# BUILDING AN ARCHIVES: A CASE STUDY IN SOUTH CAROLINA

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***ABSTRACT:*** The process of planning and construction of the South Carolina Archives and History Center (SCAHC) is examined in light of current literature. This article outlines lessons learned and makes suggestions for further research and analysis. Because purpose-built archival facilities are a rarity, architects must work closely with the archives staff. A new building presents many opportunities and challenges to upgrade the institution's functionality. It must be designed with flexibility for future upgrades and expansions. Based on recent experience the author recommends that archivists document their experiences and create richer literature on the design and building of archival facilities.

## *Introduction*

In May of 1998, the South Carolina Department of Archives and History (SCDAH) opened its new building, the culmination of ten years of effort.[1] The SCDAH project was propelled by a broad upturn in the economy that generated a building boom in public-sector archives in the United States. Several large repositories around the country outgrew their aging facilities about this time. The National Archives' new facility in College Park, Maryland, known in the profession as "Archives II," was the largest; several state archives also built new buildings or major additions, including Oregon, Delaware, Alabama, Georgia, and Mississippi.

When the SCDAH project started the design process in 1995, there was little recent literature available on the planning and design of a modern archival building. The staff consulted the standard works then available in the library literature. Holt (1989) and Godfrey Thompson (1989) deal with elements of library design, such as open stacks and bound materials. But they also cover areas common to archives, including security, staff work areas, loading docks, and reference service desks. Metcalf (1965) is valuable for its emphasis on the budgeting process. Garry Thomson's volume on museums discusses design for noncirculating collections. Only Swartzburg, Bussey, and Garretson (1991) discuss planning a purpose-built facility for archives, but their work concentrates on preservation concerns without much detail about the process of

planning and construction. None of these works deal with the impact of computers on work processes, the growth of electronic records, or a large reformatting operation (either microfilm or digital), all of which are major elements of a fairly large archives organization.[2] NARA published Technical Information Paper (TIP) 13 on specifications for various aspects of its College Park facility, but the paper did not appear until late in 1997—too late to be of use in the planning and construction of the Archives and History Center in South Carolina.[3] Though useful in providing information on specifics of the finishes used in storage areas and the design of a fire suppression system to complement high-density mobile shelving, much of its content is relevant only to Archives II.

Not until 1998—after the Archives and History Center was opened to the public—was a volume published on the design and construction of a modern archival facility: Ted Ling's *Solid, Safe, Secure: Building Archives Repositories in Australia*.[4] This remains the only basic manual that covers the processes of planning, design, construction, and maintenance of a purpose-built archival facility.[5] Libraries have continued to publish on design and construction because they must cope with the growing impact of the digital revolution. Most archival repositories still retain more paper and film than any other media, but as digitization replaces microfilming and the number of electronic records in the public sector increases, archivists must reexamine the design of their facilities to accommodate twenty-first-century formats and Internet access.

## *Design Phase*

Ling's work limited its discussion of a vital step in the process: the development of a budget and securing funding. Ling's text begins with site selection, building structure, and definition of the spaces and functions within the building. This planning effort, he says, leads to a "design brief" used to select the project architect.[6] The first step for SCDAH was to develop a building program, from which a project budget was created. This budget was based on the personnel and functions desired in the new building. An architect used that list to estimate the square footage required, multiplied that figure by standard design and construction costs, and provided an estimated budget of $21 million for the project. The SCDAH eventually secured $18.5 million from the state legislature and began a fund-raising campaign for the remainder.[7]

Development of the building program provides a valuable opportunity for the staff and administration to have serious discussions about their institutional priorities. The organization has to decide which functions are essential to its mission. It must also try to predict which functions will expand or decline in the future. The discussions must lead to strategic decisions, not "wish lists." Since the architectural firm that develops this preliminary building program does not necessarily continue on the project through construction, the institution should establish and document these priorities at this stage of the project, when the pressures of design and construction are still minimal.

Ling referred to the initial planning document as a "design brief." This describes the main building zones to be addressed: records storage, staffing (including conference rooms, libraries, and staff lounges), reference facilities, special services (preservation and microfilming labs), and building services (loading docks, physical plant rooms, and general storage). He listed the details that should be included in the brief: shelving, energy management, environmental requirements, security, and conservation facilities. The SCDAH did not develop its building program to the same level of detail, dealing with these issues only after the project architect was selected, and clarifying priorities as the project developed. The final budget for the SCDAH project was very trim indeed because details regarding equipment and special environmental conditions for the storage areas were not included at the outset. Shelving for the collections was not designated an "essential" element during the early discussions. There was no agreement that costs of purely functional elements of design, such as wiring for Internet access in the conference rooms, would take precedence over "artistic" elements in the design, such as high finishes in an entrance hall outside the auditorium. Developing written priorities during the earliest stages would have provided strategic guidelines as elements were trimmed to meet the final budget.

SCDAH selected a site on free land in the State Research Park, seven miles northeast of the old archives building in central Columbia. The choice resolved several issues. First, it saved a substantial amount of money. The new site lay above the city's extensive hundred-year flood plain, it was large enough for future expansion, and it was in an area free of industrial development and its pollution, reducing the need for expensive gaseous filtration in the HVAC system. It had room for extensive patron and staff parking. Best of all, it offered easy access to the interstate system.

In 1995, the SCDAH reviewed bids from three architectural firms to design and oversee construction of the new South Carolina Archives and History Center. SCDAH selected Helmuth, Obata, and Kassebaum (HOK), one of the world's largest architectural firms and the designers of Archives II.[8] Experience in environmental controls specifically designed for archival collections was considered a critical element in collection preservation. For this reason, the request for proposals required the winning architectural firm to hire a consultant with expertise in the environmental conditions needed for archives; HOK hired William P. Lull of Garrison/Lull, Inc., for the project. Public sector projects are governed by a myriad of regulations, some of which present problems for such an unusual purpose-built facility. While the SCDAH might have been better served by hiring Mr. Lull to advise them directly throughout the project, the state's regulations requiring indemnification of contractors forced SCDAH to hire this consultant through the architectural firm, which was large enough to afford the required insurance coverage. The project manager has to recognize the potential conflict between the architectural team and a specialized consultant and be able to resolve such tensions.

