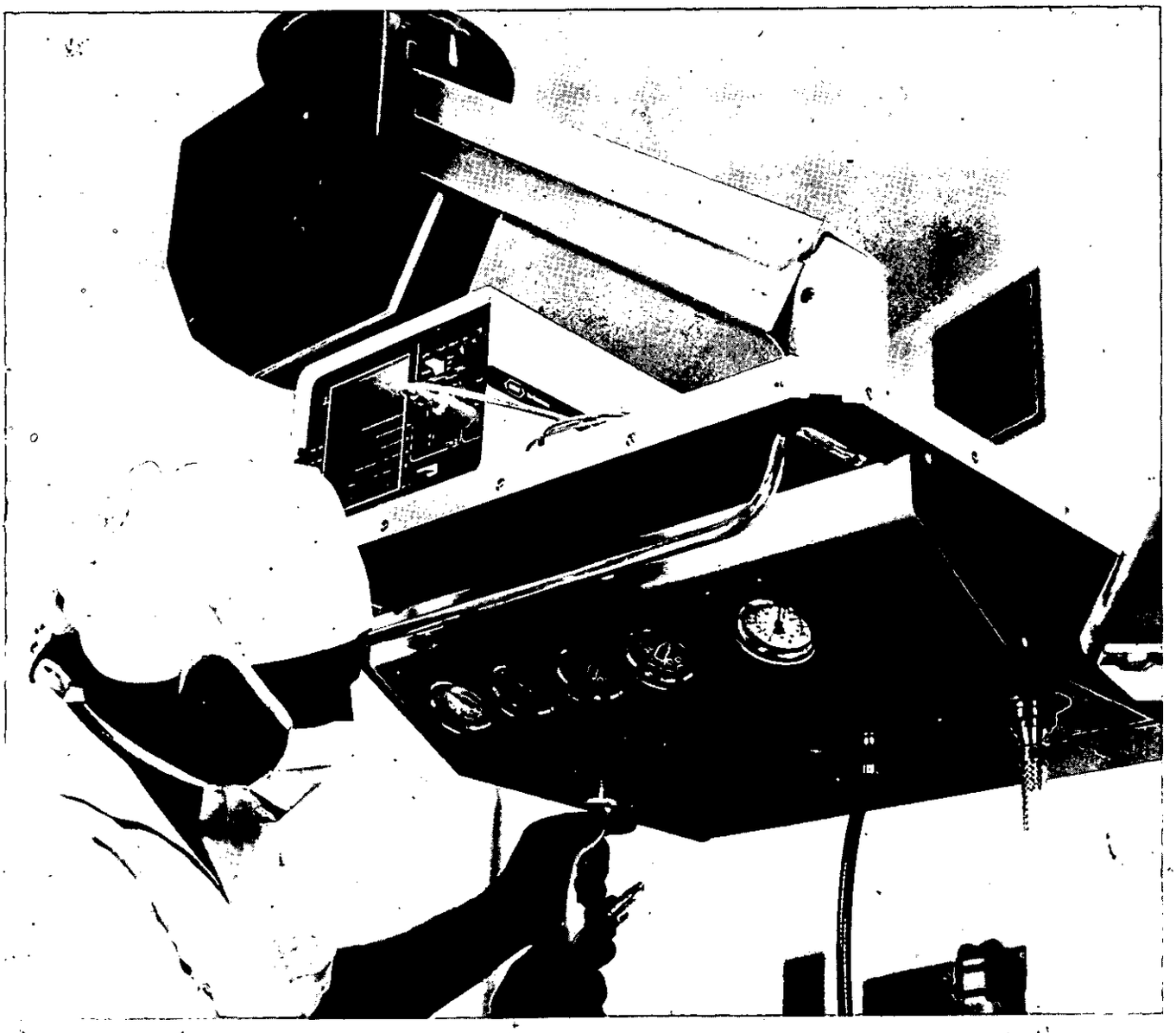
For further details or free computer analysis showing your existing costs and how they can be reduced, simply write, telephone or telex

FUTURE LAUNDRY SYSTEMS LIMITED

Energy conservation specialists to the Laundry Industry.

The Manor House, Bishops Itchington, Warwickshire CV33 0QG.
Telephone 0926-612121 Telex 312326

FLS1.83



The New Star of the Theatre

BOC Multi-Purpose Pendant

A busy operating theatre is no place for yet another piece of equipment, you might think. Certainly, we are as familiar as you are with some of the inherent theatre problems, like overcrowding of equipment, trailing electrical leads and gas hoses, limited working surface and very often as well, limited manoeuvreability.

The New Star we refer to is the BOC Multi-Purpose Pendant and, unlike most ordinary stars of the theatre, ours doesn't attract crowds and overcrowding – quite the opposite.

The Multi-Purpose Pendant is ceiling mounted, with a main arm that rotates through 270 degrees and has power driven automatic retraction, it incorporates up to six gas terminal units plus anaesthetic gas scavenging, and up to 4 single electrical socket outlets, it also offers a table top area for monitoring equipment.

For further information or technical advice, please contact our Staveley Head Office.

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Medishield Pipelines

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