

This library will create new spaces and tools for collections, preservation, and collaboration.

The elliptical glass dome will preserve the open space environment of the west lawn. The lower portion of the dome will be totally transparent to provide unobstructed visibility between inside and outside. The axis of the dome will be slightly angled as a gesture toward the nearby landmark.

High performance Low E fritted glass will provide shading from solar heat gain. At the upper area of the dome, the glass will incorporate 57% shading with a ceramic frit dot pattern applied to the interior of the external surface of the insulated glass. The high performance glass will reject 73% of the solar heat while admitting 50% of the visible light. As a result, the Grand Reading Room will be flooded with daylight that is appropriately shaded to create a comfortable work environment.

The glass dome will be supported by a light steel grid shell made up of 6-inch diameter high strength structural steel tubes parallel to the ellipse axis and spaced at approximately 6 feet in each direction. The steel grid will be anchored to the concrete ring beam. The dome glass will be supported above the steel tube grid at each intersection.

The library will be the only top research library in North America acting to keep its entire collection on campus for the next 20 years. The library will provide on-campus storage capacity for an additional 3.5 million volumes, bringing the library system's total capacity to 11 million print volumes when full. Its high-density automated storage and retrieval system (ASRS) requires one-seventh of the space of regular stacks. When a request is made for material stored

in the system, it will be retrieved within minutes by a robotic crane—unlike retrieval from off-site storage facilities, where it may take up to three days to receive requested material.

A cross-disciplinary collection of materials from all of the existing libraries on campus will be united in the library, and scholars from all disciplines will enjoy working in the Grand Reading Room under a soaring elliptical glass dome. By opening up collection storage space in the campus libraries, the library will enable the rethinking and repurposing of spaces in libraries across campus, creating the opportunity for new individual and group study spaces, and increasing opportunities for collaborative work within these libraries' walls.

### **Ground Floor**

**Grand Reading Room:** This 8,000-square-foot room will provide comfortable seating for 180 faculty, students and visiting scholars under a soaring elliptical glass dome.

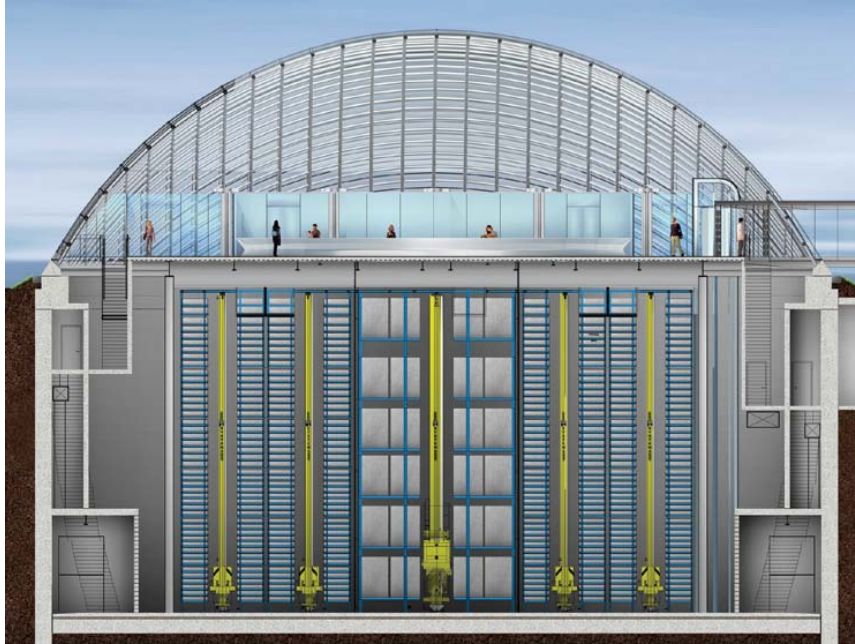
**Preservation Department:** The Library's capacity to preserve its rich collections will be greatly expanded in the new 6,000-square-foot area, which includes:

- **Conservation Laboratory:** Special paper washing sinks, fume hoods for chemical treatments, bookbinding equipment and flexible workstations will be used to conserve original artifacts.
- **Digital Technology Laboratory:** Large-format digital cameras will be used to create high-resolution digital images of unique book and paper materials that are too fragile for traditional conservation treatment or frequent handling.

