

THE REPAIR OF OXFORD'S HISTORIC BUILDINGS, WITH SPECIAL REFERENCE TO THE DIVINITY SCHOOL AND DUKE HUMPHREY'S LIBRARY

An Appeal launched in 1957 drew public attention to the serious condition of Oxford's soot-encrusted and decaying Historic Buildings. It stressed the urgent need for an immediate and substantial programme of repair without which architectural detail and the very character of so many of these fine buildings would be irretrievably lost. The programme which the Appeal Fund succeeded in implementing covered most of the University's ancient buildings and the ancient buildings of all of the men's colleges with the exception of Merton, All Souls and Magdalen who financed their programmes from their own resources.

To qualify for assistance the buildings had to predate 1800 but an exception was made to this rule in the case of Keble in recognition of Butterfield's work. Eighteen Colleges participated in addition to the most important University buildings which included the Sheldonian, the Old Ashmolean, the Radcliffe Camera and Radcliffe Observatory, the Divinity School and Old Bodleian Library.

The objective in all cases was to cleanse and preserve as much of the original work as was practicable, and where replacement was essential to follow with the utmost integrity the original architectural detail.

Regrettably an appreciable amount of refacing proved necessary. The reason for this can be traced directly to the quality of the stone originally used. Until the early part of the 19th century practically all of the stone for the University and College buildings was obtained from local quarries, mostly from in and around Headington and Taynton. It may seem paradoxical to say that the best preserved masonry in Oxford dates from the early medieval period, whilst the material which is being replaced today had been quarried some three centuries later. The best of the medieval stones — Headington hardstone — has proved the most durable. It was used in the Bell Tower at New College (1396-7) and for the plinth of nearly every ancient building in Oxford. Unfortunately it is no longer available.

The Taynton freestone as used by Richard Winchcombe in the early 15th century work at the Divinity School evidences the high quality and selection of this attractive and durable stone.

The spate of building which took place at the beginning of the 16th century and onwards, coupled with the transition to the sophisticated ashlar faced architecture of the Renaissance, combined to produce a demand which the old quarries were quite unable to meet. Many new quarries were opened at Headington affording

an abundant supply of freestone conveniently close and with consequent low transport charges. Entire Colleges were built or rebuilt in this material including Wadham, Oriel, Queen's and University College. Standards of selection and the quality of the material supplied deteriorated rapidly, and this was discovered at the Old Schools Quadrangle erected between 1613-24 and where the stone used in the ground storey has weathered so much better than in the upper stages. The greater part of the original facing of the lower storey of this building has been cleaned and preserved: in the case of the western internal face of the Old Schools Quadrangle decayed ribs were replaced by setting new material into the original stone. Weaknesses in the staircase enclosures necessitated the introduction of reinforced concrete wall beams and stanchions at each salient angle, all concealed behind the masonry.

The untrustworthiness of the soft Headington freestone came to be appreciated by the beginning of the 18th century and substitutes were sought: Bath appearing in Oxford in 1822. The most durable of these, however, was Clipsham stone from Rutlandshire, introduced by Sir Thomas Jackson in 1877, and later used by him for the repair of the Old Schools Quadrangle.

The Clipsham stone demonstrated its good weathering qualities and was the material chosen for most of the projects in the present operation. The careful selection of the stone at the quarries was undertaken by an Inspector (Mr. Upton) provided by the Ministry of Works.

Various methods were employed for cleaning. The masonry was washed by a rig of small spray jets mounted on the scaffolding and pressurised by small electric pumps. This I think proved the most successful. Care was needed however to prevent the saturation of the walls. Temporary pointing was often found necessary before washing commenced. At the Old Bodleian bronze electrodes were introduced into the jointing of the inner wall faces in strategic positions to enable regular measurements of moisture to be recorded and to alert the operators should penetration occur.

At Merton College Chapel Professor Baker cleaned the two beautiful figures flanking the window in the North Transept by the application of lime poultices. When cleaned the figures were then treated with numerous applications of pure lime water. This experiment in case-hardening the surface of the stone is being kept under observation.

