University of Chicago Library Shelving Addition

Materials prepared for
The University of Chicago
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EXECUTIVE SUMMARY

The University of Chicago Library is among the nation's largest and most distinguished academic research libraries, renowned for its collection of more than 7 million volumes, the depth of coverage it provides within intellectual fields, and the breadth of its holdings in non-Western languages and international area studies. The Library is the principal component of the University supporting research and teaching across all divisions, departments, schools, and interdisciplinary fields. In a highly competitive academic environment, the Library is an essential component of the University's international intellectual distinction. It is also a crucial factor in the retention of distinguished faculty and the recruitment of new faculty and students.

Beyond its large scale and rich collections, the Library is especially treasured for the integrated organization of its holdings and remarkable ease of access, and its concentration of all collections on campus within easy reach of faculty, students, and other users, qualities we seek to preserve. To maintain the University's productive environment for creative research, the Library must continue to provide ready on-campus access to the full range of its collections.

Over the past three years, the University has explored options for managing the Library's growing holdings. Shelf space is a critical need as the total shelving in the libraries on campus will be functionally full in 2007. A range of options has been considered, focusing on an on-site vs. off-site facility, and on a high-density automated vs. compact vs. high-density non-automated shelving system.[1] After a prolonged process of consultation with faculty and students, and a careful evaluation of programmatic needs, we recommend an **on-site high-density automated shelving system**[2] for the management of the Library's print collections. The following considerations shaped this decision:

Programmatic Considerations: On-Site Collections vs. Off-Site Storage
Innovative research depends on ready consultation of all available sources, including especially those that are undiscovered, less well known, and less frequently cited by other scholars. Off-site storage does not support the programmatic need of University faculty and students for immediate on-campus access to integrated collections. Universities without campus space for library expansion have needed to store some collections off-site. The University of Chicago is in the advantageous position of having adequate on-campus space for expansion.

Access and Cost Considerations: Compact vs. High-Density Automated vs. High-Density Non-Automated Shelving
Faculty and students strongly prefer that the Library's collections be housed on campus in browseable compact shelving. This option, however, involves much higher construction costs (see Appendix 1) and higher long-term operating expenses (see Appendix 2). An on-campus high-density automated system offers the advantage of lower costs, while continuing to meet the research demands of faculty and students, maintaining all collections on-campus and providing access within minutes to any volume it holds. While an off-site facility has the lowest construction cost, it does not support programmatic needs.

Format Considerations: Persistence of Print vs. Digitization
While the Library is expanding its digital resources, it continues to develop its collections of printed books and serials, non-Western area studies materials, and rare books and other special collections. Digitization of books and serials, highlighted by the recent Google Print initiative, promises broader access only to some types of print materials. Google Print has not yet demonstrated its functionality on a wide scale; copyright law limits access to materials published since 1923; and, as with all digitization efforts, long-term access and stable forms of archiving are not yet assured. The greater part of the Library's most valuable non-Western area studies materials, scarce and rarely held monographic and serial titles, and unique manuscripts and archives collections will not be replaced by digital copies at any time in the foreseeable future.

Long-term Considerations: Programmatic Growth vs. Facility Obsolescence
The Library's projections for future collection size account for reduced rates of growth for certain materials, such as journals, now increasingly being digitized. Yet the research needs of faculty and students will still require that millions of volumes of collections in print form remain on campus. Stack space in Regenstein and other libraries vacated by future deaccession of print materials will be incorporated within the Library's larger programmatic plans for reconfiguration of reading rooms, expanded study and learning spaces, and enhanced spaces for seminars, small-group meetings, and faculty-student consultations. In contrast, an off-site facility cannot easily be repurposed for the future needs of the Library. An on-site addition with high-density automated shelving can thus be seen as part of a long-term capital investment strategy for the University.

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[1] Descriptions of high-density automated, compact, and high-density non-automated shelving can be found on the next page.
[2] The on-site addition is envisioned to the west of Regenstein Library, bounded by Ellis Avenue, 57th Street, and the Moore sculpture (see page 5 for site map).

