A Typical Archival Conservation Laboratory

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The intention of this article[1] is to set down some of the factors in Conservation laboratory design as they have developed in Australian Archives.

I have not attempted to describe a full scale research laboratory for archival conservation. This is certainly needed in Australia but the aim of the present article is to offer a practical guide to small institutions setting up a practical conservation laboratory[2].

I should say at the outset that of what follows very little is my own original work. It relies heavily on ideas from and the team effort of my colleagues in the Repository Management Section of Australian Archives.

The Australian Archives over the last few years has planned and had constructed purpose-built repositories in Sydney, Darwin and Perth and made modifications to existing repositories in Adelaide, Melbourne and Brisbane. A new repository in Canberra is due for completion in late 1980.

In each of these building projects a conservation laboratory has been included. Each is an improvement on its predecessor. This programme will culminate in the National Archives building in Canberra for which the conservation laboratory is being designed at the moment. This latter building will have had the benefit of the design and setting up of a wholly new, temporary, conservation laboratory at Fyshwick, a suburb of Canberra, the initial design of which was carried out by a previous employee of the Australian Archives, Ms Rosemary Millar, and completed by our present conservator, Mr Murray Millar. This workshop is to be used by Canberra conservation staff until the National Building is completed some time in the 1980's.

SITE FOR THE LABORATORY

In an ideal world the archivist would be able to construct a new laboratory as part of a new, air-conditioned repository. Those of us who

have been lucky enough to integrate a laboratory into the overall design of a repository are no doubt extremely rare. To do so enables the siting to be done in relationship to the records assessing area and the fumigation/airing room complex[3]. It is more usual for the archivist to have to modify some other area, often pathetically unsuitable like a cloakroom or storeroom (or in one case I know — a toilet block). Whatever the position chosen or forced by circumstances onto the archivist, one golden rule remains: it cannot be too large. It seems inevitable that no matter how adequate an area appears in the planning stages it will shrink rapidly when furniture, fittings and the multitude of equipment conservators now require, appears on the scene. The minimum area necessary to cover the activities mentioned in this article is 320 sq.m. However the rule of 'the larger the better' should always apply.

A conservation laboratory must be close to the main records and storage area and if possible on the ground floor of the building. Much of a conservator's work is associated with monitoring the environmental conditions of a repository and he will frequently be called upon to inspect and perhaps undertake emergency treatment of new accessions. It should therefore be in close proximity to a fumigation chamber and airing room.

DOORWAYS

These must be wide enough to permit the free and regular passage of loaded trolleys and the movement of benches and pieces of large equipment. Double doors should be provided to the main entrance of the Workshop. All doors giving access to the laboratory must be fire rated.

Doors should be close fitting, but should not require a sill that would impede the passage of trolleys. They should be self-closing but capable of being kept open to allow uninterrupted passage where necessary.

No door should have a grill or other opening that would allow the passage of air. Fumes must not be allowed to enter other parts of the building from the laboratory. All exit doors must swing in a direction consistent with the direction of flight in an emergency. If possible, steps or stairs should be avoided at the point of egress from the laboratory.

LIGHTING

A conservation laboratory should be supplied with good natural lighting and adequate artificial, usually fluorescent lighting. However the natural lighting should not be direct and if the windows can be ultra-violet light filtered so much the better. The fluorescent tubes must certainly be U/V protected either within the tubes themselves, such as Philips TL 37RS, or with added perspex filters. In effect each tube should be filtered to cut off light of wave length shorter than 400 nm.

Emergency lighting must be provided nnd designed to come on in the event of a general power failure and/or fire alarms being activated. Exit

signs should be illuminated over doorways leading outside the building. Emergency lighting should be installed in all separate areas, such as darkrooms and stores.

All fluorescent lamp ballast units should be individually fused and all wiring should be mineral-insulated copper sheathed cable with screwed joints.

FLOOR

The floor should be surfaced with terra-cotta tiles or some similar finish which will enable hosing down to take place and which will not be affected by spilt acids. It should have a number of waste drainage holes. If it is not practical to surface the whole floor in this manner then a 'wet area' can be installed around work benches.

SAFETY SHOWER AND EYEWASH STATION

This is an essential element in any laboratory no matter how small and, if necessary, other equipment should be sacrificed in its favour. This equipment consists of a deluge shower and eyewash apparatus fitted with a large handle. Its purpose is to douse burning clothes and wash off acid or caustic solutions accidentally splashed into eyes or spilt on clothes and the body. It must be situated in a prominent part of the workshop with uninterrupted access. These units are available commercially.

FUME CABINET

These are now considered essential when fitting out a conservation laboratory. They consist of a rectangular cupboard with a sliding glass door and a fan-assisted vent out of the cabinet into the atmosphere. They are available commercially, with or without a sink with hot and cold water. Our latest designs also incorporate a deionised water supply.

Any experiment or conservation processs which gives off noxious fumes should be conducted within a fume cabinet. Processes such as non-aqueous deacidification must also be carried out in a fume cabinet.

One cabinet is suitable for a small workshop. The ratio should be one fume cabinet for every three conservators. They should be located away from doors and windows.