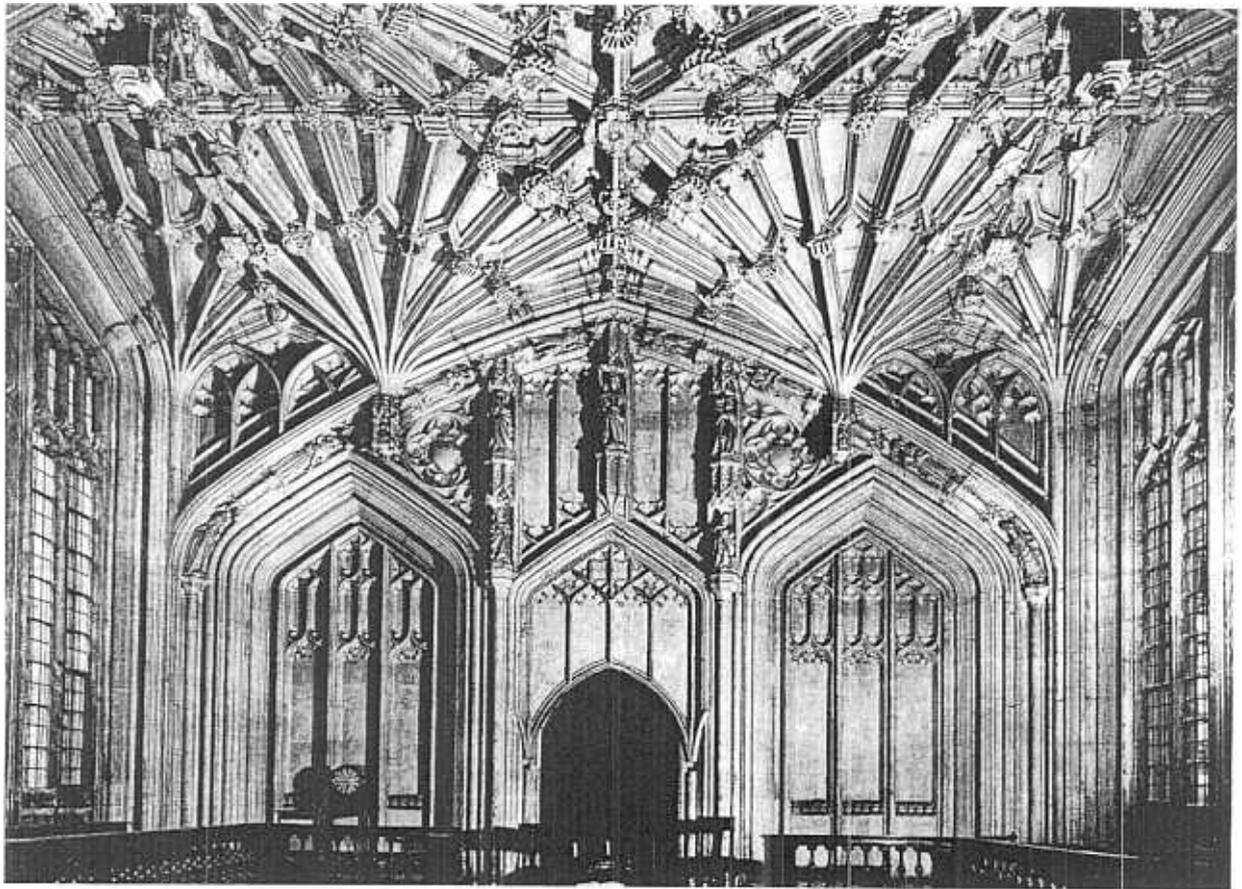


Fig. 1. — The interior of the Divinity School.

Examples of cleaning and repair can be seen in most of the Colleges including the Tom Quad at Christ Church, New College (outer Quadrangle), the Old Schools Quadrangle, the Radcliffe Camera, etc. Appreciable areas of refacing took place at the Sheldonian, Wadham College, the Garden Quadrangle at New College.

One of the most successful examples of refacing is the College Library at Christ Church where Portland stone was used in conjunction with Clipsham. As another variant to Clipsham, Purbeck stone was employed for the roof of the Muniment Room at Merton College.

Towards the latter part of the programme cleaning by dry sand blasting was tried experimentally for part of the Radcliffe Camera and at Hertford and Brasenose Colleges. Whilst this process avoids the saturation of masonry, is more speedy and possibly less expensive than washing, it is not without its drawbacks. It can so easily destroy crisp arrises and ruin carving when applied to soft stone. I found it unacceptable for the Old Bodleian: it is a process which should be used with the utmost caution.