DESCRIPTION OF SHELVING OPTIONS

Recommended option
High-density automated shelving: barcoded items are sorted by size (not by call number) and stored in bins. These bins are housed in storage racks that can be constructed up to 50 feet in height. Bins are retrieved automatically by means of a robot and the retrieval is almost immediate (within 5 minutes). High-density automated systems require approximately 1/7 of the floor space that conventional fixed shelving requires.

Compact shelving: this term refers to mobile shelving units mounted on wheeled carriages that run on tracks perpendicular to the shelving unit. Shelving is accessed by either pushing a button (electrical) or turning a handle (mechanical), to open an aisle in the desired location. In a compact shelving bay, there is one access aisle for a number of ranges, thereby saving considerable space. Compact shelving typically requires 1/2 of the floor space in comparison to fixed shelving.

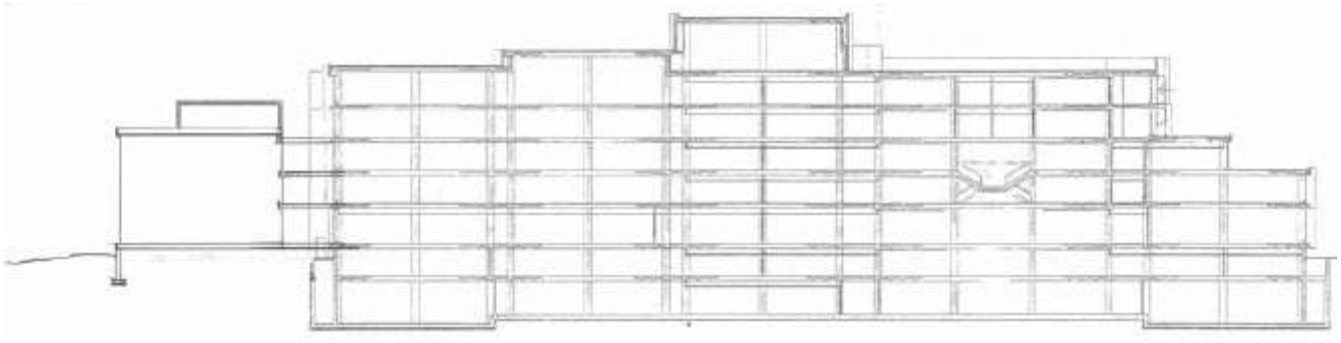
High-density non-automated shelving: this term refers to 30-foot high fixed shelving units. Barcoded items are sorted by size (not by call number) and stored in barcoded trays. The items and trays are associated with barcoded shelves in a specific barcoded shelving unit. Items are typically accessed by means of an "order picker," a modified forklift. Retrieval requests are typically batched according to location to simplify retrieval. Retrieval times range from 6 – 60 hours (the latter is the case if the facility is closed Saturday and Sunday). High-density non-automated shelving typically requires 1/6 of the floor space that conventional fixed shelving requires.

COMPARISON OF OPTIONS FOR LIBRARY SHELVING ADDITION

[this page contained financial information disclosed to the Trustees.]

SITE MAP

The above drawing shows the addition as now envisioned to the immediate west of the existing Regenstein building. Its exact location and design, however, have yet to be determined. The suggested parameters for the ASR system addition are approximately 60' wide x 250' long x 50' high (not including the mechanical penthouse) with a 15' x 117' connector to the existing building. The total gross square footage of the ASR addition is estimated at 38,200.



Elevation view from 57th Street looking north. The ASR addition is on the left.

DISCUSSION

On-Site Collections vs. Off-Site Storage

Most other university research libraries faced with the need for additional space have been forced to build off-site storage because they did not have the open land to expand an on-campus library. In contrast, the University of Chicago is in the fortunate position of having adequate open land adjacent to our main campus library. Although the off-site option is less costly, the academic and programmatic benefits of keeping the Library collections together justify the increased cost.

