



1988

A Proposal for Furnishings in the Reading Rooms of the Furness Library Based on Historical Precedent and Modern Furniture Requirements

Simon Herbert
University of Pennsylvania

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Disciplines

Historic Preservation and Conservation

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A PROPOSAL FOR FURNISHINGS
IN THE READING ROOMS OF THE FURNESS LIBRARY
BASED ON HISTORICAL PRECEDENT AND
MODERN FURNITURE REQUIREMENTS

Simon Herbert

A THESIS

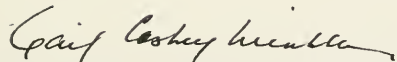
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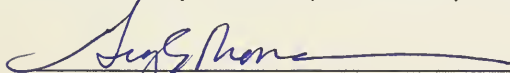
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the University of Pennsylvania in
Partial Fulfillment of the Requirements
for the Degree of

MASTER OF SCIENCE

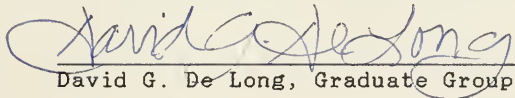
1988



Gail Caskey Winkler, Lecturer, Advisor



George E. Thomas, Lecturer, Reader



David G. De Long, Graduate Group Chairman

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I could not have completed this thesis without the patient assistance of those who spent time supporting, guiding and encouraging me towards a timely conclusion.

My thanks are extended to: Mark Lloyd and his staff of the University of Pennsylvania Archives for photographic and research assistance; to Alan Morrison and the staff of the Fine Arts Library, University of Pennsylvania; and to Nancy Trainer from the office of Venturi, Rauch and Scott Brown, architects.

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To Gail Winkler, my advisor, I would like to give special thanks for being both an advisor and exemplary teacher. The lessons I learned will endure for a lifetime. Lastly, I would like to thank my wife, Charla, for her unending support and understanding.

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THE AMERICAN LIBRARY

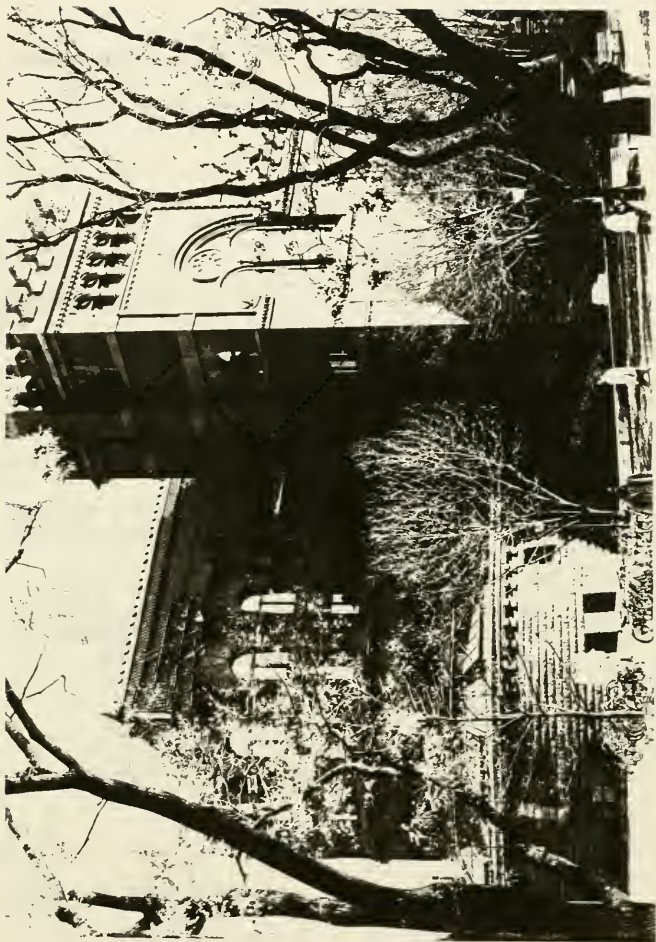


Figure 1. View of the University Library by Frank Furness in 1891. (Now Furness Library). Photo.1988.

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FINE ARTS LIBRARY

Chapter 1.

INTRODUCTION

My interest in the refurnishing of the Furness Library at the University of Pennsylvania stems from my undergraduate studies in furniture design and production taken as part of my Baccalaureate degree from Ravensbourne College of Art, Chislehurst, Kent, England (1974-1978). The work of restoration and renovation of the Furness Library (1891) provided a "real" problem to explore in this thesis. This study has been limited to the choice of furnishings for the three major reading areas on the main floor of the Library. It seems that three different approaches can be employed when refurnishing an historic interior such as that of the Furness Library. They are: to provide the same furniture which existed there in 1891; or to provide a modern alternative; To use a custom design specifically for the Library. ¹ Because of my interest in furniture design, I have chosen the third alternative. This thesis provides design solutions for a reading table, reading chair and reading lamp that will both fulfill the needs of modern students and compliment the nineteenth-century space.