I now turn to the Divinity School where some interesting structural problems were involved. This exceptionally beautiful building became the nucleus of a 17th century complex which now comprises the Old Bodleian Library, the Divinity School, Convocation House and Chancellor's Court. Begun in 1423 it was originally intended as a single storey vaulted Hall of five bays. Progress in its building was slow: it was far from complete when in 1444 the decision was taken to add an upper storey as a new library to house Duke Humfrey's gift of books. It is presumed that the masonry vault was then abandoned for it is significant that the buttresses on the south side of the building were completed without proper bonding. Work continued sporadically for in 1479 the building was still uncompleted, and as it turned out fortunately so, for a generous gift from Bishop Thomas Kempe made it possible to revert to the original project of a vaulted room.

The introduction of the splendid vaulted ceiling by William Orchard was contrived with remarkable ingenuity, and certainly is a masterpiece. It was designed to support light reading lecterns for the chained books.

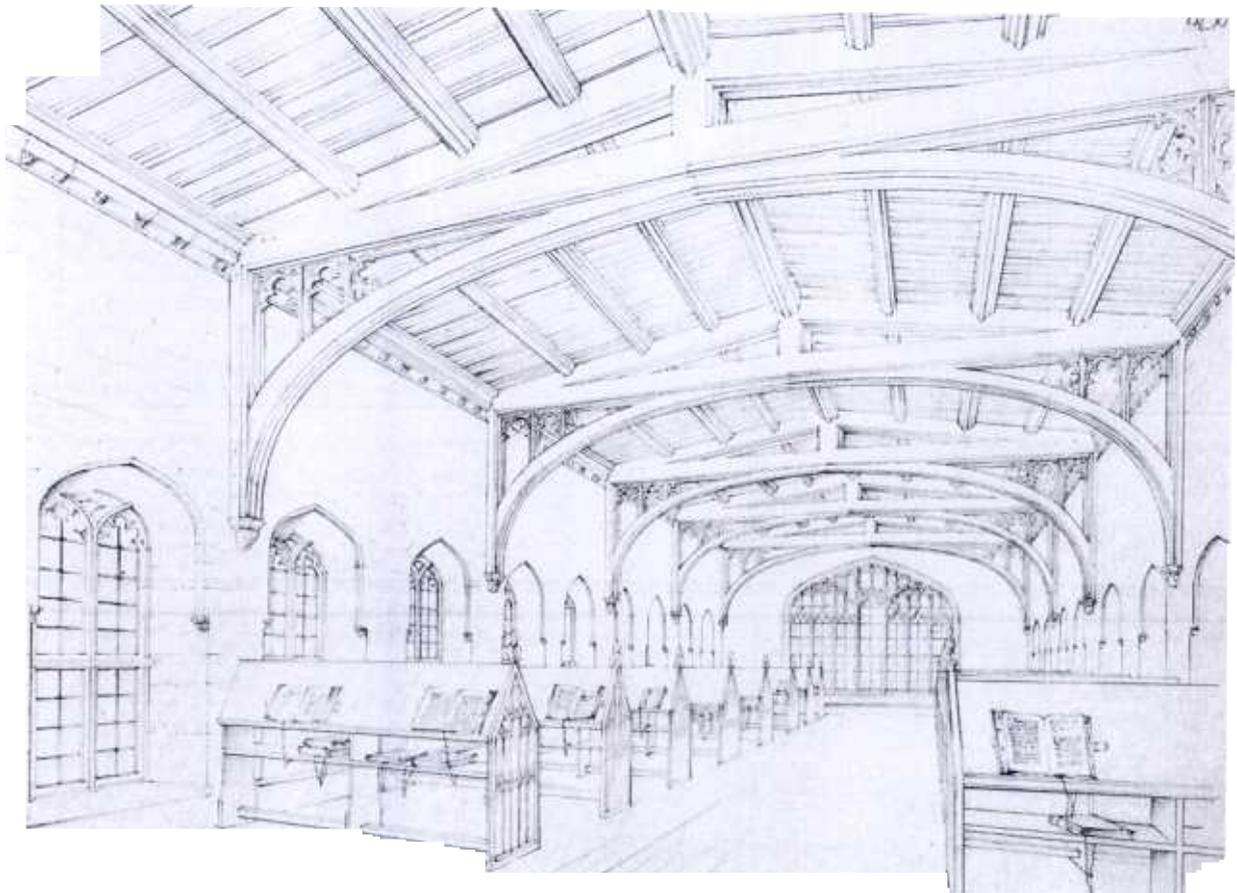


Fig. 2. Probable appearance of the interior of Duke Humphrey's Library in 1488. (Drawing by R. Potter.