**Circulation Service Center:** Library users check out materials they requested from the ASRS and obtain information from Library staff.

### **Lower Level**

**Automated Storage and Retrieval System (ASRS):** This system will shelve materials underground by size rather than library classification, in racks extending 50 feet down, with a capacity to hold 3.5 million volumes.



## **Owner Goals**

Goals are why the owner is laying out all that money to install the HVAC systems. Goals tell us how important each criteria are relative to the other criteria.

First cost cannot be considered by itself. Things that improve performance at weather extremes, operating cost, reliability, flexibility and maintainability generally involve greater first cost, and reducing first cost often increases operating cost and reduces reliability, flexibility and/or maintainability. The thrust of our HVAC selection process is to strike a balance between first cost and those other criteria.

We begin with a description of the characteristics of a high performance library. The report will evaluate the following Owner goals of flat lined temperature and humidity for archival library materials, indoor environmental quality, maintenance, energy efficiency and sustainability.

### **Flat-Lined Temperature and Humidity**

For an archival library, preservation of books, notes, photos and artifacts and are the main priority. The first job of the HVAC systems will be providing consistent temperature and relative in the reading and workroom areas. The basement archival storage will be a cold and low humidity space.

### **Indoor Environmental Quality**

Evidence strongly suggests that poor environments in libraries, primarily due to the effects of indoor pollutants, adversely influence the health and performance of students and teachers. This evidence links high concentration of several air pollutants to reduce attendance level due to sickness. There is also persuasive evidence that microbiological pollutants are associated with increases in asthma effects with respiratory infections, which are both related to reduce occupant performance.

Thermal comfort is that condition of mind which expresses satisfaction with the thermal environment. Because there are large variations, both physiologically and psychologically, from person to person, it is difficult to satisfy everyone in the space. The environmental conditions required for comfort are not the same for everyone in the space. However, extensive laboratory and field testing have been collected that provides the necessary statistical data to define conditions that a specified percentage of occupants will feel comfortable.

Natural day lighting is a show stopper as it relates to indoor environmental quality and occupant productivity. Connection to earth and the outdoors will create in indoor built environment of unparalleled indoor environmental quality.

Before we evaluate HVAC systems for consideration, we have to go through a few required yes or no gates. The chosen system must be able to meet the cooling and heating loads, it must be able to maintain minimum code required health and comfort, and it must fit in the allocated mechanical space allowing proper maintenance.

#### Maintenance

Simply stated we must provide adequate space to allow the service of our HVAC equipment. We also need to provide the University with HVAC control sequences that are so simple they work. With improvements in IAQ and comfort, occupant complaints will be reduced. The commissioning process will be allow direct training from the contractors and design team.

#### Energy Efficiency

We must demonstrate a 14% percentage improvement (2 LEED points for EA credit 1) in the proposed building performance rating compared to the baseline performance rating per ASHRAE Standard 90.1-2004 to allow the project to take advantage of the City of Chicago Green Permit process.

#### Sustainability

Sustainability is a characteristic of a process or state that can be maintained at a certain level indefinitely. The term, in its [environmental](#) usage, refers to the potential longevity of vital human [ecological](#) support systems, such as the planet's [climatic system](#), systems of [agriculture](#), [industry](#), [forestry](#), and [fisheries](#), and human [communities](#) in general and the various systems on which they depend.

## Challenge #1 – Archive Storage

The processes of decay are profoundly influenced by environmental conditions. A proper environment can prevent damage, and an improper environment can cause damage. Temperature and RH determines the preservation quality of your storage environment.

Temperature is the most significant determinant of the rate of chemical reactions within the organic materials of your collection objects. In other words, Temperature determines how fast (or how slow) organic materials will "naturally age". Relative Humidity determines how much moisture your collection objects will contain. High RH will leave objects too damp, while low RH will leave objects too dry.