HOK's design team led a series of meetings with SCDAH administration and middle management to produce the "design program," charting the adjacencies of various functions and tracking normal work flow. It set forth the specific space needs for each of the facility's functions and the special requirements for records storage and work areas. HOK's design team then began a lengthy process to develop complete bid-and-build

drawings and specifications. Within eight weeks HOK presented fairly detailed floor plans and elevations laying out the building's footprint and exterior appearance.

This was a critical point in the process, for it established the square footage allotted to records storage. Ling's work implied that most of the client's space needs and priorities would be clearly defined by the time the design architect is on board. In South Carolina's "real world" situation, the client could not firmly establish collection space needs. New shelving was not fixed as an essential element in the budget for the new building, therefore, the design of the shelving was unknown. Without knowing what shelving size and type would be used, it was not possible to accurately determine how much floor space would be needed for collection storage. Although Ling's work assumed the building's budget included shelving—he did list it in the design brief[9]—he did not stress the importance of making this commitment at the beginning of the budgetary process.

The HOK team continued to refine its plans, working with the environmental consultant, engineers, a security consultant, and the SCDAH director and his deputy director of administration (who was project director for the construction). Some architectural firms develop the building design in consultation with a building contractor to keep a running total of potential construction costs. Other firms use in-house staff to develop cost projections. When the design team has to make cuts, they should be guided by the client's priorities for the building's functions.

As the particulars of the SCDAH design developed, specific questions regarding design details were referred through the project director to members of the staff. It is HOK's practice to strictly control the flow of information during this part of the process, passing all communication through the two project directors (one on the HOK side and one on the client's side).[10] Other architectural firms who manage projects, particularly those in the academic setting, encourage wider review and discussion between the designers and the client's staff during the development of these details. Ling pointed out that archivists are the only people with a depth of knowledge about the work flow and specialized purpose of an archival facility, and he also recommended that individuals be allowed to review and comment on the design of their personal work spaces.[11]

## *Construction Process*

Construction began after bids based on the final drawings and specifications were reviewed and a contractor was selected. The construction project team consisted of the architects, the construction project manager, the site manager, and the archives project director. Ling stated a representative of the relevant government body, like the department of works, should be a member of the team. The South Carolina Budget and Control Board, legal owner of the finished building, chose not take an active role in the project team.[12] This decision ultimately had a negative impact on the building's long-term maintenance; their General Services team remained unfamiliar with the design and operation of the building's complex HVAC system. The SCDAH project team also included a member unmentioned by Ling, a move consultant, Facilities Resources, Inc., (FRI). FRI helped select a suitable moving firm and oversaw the

move itself. Their greatest contribution, however, lay in their help with preparing the collections for the move, a process that took 19 months of effort by the archives staff and resulted in much improved access to the collections.

At the beginning of the construction, the project team met to establish a timeline, coordinating completion dates for various phases of construction, for preparation of the collections, and for the move. That timeline was entered into a project management software package; changes in the construction schedule were to be entered into its database and shared with the project team. When considering project management software, the team should choose a package that is familiar to all members of the team and post it on the agency's Web site. Updates must be shared with all team members. When the project database is on the Web site, general staff can stay informed and feel more involved in the project's progress.

Ling did not mention the use of software management packages, though he stressed the need for communication through team meetings and staff review. He also stressed documentation of the construction process, suggesting a diary be kept.[13] The SCDAH project manager held weekly meetings with the architect, the contractor, and subcontractors. He also held less frequent meetings with representatives of General Services, FRI, the SCDAH director, and the various staff involved in the preparations for the move. There are no formal minutes of these meetings in the project records.

Ling's work did not mention publicity regarding the move to a new facility. In South Carolina the agency published announcements in 1997 that it would close for two weeks in the spring of 1998 to move to the new facility. So many researchers who use the South Carolina Archives travel from outside the state that the announcements had to be issued nearly a year ahead of time. This meant there could be no delay in opening the new building.

## *Structure of the Building*

The basic design of the SCDAH project was influenced by HOK's work on the Archives II project; the physical layout distances the public access areas from the staff work areas and record storage.[14] The South Carolina Archives and History Center is a three-story building in four sections. Public traffic is restricted primarily to the first floor of two sections. Access to the second-floor office areas and to labs and records storage is controlled by security codes and proximity keys. The key cards generate a computer log of the identity of the people passing through each locked door.

Security cameras are mounted at every entrance and monitored at the reception desk and at a security station on the third floor. Modeled on the security system of Archives II, SCDAH security initially had only one monitoring station on the third floor. NARA, however, has a full-time security staff that can operate a control room removed from the reception area.[15] The SCDAH added monitors at the main reception desk in order to observe all traffic during operating hours. Within two years of opening the facility, SCDAH conducted a security review. It relocated some of the original cameras and added several new ones. Ling recommends a security survey every 18 months, and ever-cheaper technology makes it feasible to add new equipment.[16] In addition,