A drawing by John Berekblock made in 1566 depicts the form of the building at this date, and it bears a very close resemblance to its smaller counterpart at Winchester College.

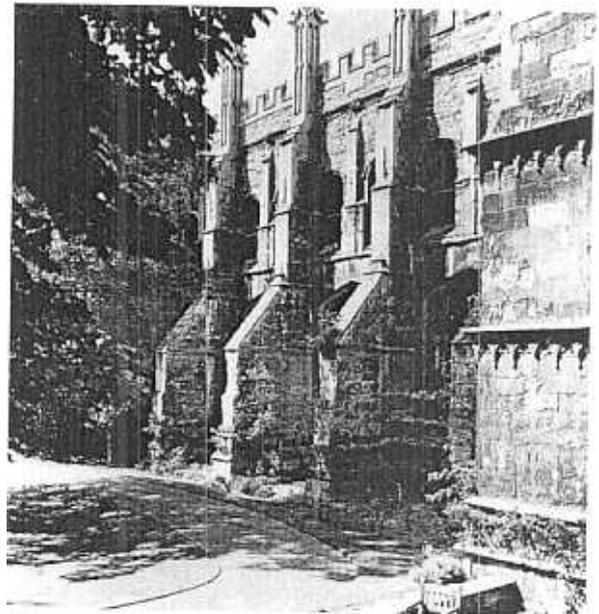
After only some sixty years of service the Duke Humphrey Library fell a victim to the troubles of the Reformation. The books and furniture were dispersed, and for over forty years the building remained empty and neglected ⁽¹⁾.

In 1598 Sir Thomas Bodley undertook "to bring the great desolate room back into use" then to house printed books in huge presses. An increasing demand for additional space resulted in the building of the Arts End Library above the Proscholium and the consequent removal of the east wall of the Duke Humphrey Library. In 1637 a further extension was made to the west with the Convocation House and Chancellor's Court beneath, and the removal of the western end of the Duke Humphrey Library.

To make matters worse galleries were slung from the

⁽¹⁾ "Recent Discoveries in the Bodleian Library" Dr. J. N. L. MYRES.

Fig. 3. — South elevation of Divinity School with Wren's buttress extensions.



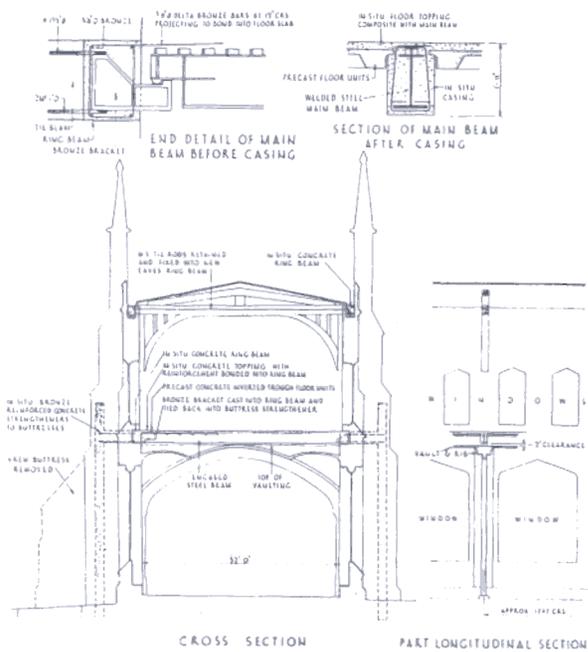
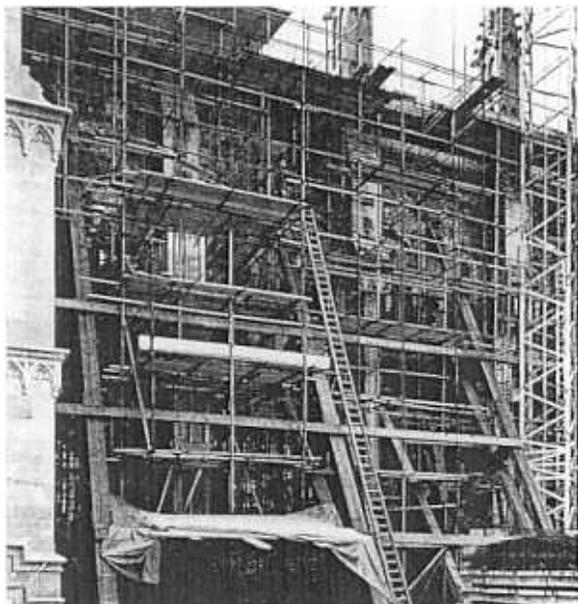


Fig. 4. — The structural reinforcement of the Divinity School (1963-1964). A reproduction from the Engineer's drawings embodying the Architect's proposals.