Methodology

Types of libraries in the late nineteenth-century may be grouped into three categories; large public libraries, collegiate libraries and small regional libraries. The Furness Library is a collegiate library designed for use by a student population. The examined sources for historical precedent were published accounts of other libraries designed by Furness and his contemporary architects. The Library Journal, The American Architect and Building News and the Architectural Record of the late nineteenth and early twentieth centuries contained examples of library design and photographs of reading rooms. These were mainly public libraries located in the Northeast. Had time permitted, more libraries of the collegiate type should have been studied, not only on the east coast but in other parts of the United States as well. Furthermore, a more in-depth study could be made of the period literature on library design and furnishings.

During this research, photographs, books and documents relating to the history of the Library and its furnishings were used from the Archives of the University of Pennsylvania. None of the original Reading Room

furniture remains in use today, having been replaced by other pieces in the intervening years since 1891. Nor did Frank Furness design tables or chairs for the library. The area of study is limited to providing solutions for reading furniture and task lights and does not address the need for choices of furniture in other areas including recent suggestions for seating around the fireplace in the Main Reading Room.

Finally, in designing the furnishings for contemporary student use, several scientific studies were consulted: Niels Diffrient's Humanscale 1/2/3, which looks at ergonomic data; Robert Sommer and Edward T. Hall's examinations of psychological and personal space requirements; and the Illuminating Engineers Society recommendations for lighting levels.

Overview of the Chapters.

The second chapter is an historical analysis of the furnishings and lighting in the Main Floor Reading Rooms of the Furness Library. The analysis makes extensive use of the historical reports produced for the project architects by Clio Group Inc., under the direction of

George E. Thomas.

The third chapter is a scientific analysis of the requirements for seating, reading and task lighting. It explores issues of ergonomic needs based on Niels Diffrient's Humanscale 1/2/3 (1974) and recommended specifications from the Encyclopaedia of Library and Information Science (1972). The chapter also reviews psychological spaces and acoustical needs.

Chapter four begins with a brief survey of some of Frank Furness's known furniture designs and looks at some of the motifs he used. Furniture by Frank Furness is not well documented to date, but several articles in books and magazines brought to light a selection of pieces in museums and private collections which have been attributed to the architect. Furness apparently included in his furniture designs many of his architectural ideas. This is followed by an explanation of the design proposals accompanied by eleven design illustrations.

The fifth chapter sums up the thesis and summarizes the proposals.

Chapter 1.

Endnotes

1. Marilyn Johnson, "Furnishing the Furness Library, The University of Pennsylvania. A summary of information and recommendations from a meeting on May 19, 1988." August 28, 1988. The report recommends that an original design of chair and table be created for the Furness Library furniture. pp.2-3.

Chapter 2.

HISTORY OF THE FURNISHINGS IN THE FURNESS LIBRARY.

This chapter traces the history of the furnishings in the main reading areas of the Furness Library at the University of Pennsylvania. The reading areas are located on the first floor of the building, and are comprised of three connected spaces; the Main Reading Room, the Rotunda Reading Room, and the Study Alcoves. A comparison is then made with reading rooms in other libraries of the period by architects as notable as Frank Furness, specifically McKim, Mead and White and H.H. Richardson. The last quarter of the 19th century was a period of widespread public library construction. The assumption is that although the Furness Library is a "collegiate" library designed for use by a student population, the requirements for seating and reading remain generally the same as for non-collegiate public libraries. Public libraries of this period by other architects are therefore valuable cross-references in understanding the furnishings in the University of Pennsylvania Library by Frank Furness.

The Library of the University of Pennsylvania, 1891.
Frank Furness, Architect.

Philadelphia architect Frank Furness (1839-1912) received the commission to design and build a new library for the University of Pennsylvania in 1887. The library opened for limited use in 1890, mostly as a proving period for the building and library staff and was dedicated in 1891. ¹ Formerly the University Library, it became the Fine Arts Library after the Van Pelt Library opened in 1962. It is now called the Furness Library in memory of Horace H. Furness, a noted Shakespearean scholar and professor at Penn. In addition to being the architect's brother, Horace Furness chaired the committee which gave Frank Furness the commission. ²

This was the third library building that Furness had designed; his first--for the Library Company of Philadelphia--had been completed in 1880. It was demolished in 1940 (fig. 2). ³ His second library was built the same year as the Library for the University of Pennsylvania in Newcastle, Delaware, but was a small regional type of building with a single reading room. ⁴ As in the Library for the University, Furness used a ceiling skylight to allow light into the reading room area. ⁵ Earlier, Furness had made alterations to the



Figure 2. Library Company of Philadelphia. Reading Room. Fraser, Furness and Hewitt, 1880. Demolished 1940. James F. O'Gorman, The Architecture of Frank Furness, (1973). Catalogue of Selected Buildings by George E. Thomas and James F. O'Gorman. p.123.