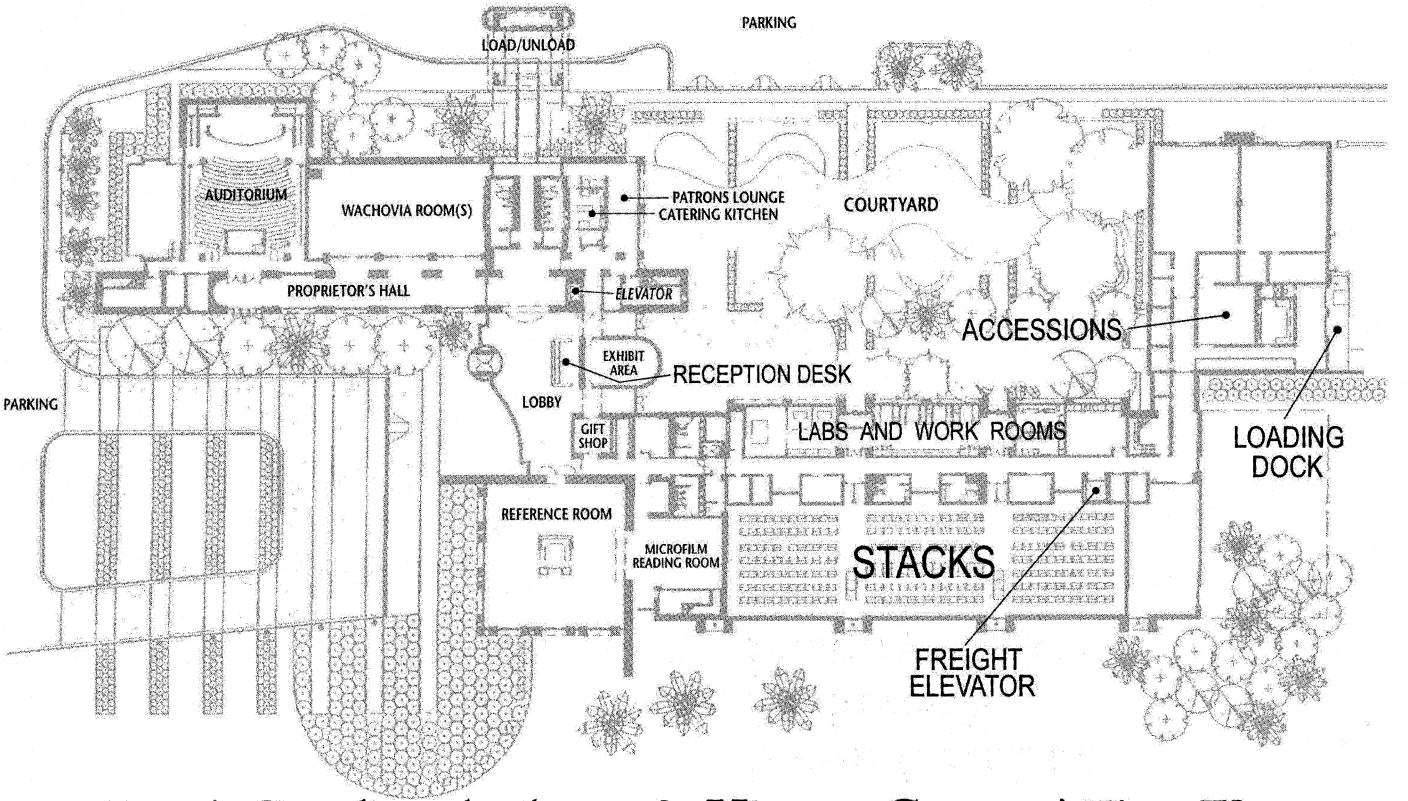
the SCDAH periodically reviews the log of staff access to record storage areas, and updates staff authorizations.

The lobby and reference room are three-story-high open spaces. The reference room and most office areas have natural light from broad expanses of windows.[17] The lobby at SCDAH mimics that in Archives II, with its glass front and visitor's reception area. The glass walls in both lobbies flood the reception areas with blinding sunlight most mornings, interfering with receptionists' view for a few hours each sunny day.

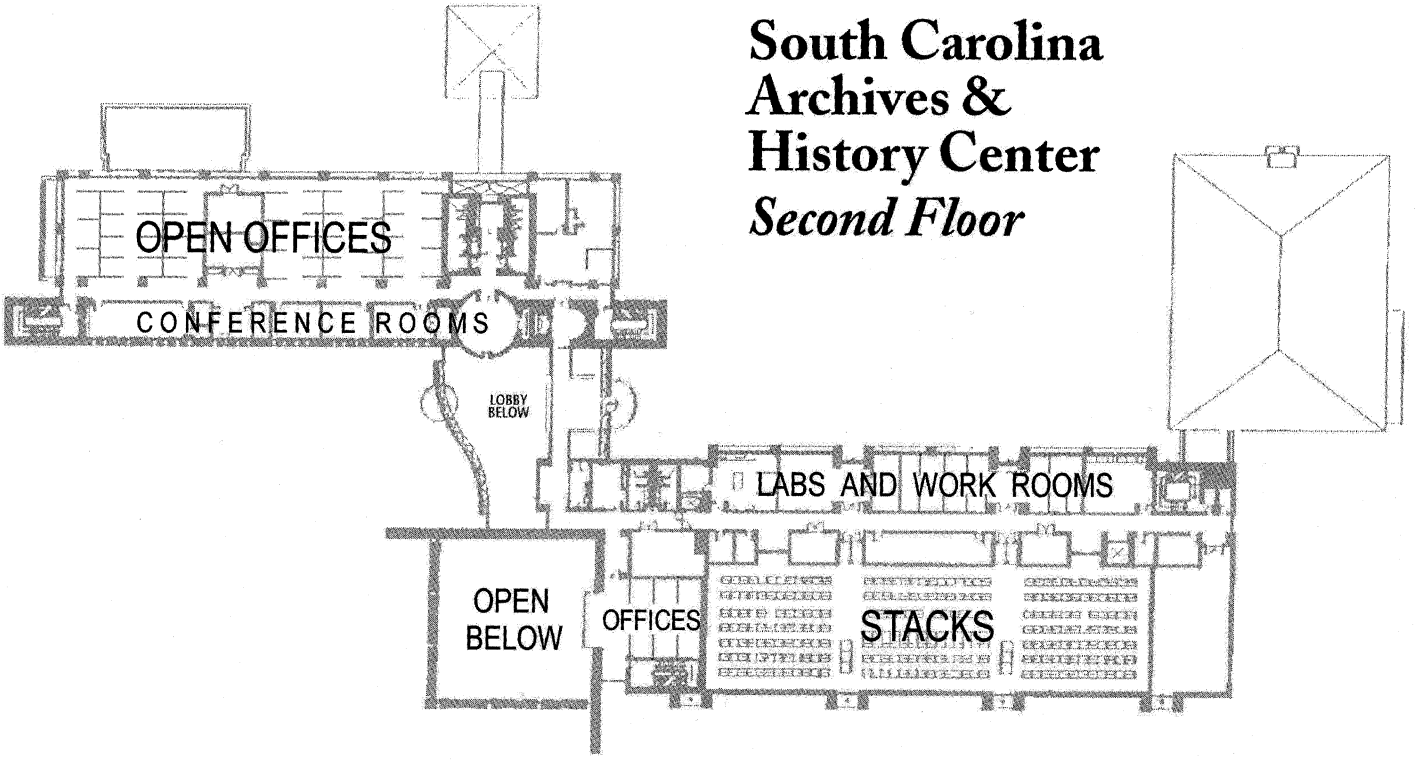
Record storage and microfilming areas have no natural light, while conservation and processing areas have indirect natural light. Record storage, in three floors of stacks, is directly across the hall from the labs and processing workrooms. Records are transported to the upper stacks via a conveniently located freight elevator, which lies between the stacks and the nearby covered loading dock at the rear of the building. The structure of the stack areas is sealed concrete on steel framing, wrapped in a watertight building envelope, and faced with a brick exterior. The floors of all three stacks were built to sustain the weight of compact shelving. The stack interiors—including the shelving—are painted white to maximize ambient light from the UV-filtered lighting. Two motorized double doors provide access to each stack. The roofs on the building's multistory sections are almost flat (with a slant of three inches), and have interior and exterior drainage. While a peaked roof is more desirable in a rainy climate, a flat roof is less expensive to build, and maintenance personnel prefer a flat roof for access. The design of the stacks will accommodate extensions.