Fig. 5. — Divinity School. Structural work in progress.

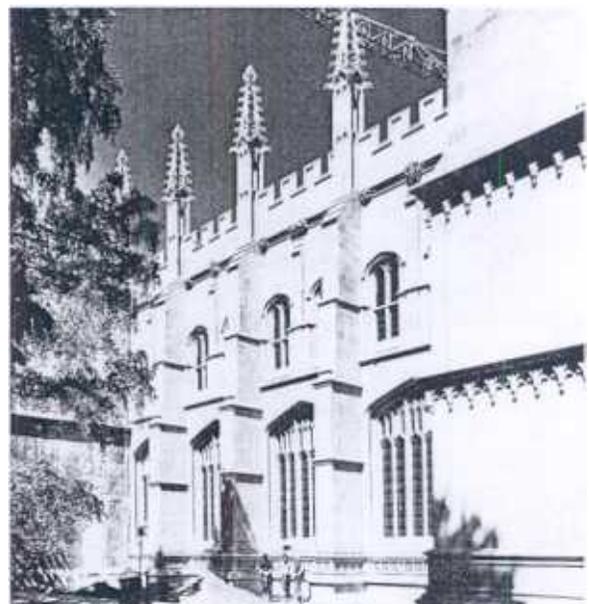


roof over Bodley's bookcases. It is hardly surprising that this drastically weakened and grossly overloaded structure began to fail. The south wall which had been founded over rubbish pits inclined outwards. Sir Christopher Wren who was called in in 1700 devised a system of iron slings to ease the weight of the bookcases from the vaulting, and added extensions to the buttresses on the south side of the building mounted upon ramping arches.

This reinforcement appears to have been reasonably successful but it by no means cured the trouble for in 1877 Douglas Galton, an eminent Engineer, was consulted. He removed the galleries from the Duke Humphrey Library and reconstructed the floor using composite girders of oak trussed with iron. The subsequent advent of a piped hot water heating system caused the timbers to shrink and the girders to sag with the result that the heavy book presses were once more bearing upon the delicate masonry vaults. The floor indeed flexed like a bridge, and the constant powdering from the jointing of the vaulting beneath evidenced movement in the masonry.

To remedy this distressing state of affairs I proposed in my report to the University in 1959 that the structure should be reinforced with an H-frame; reinforced concrete stanchions being formed in the buttresses and linked with new tie beams forming an integral part of a reinforced concrete floor. This proposal was confirmed and developed by Mr. E.W.H. Gifford, the Consul-

Fig. 6. — The restoration of the south elevation of the Divinity School completed.



ting Engineer, and it will be seen from his drawing how the elements and connexions were contrived (?).

A contract was arranged with Messrs. Benfield & Loxley and a crane installed to service all sides of the building. The removal of Bodley's bookcases revealed the shadows of the former lecterns in the Duke Humphrey Library.

The first task was the introduction of the reinforced concrete lateral wall beams to provide a seating for the girders spanning the vaulting and connexions for the stanchions. The underpinning of the masonry was executed in short lengths with precast concrete props which were cast into the beams. The steel girders were introduced through the windows with the aid of a specially contrived trussed girder for no loading whatever could be permitted on the vaulting. The lower part of the buttresses were taken down and rebuilt to accommodate the concrete stanchions which