University faculty members overwhelmingly and passionately favor keeping all Library collections on-site (see Appendix 3 for faculty comments). Faculty and graduate students typically conduct advanced research by consulting several books simultaneously or in quick succession as they follow the thread of an argument or citations in footnotes from one book to the next. Following such a thread through five or six different sources may be an hour's work using conventional shelving, but it can become a labor of days or even weeks when key materials are stored off-site, requiring one day or longer for each step. The most original and innovative research often requires exploration of little-known and undiscovered texts, the very materials that are most typically moved off-site. Since these "low-use" sources are often those with the least complete indices or descriptions, researchers must individually examine large groups of volumes or lengthy runs of serial publication. Researchers consulting original manuscript and archival material frequently need to examine voluminous amounts of material, something almost impossible to accomplish in a timely fashion when the materials are stored off-site. Echoing strong faculty views, the Faculty Committee on Library Expansion has noted, "the move off-site would cause the loss of an increasing rare scholarly resource. At least in the humanities and some of the social sciences, the quality of scholarship done at the University would suffer in consequence of the change."[3]

Keeping the Library's collection entirely on-site will also give the University a significant comparative advantage among peer institutions. Visiting scholars, particularly those from European universities with closed-stack libraries (conditions nearly identical to off-site storage), have praised the Library's well-organized and readily accessible collection as highly conducive to scholarly research. Leading scholars' decisions to join the University's faculty and remain at Chicago have also been strongly influenced by the Library's consolidated collections and ease of use. Moving part of the Library collections off-site will devalue this important University asset among our own faculty and within the wider scholarly community.

Nearly all university libraries with off-site storage facilities have chosen to fill them with materials identified as "low-use." Selecting materials on this basis at the University of Chicago, however, would be extremely difficult. While the Library could attempt to transfer only infrequently-consulted materials off-site, freeing sufficient space to accommodate new growth would soon force the selection of more frequently consulted items, such as recently published books and journals. Repeated requests for circulation of frequently-used materials from an off-site facility can be expected to lead to higher operating costs, greater risk of physical deterioration of the books, and growing frustration among faculty and students. The experience of other universities with off-site storage substantiates these concerns. After transferring nearly 500,000 of its library books off-site (roughly 20% of its collection), MIT has opted to remodel its existing on-campus library space rather than transfer more books.[4]

Other potential advantages frequently cited for an off-site shelving facility, such as controlled access (to limit loss and theft) and an optimal environment (temperature and humidity set at preservation levels) can be realized just as well by an on-campus high-density automated facility. The only distinct advantage of off-site storage—its lower initial construction cost—is substantially diminished by the clear

[3] Report of the Ad-Hoc Faculty Committee on Library Expansion, p. 2. http://www.lib.uchicago.edu/e/using/longrange/spcollrpt.pdf

[4] MIT Libraries Space Needs, http://macfadden.mit.edu:9500/space97/#storage

benefits an on-site collection brings in recruiting and retaining distinguished faculty and in maintaining the University's reputation as a center for the most innovative and productive scholarly research.

Compact Shelving vs. High-Density Automated Shelving vs. High-Density Non-Automated Shelving

University faculty and students have overwhelmingly indicated a strong preference for a Library addition that is on-campus and has browseable shelving. In this model, researchers enter the stacks and retrieve books themselves, and Library staff reshelve returned items.

The chief disadvantage of browseable shelving is cost. Constructing a browseable compact shelving addition to Regenstein capable of holding 3.5 million volumes would cost over $67 million dollars. By contrast, an on-campus high-density automated system would cost $36 million dollars.

Both these options are substantially more than the $18 million dollar cost of an off-site, non-automated storage facility. The primary cost drivers of an on-site facility are building area (gross square feet) and architectural expression. In comparing the on-site high-density automated facility with the off-site option $13.3 million dollars can be directly attributed to the cost of the additional programmatic spaces (reading room, research carrels and preservation department), the cost of the robotic retrieval system with its specialized bins and shelving, architectural detailing consistent with the campus context, and site utilities. The $13.3 million is then increased by 35% for project soft costs to total $18 million dollars (see Appendix 1, "Construction Cost Comparison).

On an operating cost basis, the on-campus automated facility is the most cost-effective option. Appendix 2 (see pages 11-12) shows the 25-year cost of operating each type of facility.

An on-campus high-density automated system is the lower cost compromise to the preferred compact shelving facility that faculty feel would best meet their research needs. Typically, a researcher who finds an interesting book in the catalog writes down the call number and then walks to the appropriate floor and location in the stacks. In an high-density automated system, a user would identify the needed item in the catalog, supply his or her name and library barcode, click a request button in that record, and then walk to a central delivery desk, where the book would be waiting. High-density automated retrieval promises exceptionally quick retrieval times (other institutions with such systems deliver materials within five minutes).