The fourth section of the building is a single-story structure that houses physical plant equipment, a covered loading dock, a mail room, and the accession "suite" for new transfers. The equipment rooms are accessible through large roll-down doors, which allow easy transfer of replacement boilers and chillers. Cooling towers are located on the ground outside this section of the building, where they are easily maintained and pose no threat to collections. Ling recommended a loading dock that allows a truck to pull inside the building. This option is more expensive, restricts the work area, and can encourage the influx of pollutants. An error in a driver's judgment could even result in some serious structural damage.[18] At SCAHC, general delivery and maintenance personnel have access to this section via a back drive. The collections areas are inaccessible without proximity key cards, and general delivery personnel must have a staff escort to enter the accession suite or the other sections of the building.

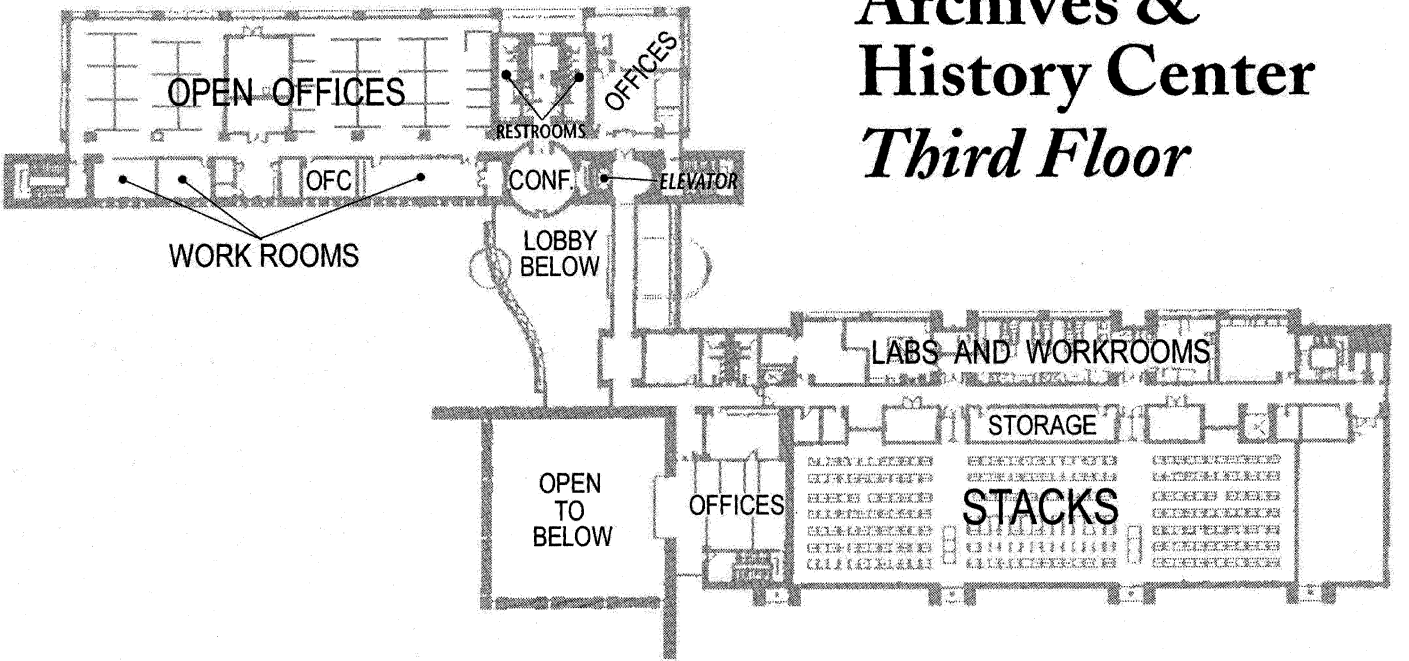
The accession suite is a significant element in the institution's work flow and is key to preservation of the collections. It provides adequate work space for the archivists to review new transfers, enter the location information into the database, and mitigate any serious preservation problems.




**South Carolina Archives & History Center / *First Floor***


South Carolina
Archives &
History Center
Second Floor
OPEN OFFICES
CONFERENCE ROOMS
LOBBY
BELOW
LABS AND WORK ROOMS
OPEN
BELOW
OFFICES
STACKS

# South Carolina Archives & History Center
## *Third Floor*



## *The Stacks*

Published standards on the environmental conditions required for storage of archival records on paper and for film exist, and most archivists are familiar with them.[19] But the design of archival record storage spaces involves many issues, which must be resolved with help from an environmental consultant and mechanical engineers. The SCDAH project succeeded in securing recommended levels for temperature and humidity in the stacks: 60 degrees and 35 to 45 percent. Separate air handler units for each stack sustain these conditions. Each unit maintains constant humidity by using a combination of a desiccant wheel and a rehumidification system. Stack conditions are further stabilized with positive air pressure. Although Ling recommends construction of specialized storage areas for various media, the SCDAH design saved money by establishing and maintaining one set of environmental conditions throughout its stacks. The environmental consultant advised against construction of specialized storage for microfilm masters, arguing that polyester film-based negatives remain stable for centuries when they are stored at 40 percent RH and 60 degrees Fahrenheit. That advice saved over twenty thousand dollars in construction costs. The SCDAH will have to reformat its older, acetate-based negatives in order to fully realize the long-term benefits of conditions in the stacks.[20]

The designers selected a wet-pipe fire suppression system because it is less expensive and reacts faster than a dry-pipe system. Gaseous fire suppressants were not chosen because they are costly and ineffective in large spaces. The sprinkler heads in the stacks are set up to accommodate compact shelving, and they are designed to shut down as the fire goes out. All other sprinkler heads in the building are standard equipment that must be shut off manually. Ling supports the concept of fire prevention through compartmentalization, in conformity with best practices in Europe, where collections may not be in containers or may have large holdings of parchment.[21]

The SCDAH team made a serious error by failing to select the design of its shelving early in the design process. It compounded this error by failing to have truly accurate figures for the size of the collections. The architects were told they had to design a space large enough to house 65,000 cubic feet of records. After the SCDAH took possession of the building, a survey of the stacks revealed the shelving in the stacks could house no more than 39,234 cubic feet of records.