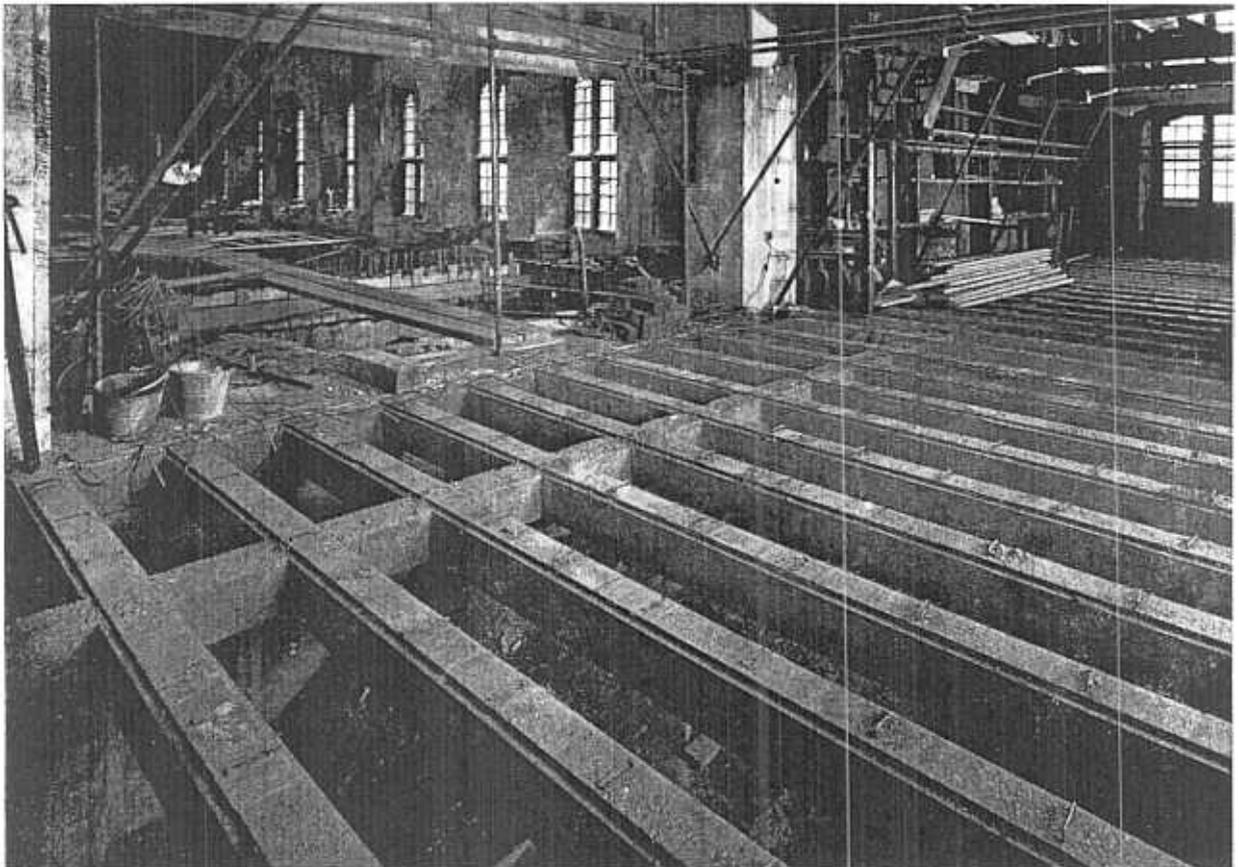
were reinforced with bronze metal. The decaying Wren buttresses had served their purpose and were no longer required, but the «ramping arches» were preserved and remain below ground level. The south elevation overlooking the Fellows Garden of Exeter College was thus restored to its original appearance. But this was not the end of the structural problems for it was discovered that the delicate fan vaulted ceiling over Convocation House was also showing signs of distress. Here again heating engineers with reckless abandon had cut deep chases into the timber floor beams which supported the massive Selden End Library. It is little short of miraculous that their amateur props built directly on to the thin masonry vault panels did not bring about a total collapse.

As a result a new floor was constructed with reinforced concrete precast beams, and a similar floor provided at the Arts End. All of these floors were provided with traps to permit the examination of the vaults.

The galleries, staircases, cornices and wall fittings in the Selden End Library had undoubtedly been disturbed when the floor was removed for the introduction of the

) E. W. H. GIFFORD & Peter TAYLOR.

Fig. Introduction of the reinforced concrete floors above the vaults



aforementioned masonry vault over the Convocation House which replaced a plastered ceiling, and flying galleries had been provided across the end windows. It was decided to effect a restoration based upon a drawing made by David Loggan in 1675.

New staircases were concealed behind the wall fittings to afford access to each gallery, cornices were replaced and the coffered ceiling received a number of salvaged decorated contemporary panels. Structural repairs were executed to the roof and concrete wall beams introduced beneath the wall plates. The decayed ends of beams were reinforced with epoxy resin and secured with steel reinforcement.