Faculty rapidly reviewing a large quantity of research material generally skim quickly through many items, selecting only a few for in-depth review. Proposed plans for the Regenstein Library addition include well-equipped space for consultation of delivered material, enabling researchers to work productively with large numbers and sets of books.

A high-density automated system also offers many of the advantages normally associated with off-site shelving. Books can be kept in an optimal preservation environment, which is cooler than most people find comfortable for conducting long periods of research. Unlike browseable shelving, there is minimal chance of books being misplaced due to incorrect reshelving by users or staff, nor can users "hoard" materials by hiding them in far-away sections of the bookstacks.

Although relatively new to libraries, the technology and hardware underlying high-density automated systems are well established and have proven consistently reliable in other settings. Both the Ford Motor Co. and General Motors use high-density automated systems to manage "just-in-time" retrieval of parts and components for car manufacturing.

Persistence of Print vs. Digitization

In fiscal year 2004, the Library acquired 147,500 volumes of new material, approximately the same rate we have maintained for several years. During the same period, the number of digital resources acquired for Library patrons quadrupled over the previous year. For the foreseeable future, we expect both to make more digital resources available while also continuing to add substantial amounts of print

items to the collection. Digital resources typically enhance the value of print items, but do not generally replace them.

Clearly, use of digital resources varies by discipline. In the physical and biological sciences, which are heavily dependent on up-to-the minute journal publications, scholars, students, and practitioners consult journal articles primarily online, allowing the Library to acquire new journals in digital form only. In many other disciplines (such as Middle Eastern or South Asian studies), digitization has had limited impact. Furthermore, systematic digitization of the primary and secondary sources in such fields is not likely in the foreseeable future. For such manuscript-dependent philological and epigraphic fields, print will remain the preferred, if not the only, medium for research and teaching. Other fields and disciplines (history, literary studies, or theology, for example) will often demand the simultaneous perusal and comparison of sometimes dozens of volumes, making on-screen use of digital materials unwieldy or even misleading. Again, the researcher consulting hard copies laid out on the table will remain the norm.

Recent digitization efforts like Google Print promise to make many more books available online. At present, Google is just beginning to digitize thousands of books in several libraries. The project's scope is ambitious, and while Google now promises full funding, they could just as likely decide at some later date that continuing to scan books is not in their interest. The University of Chicago cannot base its long-term research decisions upon Google's promise.

It is important to recall that under U.S. copyright law, books that were published by 1923 are in the public domain, but those published after 1923 are still under copyright. Although digitized copies of books can be made fully searchable, Google cannot legally permit more than a few pages of any copyrighted book to be read at one time. It is thus difficult, if not impossible, for a scholar to attempt to read a copyrighted book cover-to-cover using only the digital version available on Google Print. Because significant portions of the University of Chicago Library's collections are still under copyright, it will be expected that the Library continue to retain copies of these materials in print form.

Long-term access to Google Print digitized books is also a serious concern. Google currently offers searching of digitized books for free, and has no stated plans to begin charging for access. However, Google has offered no assurance that it will maintain its digital files in perpetuity, or that it will spend the money to migrate or transfer digitized books to a different format if electronic reading technology changes. Google thus offers no assurance as a replacement for a print collection.

Google itself does not intend its digitization effort to replace the traditional library. "We [Google] hope to guide more users to their local libraries," Google has stated. "In general, Google Print is designed to help you discover books, not read them from start to finish."[5]

Google Print may eventually prove to be an essential first-step research tool,

A screenshot from a copyrighted book in Google Print.

[5] Google Print Library Project, http://print.google.com/googleprint/library.html, accessed April 22,2005.

helping scholars and students identify works they may have otherwise overlooked, or enabling them to winnow a list of materials down to the truly useful items. But far from eliminating the need to consult the traditional printed books, Google will actually increase demand for access to original materials and promote broader and more intensive use of print collections.