Ling expresses storage capacity in terms of shelf meters, and he describes the method for calculating the storage capacity of mobile shelving units.[22] Libraries calculate holdings in linear feet. U.S. archivists in the public record sector calculate the size of their collections in cubic feet, but these figures are used primarily to measure the amount of material in the holdings, not necessarily the amount of space required to house the often odd-sized and over-sized materials in an archival collection. Michael J. Kurtz writes that space needs should be calculated at 1.5 cubic feet of records for every square foot of floor space in freestanding shelving, or 4.5 cubic feet of records for every square foot in compact movable shelving.[23] Calculation of collection space requirements is further complicated when "standards" for measuring the collections vary according to local interpretation and practice; most archives' annual reports describing their holdings are based either in whole or in part upon estimates.[24]

Calculating space needs for the long term is complicated by the changing nature of public records. As more government records are generated digitally, the archives may receive much smaller transfers. While the South Carolina archivists predicted the annual acquisition rate would be at least 1,500 cubic feet every year, new records have arrived in much smaller numbers than predicted. Further study will be required to estimate space needs for collection storage in light of digital technology.

## *Shelving for the Stacks*

The SCDAH selected standard-sized, powder-coated steel shelving, which was cheaper than special-order shelving. It is also more flexible because the shelves within units are interchangeable. Flexibility and lower cost were deemed to outweigh the value of the most efficient use of space that might be gained with special-order shelving. The cost of special-order shelving might be appropriate when adapting a historic building as a repository. Economies of scale also justify special-order shelving in a very large new structure like a Harvard model off-site repository.[25]

The SCDAH staff spent 19 months preparing the collections for the move to the new building. Ling says little about moving the collections, but this part of the SCDAH project was linked directly to the design and layout of shelving in the new stacks. Every container in the collection was surveyed to determine content, physical condition, style, and size. The vast majority of containers could be shelved on one standard-sized shelf manufactured by Spacesaver. Almost all maps could be housed in the largest standard manufactured map case. Special-order shelving was purchased for only a few of the older, closed series consisting of very large oversize maps.[26]

Compact movable shelving was installed on the second and third floors of the SCDAH stacks. Freestanding but immovable shelving units were used in the first-floor stack, housing the most heavily used series. The first stack also houses oversize materials, map cases, and microfilm cases. Crystallization Systems, Inc. (CSI), a vendor that developed storage systems for museum collections, was selected to build the special-order shelving for most of the oversize materials.[27]

Ling assumes a new facility will be constructed with compact shelving.[28] Though SCDAH staff studied other options, compact shelving is certainly the best choice. Post-construction installations present major problems. The shelves are installed on raised platforms that often include plywood, which introduces harmful chemicals into the storage environment. The platforms' outer edges are obstacles to carts and hazards to personnel. Because the collections have to be moved out of the storage area to install tracks and shelving, the process is inconvenient, expensive, time-consuming, and places the collection at risk.

If compact shelving is installed, specify the height carefully. SCDAH did not want the shelves to be more than eight feet high. Because the uprights on movable ranges rest on a four-inch carriage on which the range moves, they are four inches shorter than the uprights on eight-foot-high freestanding ranges. These shorter uprights reduce either the size or number of openings in each bay.[29]

There is an ongoing debate over the choice of motorized or mechanically assisted movable shelving. The SCDAH consultant recommended the mechanically assisted shelving because he considered it better engineered. The architects insisted on motorized shelving, which has its advantages. One person can move several ranges with the push of a single button. Motorized shelves are equipped with automatic brakes that stop a range when it bumps into a box on the floor or a person standing in the aisle. The ranges can be set in "fire park" mode when the facility closes, which prevents extensive water damage if the sprinkler system discharges.[30] Motorized shelving has two distinct disadvantages: it costs nearly 60 percent more and it does not function during power failures. Anecdotal evidence indicates that motorized shelving begins to fail after a decade of steady use. The engineering of the motorized systems may have improved in the last decade to make them more reliable and long lasting; a survey of installations within the last five years would be useful.

Mechanically assisted shelving must be used with care; vendors often demonstrate mechanically assisted shelving by moving more than one range at a time. In fact, if the ranges are moved in multiples, the mechanism that moves the carriage will break. Within the first year and a half, several rows of shelving broke down at the SCDAH until the service mechanic explained the problem. Moving each row is not heavy work, but it takes time.

## *Equipment Storage on the Site*

During construction, shelving and equipment were delivered to the site and stored in the first-floor stack until installation. When the equipment was removed, the stacks had to be repainted before the collection was moved in because the traffic during construction had damaged the painted surfaces. The paint had dried to the touch within 48 hours, but the paint was still off-gassing chemicals for several weeks. At Archives II, the multilevel garage was built first and used for storage during construction.[31] Ling does not comment on this, but every large building project needs a staging area. The budget should include money for the rental of temporary storage buildings or storage pods.

## *Flexibility of Design*

Ling emphasizes the desirability of flexible work spaces, but he did not emphasize the impact of Internet connectivity.[32] Archives II is supposed to remain in use for a century, and the design incorporated raised floors throughout office areas and reference areas to allow for rewiring.[33] At SCDAH, the same purpose is served with dropped ceilings in the office areas and public meeting rooms. During design and construction, the wiring for Internet access in all the conference rooms was dropped. As the Center hosts an increasing number of public meetings, the connectivity is gradually expanding.[34]

Many workrooms at the SCAHC have a number of built-in cabinets and shelves, but most of it is suitable for office and janitorial supplies, not archival supplies or computer workstations. The collection processing rooms are more flexible; with few built-ins, they can easily be reconfigured with temporary shelving, carts, and movable computer workstations to meet the needs of changing tasks.