A generous donation towards the end of the project enabled the cleaning and repair of the painted panels in the Duke Humphrey and Arts End ceilings, this work being undertaken by Mrs. Eve Baker and her Assistants.

Many important discoveries were made concerning the evolution of the Divinity School and Duke Humphrey Library during the building operations, and these have

been fully described in "Recent Discoveries in the Bodleian Library" presented as a paper to the Society of Antiquaries by J.N.L. Myres, Esq. Ll. D., D. Litt., D. Lit., F.B.A., Director Bodley's Librarian 1947-65⁽³⁾.

The conversion of the Proscholium as the principal entrance to the Old Bodleian Library was the final work to be undertaken. It involved the cutting of new doorways to give access on to existing staircases and the necessary furnishing.

I regret that in this short paper I have been merely able to touch upon so few projects included in the programme. I would, however, draw particular attention to the work at the Sheldonian Theatre and Radcliffe Camera. Mr. Arthur Llewellyn Smith, one of the Architects concerned, will be describing this to the Conference during a site visit.

⁽³⁾ Copies are obtainable at the Old Bodleian Library

Fig. 8. Duke Humphrey's Library after restoration (1964).



The structural reinforcement of the lanterns to Hawksmoor's Twin Towers at All Souls College will be of interest, and this is described in a paper given to the Institute of Structural Engineers by the Consulting Engineers, Mr. E.W.H. Gifford and Mr. Peter Taylor⁽⁴⁾.

Among the works to the interior of buildings I would particularly draw attention to the restoration of the decorated ceiling in Lincoln College Chapel.

A record of the entire work resulting from the Appeal and other projects undertaken simultaneously is at present being prepared for publication, and it is hoped that in addition technical data, which it will not be possible to publish, will be deposited with the Bodleian Library.

In retrospect the poor quality of the stone used in the 17th and 18th centuries has undoubtedly been a

prime factor in the need for the present programme of restoration. The rate of decay of the masonry has been appreciably accelerated by atmospheric pollution, and as Clean Air Acts may abate a carbon content in smokeless zones, no steps have so far been taken in this country to deal with the ever increasing menace of fumes from internal combustion engines. Research in this field, both as regards the survival of man and his buildings, cannot therefore be too strongly advocated.

Robert POTTER
F.R.I.B.A., F.S.A.

(4) *The Structural Engineer*, Vol. 42, n° 10, October 1964.

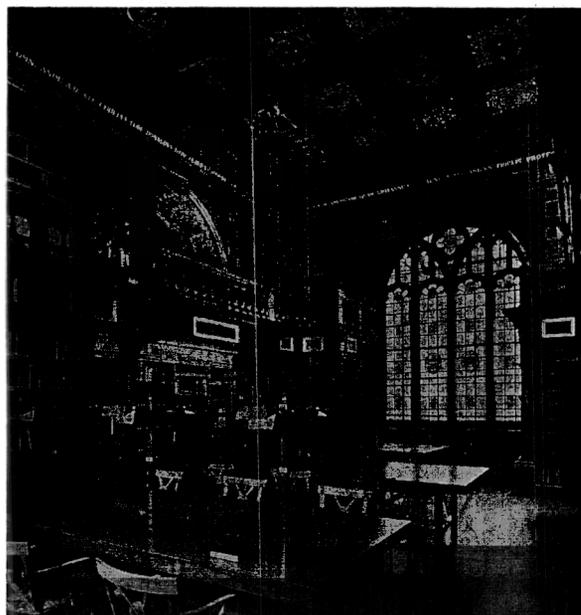
Fig. 9. — Selden End Library prior to restoration.



REFERENCES

- ARKELL W.J., "Oxford Stone", Faber & Faber.
 MYRES J.N.K., LL.D., D. Litt., D. Lit., F.S.A., "Recent Discoveries in the Bodleian Library".
 GIFFORD E.W.H., B. Sc., M.I. Struct. E., M.I.C.E., Peter TAYLOR, B. Sc., A.M.I.C.E., "The Restoration of Ancient Buildings", in "The Structural Engineer", Vol. 42, n° 10, Oct. 1964.

Fig. 10. — Selden End Library after restoration (1963-1964). (Thomas-Photos, Oxford.)