Programmatic Growth vs. Facility Obsolescence

An on-site high-density automated retrieval system, coupled with a state-of-the-art preservation and conservation laboratory, is a capital investment not only for the Library but also for the larger University community. This facility will provide the Library with sufficient capacity to accommodate new acquisitions for approximately 22 years. In addition, it will provide faculty and students convenient and on-campus access to the print resources in the high-density automated facility, with quick retrieval from these collections, and a comfortable and well-equipped adjacent reading room. The facility will contain state-of-the-art workspaces for book and paper conservation, as well as reformatting of brittle and severely damaged materials. In keeping the print collections accessible on-site, the Regenstein expansion will reinforce Chicago's distinctiveness amongst its institutional peers.

As digitization efforts continue, the Library will discontinue adding some materials in print form, relying on digital equivalents. This is occurring now with some journals, particularly those in the hard sciences and law. The Library's projections for future collection size account for this change; indeed, the addition of new print serial volumes is projected to decline by 5% per year over the next two decades. The Library will still be acquiring significant amounts of print material in the foreseeable future, particularly with its collecting focus on international area studies and non-Western language materials. Moreover, archives and manuscript collections will continue to grow by approximately 1,200 to 1,500 linear feet annually. All of this translates to a continuing need for space for the print collections.

In the coming decades, as more and more of the Library's print collections are available digitally and long-term access and stable forms of archiving are assured, it may become appropriate to withdraw some of these print collections and deposit them with the Center for Research Libraries or develop partnerships with other research libraries for the distributed retention of important paper-based library materials. However, when such a scenario occurs, it will still be necessary to retain millions of volumes of collections in print form on the campus to meet the research needs of Chicago's faculty and students. This is especially the case if, as expected, Google Print increases the demand for the physical materials that remain under copyright.

If stack spaces in Regenstein and other libraries are freed by the future withdrawal of portions of the print collections, these spaces can be incorporated into the Library's larger programmatic plans. In contrast, an off-site facility cannot be easily repurposed for the needs of the Library; it remains by its very nature a warehouse for little used material. An on-site addition allows spaces to be repurposed for the construction of collaborative and technology-rich learning spaces, expanded digital media and instructional technology spaces, reconfiguration of reading rooms, enhanced spaces for seminars, and lively social spaces for physically bringing together students and faculty in an increasingly digital world. In this scenario, the high-density automated shelving addition can be seen as part of a long-term capital investment strategy, particularly for the humanities and social sciences.

APPENDIX 1: Construction Cost Comparison

[this page contained financial information disclosed to the Trustees.]

APPENDIX 2: 25-Year Operating Cost Comparison

[this page contained financial information disclosed to the Trustees.]

APPENDIX 2: 25-Year Operating Cost Comparison (continued)

[this page contained financial information disclosed to the Trustees.]

APPENDIX 3: Faculty Comments

Selected and excerpted comments from the faculty about how the Library supports research, teaching and recruitment of new faculty and students:

- *The University of Chicago has now been surpassed by the top Ivies and Stanford in endowment and net worth, but we do have a central research Library that surpasses most or even all of their libraries in convenience and in accessibility. That is, Regenstein is one of the University's most important assets in the ferociously competitive, current higher education scene, a veritable crown jewel that gives and will continue to give the University of Chicago a tremendous level of prestige in the scholarly world, both nationally and internationally.*

- *We should keep in mind the importance of this decision for the future of the University as an intellectual community, and especially as a community that has to compete with other, wealthier private universities for faculty and graduate students in the humanities and qualitative social sciences. When Regenstein opened, it was seen as a strong and self-conscious public signal by the University of Chicago that we intended to remain among the top private research universities in the world. Gale Johnson commented to Edward Levi at the time that "The progress that has been made toward making a new graduate library for the social sciences and the humanities a reality has been a subtle but important factor in the enhanced morale of the faculty of the Division of the Social Sciences. This massive and imaginative solution to a major problem has done as much as any action could have done to convince the faculty that this University has both the will and the imagination to be one of the world's outstanding universities." That is the context in which this decision should be made, that is, what kind of addition will enable us to remain within the ranks of the top five universities in the world.*

- *I can testify that Regenstein is a crucial factor in attracting and retaining the distinctive quality of our humanities and social science faculty, most of whom have options elsewhere. As university libraries with this ease of use become increasingly rare, it can also become a trumpeted asset for the university and a real lure for shorter term research scholars like those who have enriched our programs in recent years.*