The labs were designed with a great deal of direct input by the staff who use them. The conservation lab has specialized storage for large sheets of board, rolls of Mylar, repair supplies, and tools. Many of the work surfaces for documents in the conservation lab are on wheeled tables that can be moved around the room and latched together to form work surfaces for oversize documents. The lab has enough space for all of its equipment and room for expansion. Document sinks were transferred from the old building to the new location because they were a unique design and still usable. A water deionization unit, two fume hoods, and a vented room for nonaqueous deacidification treatments were built into the new conservation lab. The micrographics lab had transferred much of its equipment from the old site, since equipment for archival-quality microfilming is no longer readily available on the market.

## *Reference Room Design*

The SCAHC reference room, one of the building's more impressive public spaces, is open to a ceiling three stories high, finished with wood paneling and brick masonry above an expanse of windows. Carpeting in the room dampens noise. Attractive wooden furniture complements the wood paneling, but it has not held up well because it does not slide easily on the carpet. Pacifico describes the design of reference room furniture at Archives II in some detail; staff members specifically requested the design of tables in the reference room to enhance security.[35] The low dividers on the tables allowed staff to observe patrons easily, but the dividers might also damage documents during viewing. Reference room tables must be designed to accommodate computers. They must be ergonomically correct, with electrical outlets within easy reach, just under the lip of the table to create a smooth surface for the documents. At least one table in the reference room should be large enough to fully support an oversize map. Libraries have begun to set up pods of desks in the reference room, where people can work in groups. Most archives patrons work individually, so the group or team work areas in an archives reference room can probably be limited to one or two.

At the SCAHC, the microfilm reading room is a low-ceilinged, very deep alcove off the side of the reference room. The alcove design shields the readers from bright ambient light in the main reading area, while its open side permits reference staff a clear line of vision into the area. The space is too crowded to allow access to as many readers as the staff had desired because the readers were placed on a large decorative wooden table that matched furniture in the main reading area. Microfilm readers should be installed on utilitarian tables designed specifically for readers; this will save space and cost less. As the use of digital reader/printer equipment increases, the design required for microfilm reading areas may change. While modern reader/printers do

not require dim lighting, they take more space and require more frequent servicing. They also need to be linked to servers to store digital images.

## *Office Spaces*

Ling suggests office design should be reviewed by the staff who will work in the space, and it should be flexible enough to accommodate working teams. He spoke to the "creature comforts," the human elements of design: natural lighting, temperature, lounge areas, general ambience created by soothing color schemes, etc.[36] Most offices at the SCAHC are cubicles in open office space. Private offices are reserved for division directors, the head of personnel, the department director, and a few designated functions. Conference rooms are available for private conferences and work groups. Many members of the staff, having had private or semiprivate offices in the old facility, did have difficulty making the adjustment to the open office layout. Privacy and noise are still problems for those on staff who work at their desks most of the day. Staff members immediately shifted the walls of their cubicles to stagger the entries to their offices, breaking up the direct line of sight into the cubicle across the hall. Even though modular furniture and open office layouts are cost effective and flexible, management should expect this "human" reaction from staff moved from old buildings with private and semiprivate offices. Design for open office areas should incorporate a system to manage acoustics: carpet, noise-absorbent panels, and white noise. Brick masonry walls absorb a great deal of ambient light; place extra desk lighting in those areas. Conference rooms should be close to office areas to allow confidential conferences or impromptu team meetings.

## *Moving into the New History Center*

Once the SCDAH moved into its new quarters, there were many adjustments. The move consultant, FRI, helped ease the transition for members of the staff by transferring an individual's office files efficiently to their new office space, arranging tours of the completed facility before it opened to the public, and providing staff with information packets containing building maps and lists of area restaurants and nearby services.

The department purchased many new computers and printers, and the new building had much better infrastructure for wired Internet access. The massive effort to prepare the collection resulted in the creation of the agency's first fully automated, searchable finding aid. But the improved technology options placed great pressure on the department's two-person Computer Services unit. Responsible for ordering and installing new equipment, transferring and upgrading old computers, and setting up the new LAN, the unit took months to work out all the problems. Some staff members were unable to access the databases and shared files for several weeks. The agency should have hired temporary employees to set up computer hardware, freeing the permanent staff to set up the LAN and databases more quickly.

## *Meeting Facilities*

When discussions about the new building began, the administration envisioned a facility that would accommodate large meetings. The department had always sponsored annual meetings and workshops, holding them off-site for lack of space. They wanted to expand their outreach programs. Various units within the agency had begun to work on more team projects, and they needed adequate workrooms. Everyone wanted the new building to have an auditorium, classrooms, and conference rooms. The administration, seeking legislative support for a new building, promised the legislature that other state agencies could use the facility for their meetings as well. Finally, it was agreed that the meeting facilities could be a good source of revenue.

No one at SCDAH anticipated how many public meetings the History Center would attract. The community at large "discovered" the Archives and History Center, with its catering kitchen, well-equipped auditorium, classrooms, and conference rooms. State agencies with regional offices around the state were drawn to the Archives and History Center for their statewide meetings because the facility was in the geographic center of the state. Parking at the Archives and History Center's suburban location was easy to find and free; but the department quickly realized that it had underestimated the parking required when conferences were held in the building and they had to negotiate parking privileges on the grounds of a nearby state agency.

So many groups wanted to make use of the Center's conference facilities that members of the archives staff were being pulled away from their regular duties to set up or break down equipment in the meeting rooms. As a result, program supervisors and senior record analysts were doing work more appropriate to building maintenance workers. Several different people handled room reservations, causing confusion about the availability of conference rooms and team workrooms.

The department was soon forced to hire a full-time employee to manage reservations and events. Policies governing the rentals were developed. Security routines were established to control public access to meeting rooms on the upper floors. The department hired part-time staff for the reception desk in the atrium to direct traffic and handle sales in the gift shop. The department quickly improved its audiovisual capabilities and Internet access in the public meeting areas on the first floor. Ling's work does not address the possibility of increased staffing needs for public services, but the SCDAH decided to add the "convention center" function when it planned the new facility. Never having conducted a formal study of potential need for the meeting facilities, the department simply underestimated the impact on its staff and resources.