THE DIRECTION OF THE WORK

Project	Architect/Surveyor in Charge
UNIVERSITY BUILDINGS	The University Surveyor, J. Lankester, M.A., A.R.I.C.S., A.M.T.P.I.
The Clarendon Building The Radcliffe Camera (Basement) The Botanical Gardens Holywell Music Room The Sheldonian	Dr. W.G. Allen, D. Litt (Oxon) M.A., F.R.I.B.A. A. Llewellyn Smith, M.B.E., M.A., F.R.I.B.A.
The Radcliffe Camera (Exterior) The Old Ashmolean The Divinity School Convocation House and Old Bodleian Library The Radcliffe Camera (Interior) St. Mary's Church	Robert Potter F.R.I.B.A., F.S.A. W. Emil Godfrey, M.A., F.R.I.B.A., F.S.A.

COLLEGES

All Souls	T.A. Bailey, M.B.E., M.A., F.R.I.B.A., F.S.A.
Balliol	Geoffrey Beard, A.R.I.B.A.
Brasenose	Gerald Banks F.R.I.B.A., Dip. Arch. Liverpool R.B. Gray, F.R.I.B.A.
Christ Church	E. Playne, D.S.C., F.R.I.B.A., A.A. Dipl.
Corpus	R. Tatchell, M.V.O., B.A. (Arch), F.R.I.B.A.
Exeter	K. Stevens, F.R.I.B.A.
Hertford	R.B. Gray, F.R.I.B.A.
Jesus	T.E. Fathers, F.R.I.B.A.
Lincoln	K. Stevens, F.R.I.B.A.
Magdalen	The Estates Bursar
Merton	The Estates Bursar
(Muniment Room)	Robert Potter, F.R.I.B.A., F.S.A.
New College	G. Beard, A.R.I.B.A.
Oriel	The Estates Bursar
Pembroke	Peter Cleverley, F.R.I.B.A.
Queen's	K. Stevens, F.R.I.B.A.
S. Edmunds Hall	K. Stevens, F.R.I.B.A.
S. John's	Sir Edward Maufe
University College	R.B. Gray, B. Arch, F.R.I.B.A.
Wadham	H.G. Goddard, D.S.O., D.F.C., A.F.C., F.R.I.B.A., M.A.
(Staircase No. 9)	Robert Potter, F.R.I.B.A., F.S.A.
Worcester	W. Emil Godfrey, M.A., F.R.I.B.A., F.S.A.

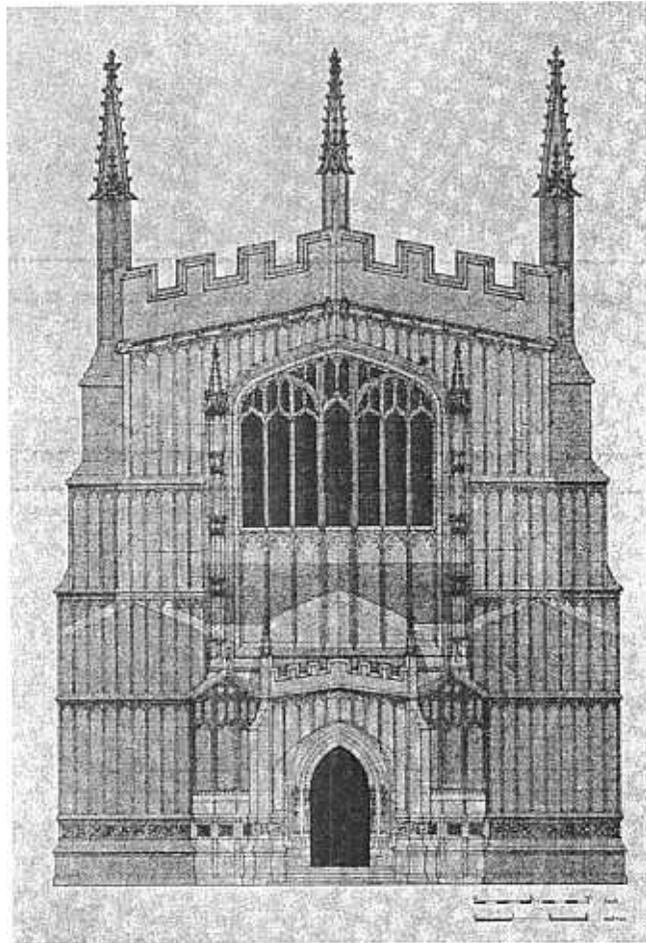


Fig. 11. — A reconstruction of the cast facade of the Divinity School and Duke Humphrey's Library. (Drawing by R. Potter.)