OFFICES

A common fault in the design of conservation workshops is the lack of an office for conservation staff to maintain their records, undertake the considerable clerical work associated with their job, converse with representatives, interview staff and the like.

The office or offices, depending on staff numbers, should be large enough to be fitted with a desk, filing cabinet, bookcase,visitors' chairs and wall charts. Half-timber, half-glass walls allow supervision of the main work area.

STORES

Dry materials such as acid free paper and board, laminating tissue and book binding leathers need to be stocked in considerable quantities. The supply is usually from overseas and ordering and shipping delays can be most inconvenient.

A chemical/flammable liquids store is also necessary. In a small workshop one of the readily available fireproof chemical cabinets is suitable. In a larger establishment a separate chemical store with adequate automatic chemical fire protection will be necessary. Local chemical storage and fire regulations in regard to venting to the outside and fire protection will need to be complied with.

PHOTOGRAPHIC AREA

Photography is an integral part of the work of the conservator. Archival items are photographed before, during and after treatment to keep a visual record of the effects of various sorts of treatment of records. More specialised uses of photography include the reading of faded or burnt documents by ultra-violet light and studying the effects on archives of various chemicals. Therefore, a photographic room where a camera and lights can be set up and a dark room equipped with processing tanks and drying racks is necessary. Both rooms will require flash proof power points and the dark room will need a light-trap.

AIR CONDITIONING

It is to be hoped that the whole repository will be air-conditioned (not, however with electrostatic air-cleaners as these produce ozone which is harmful to paper). However, the air-conditioning system for the laboratory must be separate to that for the building as a whole. Separate outlets must be provided to allow for the escape into the atmosphere of chemical fumes and mould spores. As well, a system is required whereby, in the event of a chemical accident, the room can quickly be cleared of foul air.

All air-conditioning ducts on the delivery side of the fan should be protected by an automatic fire detector of the smoke-sensitive type. The operation of this detector should automatically shut down the air-conditioning system and actuate a damper in the duct to prevent smoke entering the area. A damper should be provided wherever the duct passes through fire-compartment walls or floors.

An alarm system should be installed to indicate mechanical breakdown of the air-conditioning plant.

At least one window should be able to be opened to the outside of the building to provide emergency ventilation and removal of fumes.

EQUIPMENT

Most standard text books on conservation contain lists of basic equipment needed in a workshop[4]. What I intend listing here is the

equipment which must be built in at the time of construction of the workshop.

Light Table

The number of these will depend on the staff size. However, at least one is necessary.

A light table is really just a workbench, in the top of which is inserted opaque diffusing perspex above a bank of fluroescent light tubes. An electric switch should control these tubes. The size of the table will depend on the size of the workshop area available but it should be large enough for the repair of maps, plans and charts.

Deacidification Trough

The process of deacidification is in somewhat of a stage of flux at the moment with various institutions developing mass, non-aqueous methods.[5] The present policy of Australian Archives is to install a large, stainless steel or plastic trough (about 3 metres by 1 metre) with a hot and cold and dionised water supply and drainage system. Above this is constructed a moveable exhaust hood. Plastic, photographic processing trays can be used within this for aqueous deacidification. As previously mentioned, non-aqueous deacidification — such as the Library of Congress' Wei T'O II — must be carried out in a fume cabinet.

Binding Equipment

Depending on the experience of the conservation staff employed and the type of archival material in custody some degree of binding and repair will be undertaken in most laboratories. Hand binding has given way in most printing establishments to highly mechanised equipment. Most of the hand binding equipment on the market at the moment such as presses and guillotines is secondhand and hard to come by. It is therefore worth purchasing this equipment immediately it is found, even if it cannot be used for a few years, as the supply is drying up rapidly. Such items as a lying press can be made by a competent furniture maker if not available commercially. Nipping presses are still available. It is advisable to set aside a separate section of the conservation laboratory or even a separate room, if space and funds allow, for rebinding.

Thymol Cabinet

Even if an ethylene oxide vacuum fumigation chamber is provided for large scale fumigation needs it is advisable to have available a small thymol cabinet. This is an air-tight stainless-steel-lined cabinet in which thymol crystals are dissolved by heat for the treatment of mould infected records. This enables small quantities of records to be treated for mould. Basic designs are given by Kathpalia and Plenderleith and Werner.[6] The Australian Archives has modified the usual design of these somewhat to incorporate a fan-assisted system and timers.

Refrigerator
This is necessary for the storage of certain chemicals and raw film stock. Care should be taken when choosing a suitable model to make sure that the motor is flashproofed. Heavier than air chemical fumes can be dangerous where appliances producing any form of spark are used.

Benches
These should be 900 mm high and about 1000 mm wide and fitted with kneeholes. The bench tops should be made from an acid-resistant material such as Corning's 'Labtop'.

Library Area

Text books and journals are essential to the work of a conservation workshop and, if possible, a small carpeted library area should be provided. This area can also serve as a film and slide projection area and be equipped with a carrel for tape and microfilm use.