## *Maintenance Issues*

Ling discusses maintenance of the new facility, recommending that a program of comprehensive maintenance should begin immediately. He suggests records be kept of all incidents related to building maintenance, and he suggests regular inspections to note any problems.[37] During the first few years at the Archives and History Center, there were a number of problems with the new building's mechanical systems, security

equipment, and drainage. A sprinkler head leaked onto items in the stacks. The sprinkler failure was the result of a manufacturer's design flaw, and replacements were installed in 2005. Two steam exhaust pipes had to be rerouted. The exterior drains in the garden had to be re-routed and expanded to prevent flooding during heavy downpours. The designers put too many motion detectors in the stacks, and temporary paper signs on the shelves kept setting off the alarms for several weeks.[38]

Maintenance of the HVAC system is a major issue in any new or renovated building. During the first design discussions of the South Carolina project, the environmental consultant advised the SCDAH to have an independent agent commission the building within the warranty period. "Commissioning the building" is a term for the process of checking the HVAC system to be sure it is built as designed and works properly. The contractor routinely checks the system's operation as part of the installation. The system works if he is a reliable, competent contractor. When an independent agent is hired to commission the building, however, he invariably finds problems. The process is similar to having a proofreader check a manuscript; but the services of this "proofreader" represent a substantial expenditure. For a somewhat higher fee, the independent commissioning agent can also train the local maintenance personnel in the operation of the new system.

There is considerable debate whether the expense of a commissioning agent is justified, and Ling makes no recommendation on the matter. The environmental conditions required for archival storage place considerable demands on an HVAC system, and the system is required to perform to specifications for more than twenty years. Given the paramount importance of the HVAC to the archives' core mission, the independent commissioning fee is cost effective because any repairs required would be covered by the warranty. At some point in the SCDAH project, the director was persuaded to cut funds for an independent commissioning agent. Such an agent probably would have spotted the faulty control panel that was supposed to release chemicals to clean the boilers, a problem that resulted in failure of the boiler within three years. A commissioning agent could have saved considerable staff time by creating an operating manual for the new HVAC system and training in-house maintenance personnel on its operation.

The HVAC system at the Archives and History Center may have been "overengineered" in the general office areas. Narrow set points for temperature and humidity were set for the general office areas. The system sent hundreds of alarms to maintenance when the temperature or humidity moved outside the set points. General Services soon stopped responding to these frequent alarms, waiting instead for agency personnel to make a call when they got uncomfortable. Unfortunately, General Services also ignored alarms from the collection storage areas. The problems have been ameliorated with a combination of tactics. Set points for office areas and public spaces were adjusted to allow wider variations of temperature and humidity; system alarms are less frequent. The stacks are independently monitored by the preservation staff, using data loggers. When conditions move outside acceptable guidelines in the stacks, a service call is placed with General Services. Data logger technology has improved rapidly since the mid-90s. Ling's work doesn't discuss the use of data loggers, but new instruments can now feed their data directly to the Internet and send alarms via E-mail or pager to personnel concerned about environmental conditions in collection areas.

## *Summary*

Because building an archive facility is unusual, architects will never specialize in designing purpose-built archival facilities. Even if one firm does work on several archives projects, individual architects move frequently from one firm to another, making it unlikely that a firm will retain the same design team from one archives project to another. The archivists who have participated in this generation's projects should fully document their experiences, keeping meticulous records of the design discussions and construction meetings, and scheduling these records for permanent retention. A recording secretary should be appointed to the project team from its beginning.

Staff and administration must take time to develop written priorities for the new building before the architect is drawn into the process. The budget should allow adequate time for staff review and discussion of the design as it progresses toward detailed layout; staff members have expertise that the architects need. Before any design is developed, the staff should generate accurate figures about collection size. They should then set forth shelving specifications. The use of compact, movable shelving should be a given in a new purpose-built archive facility. One of the areas most in need of research is the calculation of collection-space requirements in a new building. Better guidelines for accurately calculating space requirements are required.

The archival staff should prepare the collection for the move, but a professional moving consultant will supply useful advice and technical support. The move presents an excellent opportunity to enhance intellectual access and improve preservation of the collections.

The impact of electronic records and digitization on the planning and design of record storage stacks requires further study. Not only must future archive buildings have the technology to provide access to electronic materials, but planners must be able to project how electronic formats will affect the growth rate of their traditional physical holdings.

Technology and building techniques are finally capable of creating a viable preservation environment. Digital controls and centralized monitoring provide the opportunity for knowledgeable preservation personnel to resolve problems quickly. Environmental monitoring programs should be a major priority of any preservation program.[39] The author recommends study of the application of the National Information Standards Organization's standard TR01-1955, for it should be interpreted and implemented in light of local climate conditions and the content of the collections. Further discussion about data loggers and how they can be used is desirable. While an independent commissioning agent should be hired to review the new facility's HVAC system and get problems corrected during the warranty period, an additional commissioning process can take place at any time during a building's existence. Resources for recommissioning a building should be built into the facility's long-range budget to identify maintenance needs for an aging system and to refresh institutional knowledge of how to operate the HVAC system.

A new building represents opportunities for expansion of public service and outreach programs, and planners can use the opportunity of a new building to upgrade the agency's services. The Archives and History Center grew into a major meeting

facility much more rapidly than expected. The external demands for conference facilities pushed the SCDAH to invest in equipment and personnel to support the meeting functions. The investment also enhanced the training capabilities of the agency because it purchased audiovisual equipment, greater Internet access, and more digital imaging equipment to meet the public expectation for a well-equipped conference center.

In order to expand the agency's functions, the new facility must be constructed to allow technology upgrades without major renovation costs. In South Carolina, the delay in wiring conference rooms on the upper floors may work to the agency's advantage. Instead of installing more wiring there, the agency can move directly to wireless access. The reference room might be more expensive and difficult to upgrade to wireless, but the nature of reference service may well change completely as more finding aids are available on-line and as electronic records change the nature of the archivist's role from that of custodian to information locator.