- *I think the question, broadly put, is how can the University of Chicago best go about maintaining a world class library. Without it there will be an inevitable decline of the quality of scholars and graduate students that the University can attract and maintain in the Social Sciences and Humanities*

- *The collections of our library and their accessibility make the University of Chicago library one of the best research libraries in the world, and I think we should do everything possible to keep it that way.*

Comments from the faculty as to why the Library's growing collections should continue to be made accessible through Library facilities located on campus:

- *Regenstein has one of the largest undivided LC classification schedules among American university libraries. There are a number of larger university libraries in this country, of course, one of them in Illinois. But almost all of them went on to the Library of Congress system decades after Chicago did. Harvard, Yale, Princeton, all had their own proprietary classification schedules, in some cases several of them, and moved to LC only in the 70s or 80s. They have had to organize their stacks in special sections. Others went with Dewey, and either converted to LC subsequently, or remained Dewey. Because of J.C.M. Hanson, who came to Chicago from Washington in 1910, and prevented the faculty from going ahead with a Dewey system, the Chicago stack is continuous and undivided. Researchers do not have to browse in several schedules. This is an almost miraculous condition for a scholar, and our situation, thanks to Hanson's foresight, is a privileged one.*

- *I've kept several considerations in mind: Preserving (and if possible enhancing) the functionality of Regenstein as one of the nation's leading research libraries, and one that is uniquely adapted to scholarly research, with most of its collections in a single, easily navigated building and accessible through a single call number system.*

- From the report of the Ad Hoc Faculty Committee on Library Expansion:
    - *In our view, the advantages of having the University's Library collection at a single immediately accessible location outweigh the advantages to be gained by going off-site. The primary benefit of the off-site option is financial, and large amounts of money are involved. The decision is therefore ultimately one for the Administration and the Board of Trustees. However, we have ourselves concluded that moving a significant part of the Regenstein collections to an off-site storage facility would adversely affect the scholarly mission at the University. We do believe that, after an initial shock during which negative reaction might indeed be quite strong, faculty and students would in fact become accustomed to off-site storage. However, we have also concluded the move off-site would cause the loss of an increasingly rare scholarly resource. At least in the humanities and some of the social sciences, the quality of scholarship done at the University would suffer in consequence of the change.*

    - *Most major American universities have adopted some form of off-site storage, although some have combined it with an expansion of their existing libraries and a few have actually cut back the size of their off-site collections. This has been a matter of necessity for them. They have had no space to expand. The University of Chicago therefore enjoys a comparative advantage at the moment; all our books are in one (or two) accessible places. In fact, the initiative of J.C.M. Hanson in 1910 caused the collection to be organized in a continuous and undivided fashion. The Library has never had the problem faced by most other university libraries, where the conversion of their own proprietary system to a newer (Dewey or LC) resulted in a subject-matter division being made in their collections. That has given us a real comparative advantage. The on-site option would continue and indeed enhance the unique status the University now holds. Some evidence suggests that scholars come here to work because of this feature. We do not believe it can be the major factor in any scholar's decision to come to (or stay at) the University. However, its importance has been mentioned often enough by the people we have consulted that we do believe it counts among the University's best features. Only the on-site option will preserve it.*

- *Virtually all large universities that have faced this problem have gone off-site. Unlike their situation, however, the University of Chicago has adjacent land suitable for expansion of the existing Library. The others have not. At Harvard, for example, increasing the size of Widener Library into Harvard Yard was not a realistic possibility. The same scenario has been played out elsewhere. By contrast, more than enough space for expansion is available immediately to the west of JRL. At the time JRL was constructed, we believe the land was left vacant with just this possibility in mind. Indeed the possibility of building a handsome addition to the existing structure on this site is one of the attractions of this option.*

Comments from the faculty as to how the Library should take advantage of the high-density automated system to expand and transform its services to faculty and students:
(Note: in the comments below, an "ASR system" is the same as an high-density automated system.)