Power Points

The array of electric equipment used by the Conservator of today is staggering. This includes PH meters, scanning electron microscopes, blenders, balances, magnifying lamps, stirrers, mechanical convection ovens, stills, lamination presses, muffle furnaces, hot plates, U/V source, print dryers and the like. The workshop will need power points in abundance, at least 6 to a bench. Some should be for 3 phase power to allow the use of heavier equipment such as compressors and power guillotines. Power points in a conservation workshop must be flash-proof and when near the floor must be water-proof.

Overhead power points connected to a running line which can be moved around the room mean that leads need not be trailed dangerously on the floor and are used in some laboratories.

Provision should be made for the emergency cutting off of all power from a single switch in the event of an accident. Power should be automatically deactivated in the event of an accidental earthing of the circuit.

Acid Sump

All drainage from the workshops must pass through an acid sump. This must be approved by the local water and drainage authority who will want to know the type and quantity and dilution of chemicals used. Photographic chemicals should also be included.

Water Supply

Hot and cold plus dionised water should be supplied to every sink. The sinks themselves should be of some material other than stainless steel (such as Xylene) if acid is to be disposed down them.

Air Supply

The conservation department of the new National Gallery in Canberra will be fitted with a dry dust free compressed air system and a compressed air vacuum system with a capacity pulling 16'' mercury vacuum creating a suction pressure of 7 p.s.i.[7]

Whilst these services are not yet installed in any current Australian Archives' conservation laboratory it is intended to install them in the laboratory which has been planned for the new Mitchell repository in Canberra.

Compressed air and a vacuum facility are useful when cleaning dusty or mouldy items. As well, some general chemical processes used in conservation work require a vacuum.

Fire Protection

Heat and smoke detectors plus ''on-off'' water sprinklers are required in a conservation laboratory. The danger of sprinklers going off accidentally is now almost negligible.

At least two 3.4 kg. Carbon Dioxide fire extinguishers must be provided in the laboratory, one adjacent to each exit. No point in the laboratory should be more than twenty-two metres from a fire extinguisher.

There are now available quick-use safety blankets for smothering clothing on fire and small bench fires.

Materials used in the construction and finishing of the workshop should be non-combustible. This includes linings of the ceiling, soffits and walls e.g. acoustic ceiling tiles, paints and varnishers. Synthetic resins with a high flame spread should not be used.

Any soundproof part of the workshop, such as the darkroom and stores, must be equipped with individual alarms notifying fire within the building as a whole.

Escape

No one should have to travel more than 20 metres to a clearly marked, unobstructed escape route.

Conclusion

The Australian Archives has developed plans for a number of pieces of laboratory equipment, including light table, work benches, deacidification trough, equipment stands, thymol cabinet, fume exhaust hood, lying press and an island work bench and storage unit. Copies of these are available to archivists fitting out a conservation laboratory.

I am extremely grateful to Messrs Millar and Corbett for their valuable comments on an early draft of this article.

FOOTNOTES

1. I have made extensive use throughout this article of *Laboratory Construction Code to Provide Safe Working Conditions* 1976, 2nd Edition N.S.W. Government Printer and *Recommendations for the storage and exhibition of archival documents*, British Standards Institution, BS5454:1977.
2. Some idea of what is involved in the design and construction of a full scale conservation research laboratory can be seen from the facilities installed at the National Gallery, London. See *National Gallery Technical Bulletin*, September 1977 for an article by Garry Thomson, John Mills and Joyce Plesters. This article covers the need for an instrument room, controlled environment room, etc.
3. For a description of a typical fumigation/airing room complex see "Fumigating Chamber and Airing Room at Villawood" by Timothy Walsh and Neville Corbett, *Archives and Manuscripts*, Vol. 6, No. 8, February 1977, 376-379.
4. See for instance *Conservation and restoration of archive materials* by Yash Pal Kathpalia, Paris, UNESCO, 1977 (Appendix 5, pp 214-216).
5. Some recent articles on this topic are "Some Aspects of the Conservation Problem in Archives" by Fraser G. Poole in *The American Archivist*, Vol. 40 No. 2, April 1977, 163-171 and "Preparation of Solutions of Magnesium Bicarbonate for Deacidification" by William K. Wilson, Mary C. McKiel, James L. Gear and Robert H. MacClaran in *The American Archivist*, Vol. 41 No. 1, 67-70.
6. Kathpalia, *op. cit.*, p. 54-57 and *Conservation of Antiquities and Works of Art* by N. J. Plenderleith and A. E. A. Werner, London, O.U.P., 1971.
7. Mentioned by the building's architect in his talk to the I.C.C.M. National Conference, Canberra 1976. See p. 103 of the *Proceedings* (edited by S. Walston), Sydney, 1977.

ADDITIONAL READING

Occupational Safety and Health in Commonwealth Government Employment: Code of Practice No. 220 — Laboratories (General): AS 2243; *Code of Practice No. 227* — Laboratories (Photographic). Canberra, A.G.P.S., 1979

Davies, John, *A study of the basic standards and methods in preservation and restoration workshops applicable to developing countries.* Brussels, UNESCO, 1973.