Finally, the planning and construction of a new archive building is a long and challenging process. On average, it takes about a decade to raise awareness of the need, secure the funding, and then design, build, and occupy a new building. The profession should be documenting the process thoroughly because one rarely goes through the effort more than once in a professional lifetime. A scholarly dialogue is necessary to develop a set of published standards to accompany the forthcoming SAA basic manual by Tom Wilsted, which updates Ling's 1998 work. Changes in technology and the growth of electronic records and digital media should spur a constant discussion of issues related to the proper housing and maintenance of the archival record in the context of planning a new facility.

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## NOTES

1. Roy H. Tryon, "The South Carolina Archives: A Decade of Change and Program Development," *American Archivist* 60:2 (1997): 166–183. This article describes the highlights of the SCDAH effort to secure funding and support for the new building.
2. Raymond Holt, *Planning Library Buildings and Facilities: From Concept to Completion* (Metuchen, NJ: Scarecrow Press, 1989). Godfrey Thompson, *Planning and Design of Library Buildings*, 3d ed. (London: Butterworth Architecture, 1989). Keyes D. Metcalf, *Planning Academic and Research Library Buildings* (New York: McGraw-Hill, 1965). This was followed with revised editions in 1986 and 2000; Metcalf's work was edited and expanded by Philip D. Leighton and David C. Weber under the auspices of the ALA. Garry Thomson, *The Museum Environment*, 2nd ed. (London, Boston: Butterworths, in association with the International Institute for Conservation of Historic and Artistic Works, 1986). Susan G. Swartzburg and Holly Bussey, with Frank Garretson, *Libraries and Archives: Design and Renovation with a Preservation Perspective* (Metuchen, NJ: Scarecrow Press, 1991).
3. National Archives and Records Administration (NARA), *Archives II, National Archives at College Park: Using Technology to Safeguard Archival Records*, NARA Technical Information Paper Number 13, 1997, http://www.archives.gov/preservation/storage/facilities.html (8 September 2005).
4. Ted Ling, *Solid, Safe, Secure: Building Archives Repositories in Australia* (Sydney: National Archives of Australia, 1998).
5. The Society of American Archivists will publish Tom Wilsted's new manual on planning and design of archives in 2007.
6. Ling, *Solid, Safe, Secure*, 82–85.
7. For more details on the strategic planning effort and the project funding for the SCDAH, see Tryon, "South Carolina Archives," 181.
8. HOK adopts a business practice whereby they expand the firm by acquiring local architectural firms. Walter McQuade, *Architecture in the Real World: The Work of HOK* (New York: Harry N. Abrams, Inc., 1984): 34. In South Carolina, HOK purchased a Greenville firm; most of the design and oversight on the SCDAH project was carried out by members of the Greenville firm, with advice from members of the Archives II project team. As a result of this practice, none of the primary team members on the SCDAH project had any experience building an archives facility.
9. Ling, *Solid, Safe Secure*, 83.
10. McQuade, *Architecture in the Real World*, 23.
11. Ling, *Solid, Safe, Secure*, 76.
12. Ling, *Solid, Safe, Secure*, 87. The SCDAH is an independent agency; it had to raise the money for construction and carry out the project in accordance with state procurement regulations. The architect and contractor interacted directly with the SCDAH as the client. The South Carolina Budget and Control Board, acting through General Services, owns and maintains the completed building. The SCDAH occupies the facility and pays rent to General Services for maintenance.
13. Ling, *Solid, Safe Secure*, 87.
14. Michele F. Pacifico, "The National Archives at College Park," *Government Information Quarterly* 13:2 (1996): 123.
15. NARA, *Archives II*, 24–27.
16. Ling, *Solid, Safe, Secure*, 63.
17. Ling recommended natural lighting in these areas. Ibid., 75.
18. Ibid., 40.
19. William K. Wilson, *NISO TR01-1995: Environmental Guidelines for the Storage of Paper Records* (Bethesda, MD: NISO Press, 1995). *American National Standard for Imaging Media—Processed Safety Photographic Film—Storage*, ANSI Standard IT9.11-1993 (New York: American National Standards Institute, 1993).
20. If an extension is added to the stacks, the SCDAH will have to add more air handlers or lower its stringent environmental requirements. The boilers and chillers will handle the extension, but it is not cost-effective to build air-handling units that can maintain such low temperature and humidity levels in a larger space.
21. Ling, *Safe, Solid, Secure*, 56, 74.
22. Ibid., 73.

23. Michael J. Kurtz, *Managing Archival and Manuscript Repositories* (Chicago: Society of American Archivists, 2004), 167–168.
24. The SCDAH altered the basis for calculating cubic footage over the years, and the modern archive was established with a large backlog of materials on hand from the state capitol. There was never an exact measurement of these materials in the early years.
25. Ron Lane and Reese Dill, "What to Build," in *Library Off-Site Shelving: Guide for High-Density Facilities*, ed. Danuta A. Nitecki and Curtis L. Kendrick (Englewood, CO: Libraries Unlimited, Inc., 2001), 73–87.
26. Kurtz provides a useful description of shelving options and terms. Kurtz, *Managing Archival and Manuscript Repositories*, 169–171. A discussion of preparing the archives for the move is reserved for another paper.
27. NARA chose to house all of its map cases on compact movable shelving specially built to hold the 54- and 64-inch-wide cases, a cost-effective choice for a collection with more than ten thousand map cases. NARA, *Archives II*, 17.
28. Ling, *Solid, Safe, Secure*, 73.
29. At SCDAH, in a number of bays on the second and third floors the layout of the collection had been planned for shelving with eight-foot-high uprights. Because planners had overlooked the shorter uprights on the movable ranges, we had to remove the covering shelf in order to place all our series as planned, exposing the boxes on the top shelves to the ceiling.
30. Pacifico, "The National Archives at College Park," 122.
31. Ibid., 119.
32. Ling, *Solid, Safe, Secure*, 76.
33. Ibid., 119.
34. The library staff reviewed any changes in design and construction related to IT issues at the Lied Library, a model that should become common practice in archives. Myoung-ja Lee Kwon and Kenneth E. Marks, "Construction of the Lied Library," Library Hi Tech, 20:1 (2002), 21–32.
35. The article is unclear how the design does this. Pacifico, "The National Archives at College Park," 121.
36. Ling, *Solid, Safe, Secure*, 75–77.
37. Ibid., 175.
38. Ling states motion detectors are needed only at stack entrances. Ibid., 61.
39. Ibid., 44–51.