- *With the ASR system, we have the opportunity to keep 25 years of collection growth accessible on campus. With an item retrieval time of 5 minutes or less, ASR will impose very little cost in terms of accessibility.*

- *I would much prefer a ASR system to the Harvard model where not only you do not browse books but you also have to wait 24 hours before getting them from an outside facility. The proximity of an ASR facility in relation to Regenstein seems essential to me.*

- *A second consideration is preserving and enhancing Regenstein's role in undergraduate as well as graduate research—as a library where students can indeed access all the most up-to-date electronic and web resources, but where they are also readily lured into the stacks and into self-directed reading and research—where books matter. We have a student body that by and large still reads books; whatever we do with the library has to signal that we are continuing to nurture that habit and not place obstacles in its way.*

- *I would advocate…a careful job of deciding what kinds of material would go into non-browseable storage. This should rest on research on how faculty and graduate students in different fields actually use browsing in their research, and what kinds of material they most need to browse.*

- *I would advocate…designing any ASRS system put into place down the road with an adjunct reading room, where readers can efficiently browse a large number of books at once, without having to cart them away, and insuring that the software can easily process bulk orders from a single individual researcher.*

APPENDIX 4: Library Shelving Facilities at Peer Institutions

In the last two decades, many of our peer institutions have of necessity built off-site high-density non-automated storage facilities into which are placed less frequently used materials. Expanding on-site was not an option. These warehouses for books are usually located well off the campus and have been controversial. Over time some libraries have opted to rent space instead of constructing off-site facilities, and others who have built such facilities have returned selected materials to the campus libraries. In fact, MIT is considering installing a high-density automated system to bring materials back to campus from an off-site location.

The following is a list of major research institutions with off-site non-automated storage facilities:

- **Brown University**
- **Columbia University**
- **Cornell University**
- **Duke University**
- **Harvard University**
- **Johns Hopkins University**
- **Princeton University**
- **Stanford University**
- **University of Pennsylvania**
- **Yale University**

APPENDIX 5: Additional Information Regarding High-density Automated Shelving

A 48-second video presentation of a high-density automated system is available at:
http://www.lib.uchicago.edu/staffweb/trustees/HK_automated.mov
(requires the Quicktime media plug-in, available at http://www.apple.com/quicktime/download/)

High-density automated systems are not particularly high-tech. They are a well-established technology, approximately 40 years old, and widely used in the commercial sector by many of the world's largest companies. Some of the earliest systems are still in use today after having gone through one or two technology upgrades. A technology upgrade enables the structural components of the system (e.g. the bins and racks) to remain while the computational/electro-mechanical portion of the system is upgraded, thus avoiding technology obsolescence.

High-density automated systems have been used successfully by smaller academic libraries since 1991. These systems are presently in place in libraries at

- **California State University at Northridge**
- **Eastern Michigan University**
- **University of Nevada at Las Vegas**
- **Sonoma State University**
- **Valparaiso University**

High-density automated systems are currently being built for the libraries at

- **Santa Clara University**
- **University of British Columbia**
- **Colgate University**
- **University of Louisville**
- **Georgia Southern University**
- **University of Utah**

In addition, **MIT** is seriously considering such a system in order to bring books *back* to the campus from an off-site facility.

APPENDIX 6: Selected Reports Completed as Part of the Library Shelving Facility Study

The following documents can be directly accessed from:
http://www.lib.uchicago.edu/staffweb/trustees/shelving.html

Library Annual Report, selections (August 2003)
http://www.lib.uchicago.edu/staffweb/trustees/2003report.pdf

Ad Hoc Faculty Committee on Library Expansion Report (March 2004)
http://www.lib.uchicago.edu/e/using/longrange/spcollrpt.pdf

Appendix from Library's Committee on Collection Development (March 2004)
http://www.lib.uchicago.edu/e/using/longrange/spcollapdxccd.pdf

Shepley Bulfinch Richardson and Abbott (SBRA) Library Shelving Facility Study (April 2004)
http://www.lib.uchicago.edu/e/using/longrange/sbrastudy.pdf

SBRA Library Shelving Facility Study Appendix (April 2004)
http://www.lib.uchicago.edu/e/using/longrange/sbraappdx.pdf

SBRA Library Shelving Facility Addendum (August 2004)
http://www.lib.uchicago.edu/e/using/longrange/Addendum.pdf

SBRA Library Shelving Facility Appendix to Addendum (August 2004)
http://www.lib.uchicago.edu/e/using/longrange/appendix-addendum.pdf

University of Chicago Library Report on Shelving Facility (November 2004)
http://www.lib.uchicago.edu/e/using/longrange/Library%20Report.pdf