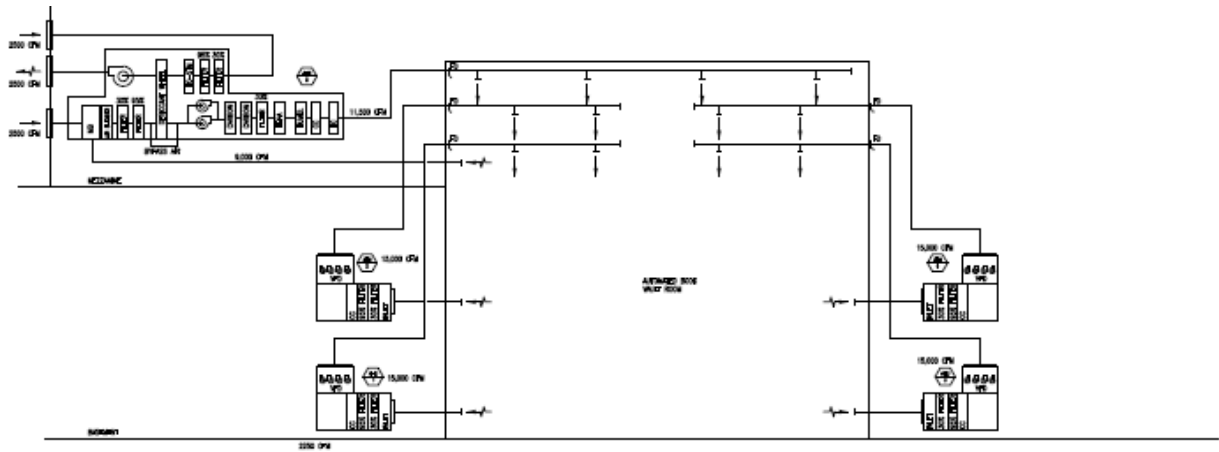
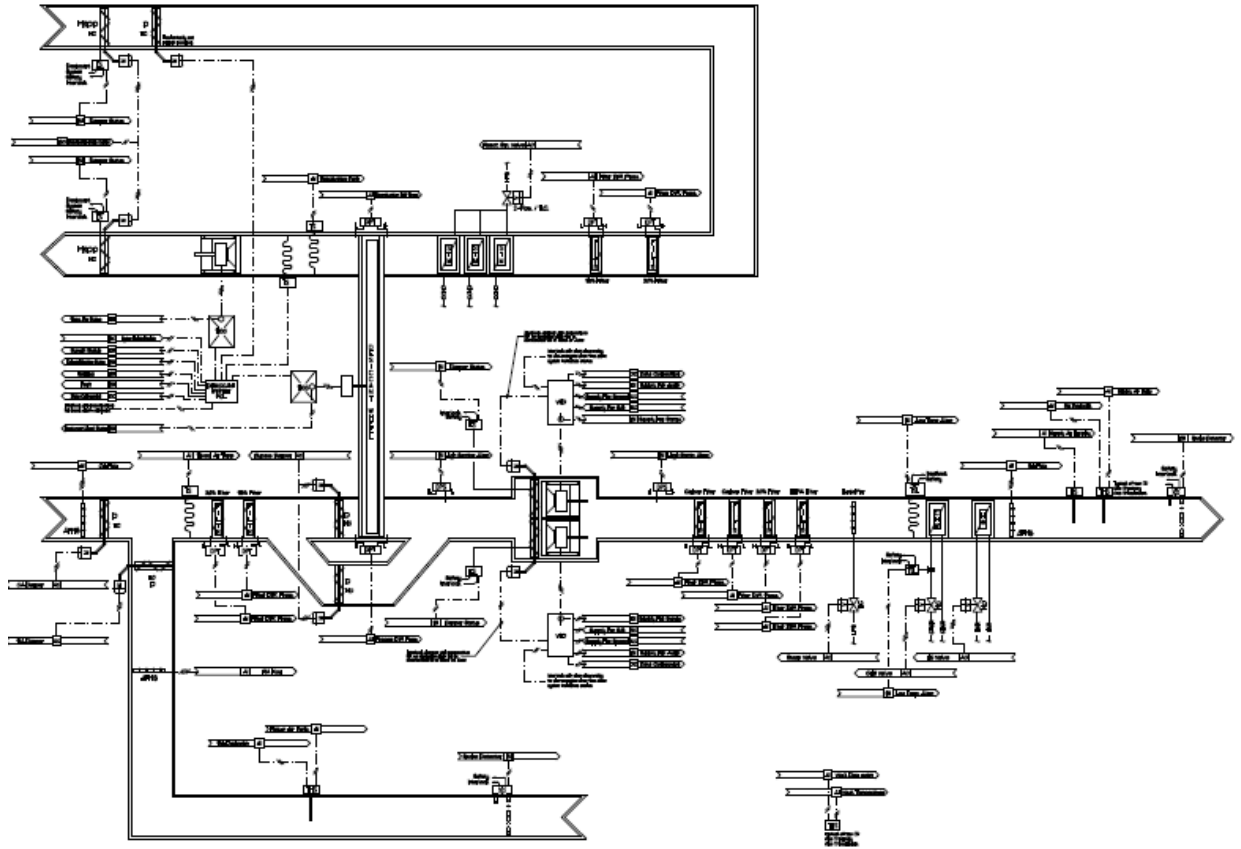
The performance targets in consideration for the lower level archival storage room are:

- 60F +/- 2F and 30% relative humidity (29F dew point)

Calculate Moisture Loads from:

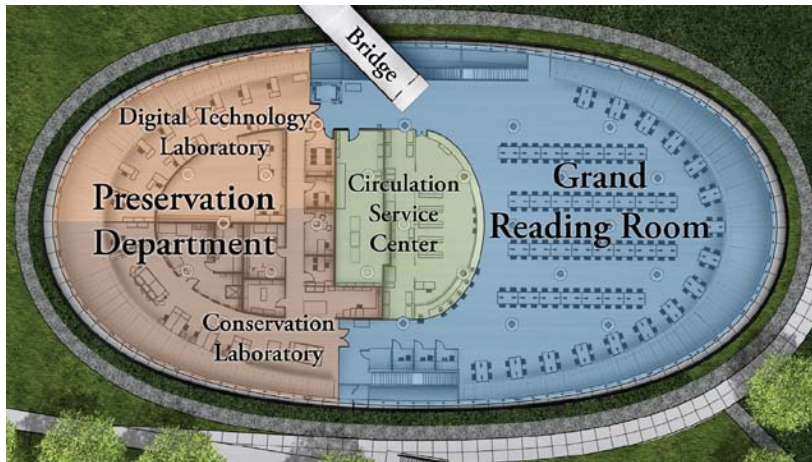
- Ventilation
- People
- Door Openings
- Infiltration
- Archive enter space condition of 80F and 60% RH

Explore cost effective HVAC Systems and performance targets that minimize natural aging, mechanical damage, mold risk, metal corrosion.



## Challenge #2 Conservation Labs

The Library will also house state-of-the-art conservation and digital technology laboratories that will preserve manuscripts and other rare materials, in their original form and through digitization. This work will enable long-distance research and innovative approaches to scholarly collaboration.



The performance target to be maintained in the ground floor preservation laboratories is 75F and 45% relative humidity (52.2F dew point) in the summer and 72F and 45% relative humidity (49.6F dew point) in the winter.

Explore HVAC Systems that strike performance targets and enhance the conservation and digital labs.

### Challenge #3 – Reading Room

This 8,000-square-foot room will provide comfortable seating for 180 faculty, students and visiting scholars under a soaring elliptical glass dome.

The performance target to be maintained in the ground floor grand reading room is 75F and 50% relative humidity (55F dew point) in the summer and 72F and 30% relative humidity (38.9F dew point) in the winter.

Explore HVAC systems that excel in thermal comfort, indoor air quality and energy conservation. Be aware of the connection of this space with the conservation and archive areas.