Franklin Market Company building for the Mercantile Library Company in Philadelphia between 1867-1869. ⁶ For the design of the Library at the University of Pennsylvania, Furness sought the advice of Melvil Dewey from Columbia University and Justin Winsor from Harvard University, whom were also consulted by McKim, Mead and White in the design for the Boston Public Library (1887-1898). ⁷ Dewey and Winsor were both highly accomplished librarians and responsible for founding the Library Journal as well as improving library awareness nationwide. ⁸

While all the reading areas in the Furness Library are connected, they form three distinct areas; the Main Reading Room, the Rotunda Reading Room, and the Study Alcoves (Fig.3). In its original and restored form, the Main Reading Room is the largest and most dramatic space in the building, with a multi-windowed vertical space rising to a skylight approximately four floors above. Although an additional level was inserted in the early 1920's, its removal under the present restoration will return the space to its original proportions. A fireplace is situated on the west wall and to the south behind two large arches is the circulation area, while to the north through a corresponding pair of large arches

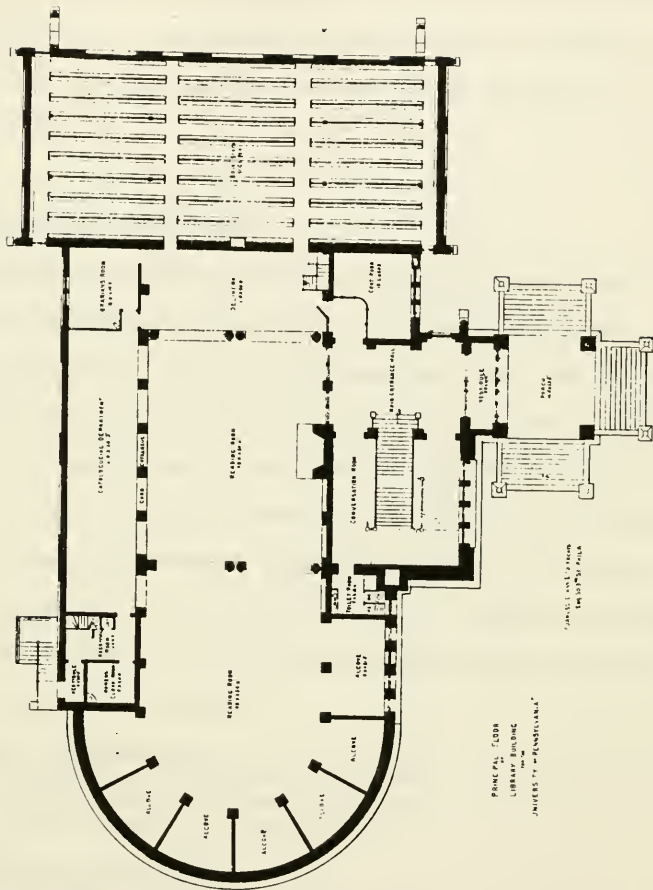


Figure 3. Plan of the Reading Rooms on the Main Floor Furnishings in the Furness Library, 1891. Proceedings at the Opening of the University of Pennsylvania, 7th February 1891. 1891. opposite.p.32

lies the Rotunda Reading Room. This room has an apsidal north end with a two-story ceiling height. Around the north wall are six smaller arches, each leading to a Study Alcove.

Furniture Specifications.

Original schematic plans of the Furness Library do not show furniture arrangements for the first floor Reading Rooms and earliest photographs from 1890-91 show utilitarian reading tables and chairs in place. These pieces are described in an undated document from the architectural firm of Furness, Evans & Co., which may be the original furnishings specifications for the University Library. ^a The following is a summary taken from these specifications of the tables and chairs for the three reading room areas:

Main Reading Room.

4 Tables seating seven per side	11' 8" X 3' 6"
40 Bent wood chairs without arms	
12 additional arm chairs	

Rotunda Reading Room.

10 Tables (enameled canvass top)	5' 0" X 3' 0"
3 Tables (enameled canvass top)	8' 4" X 3' 6"
41 bent wood chairs without arms	

Alcove Reading Rooms (six).

6 Tables (enameled canvass top)	3' 0" X 6' 8"
each table seating 10 students.	
4 bent wood chairs and one arm chair with arms per alcove (24 chairs, 6 arm chairs)	

No other reference is made concerning the appearance or design of the tables and chairs. (For a copy of the original specifications, see Appendix). In addition to tables and chairs, other furnishings for the Reading Rooms included Iron grilles. These were to be placed in arches of the six Alcoves to support curtains known as "portieres". ¹⁰ The grilles were omitted and the curtains hung from rods. A number of free-standing book and display cases were also included in the specifications. One glass fronted cabinet was located on the main floor in the Stair Tower during the course of this research, but it was is not clear whether this dates from the opening of the library. (It may have been moved since). Lighting is not mentioned in the specifications, although according to research undertaken by Clio Group for the project architects, the only lighting which was not an after thought were two fixtures at the base of the great stair near the entrance. ¹¹ A discussion of the changes in lighting is made later in this chapter on the following pages.

Reading Tables.

When the library opened in 1891, the tables used in the main reading room were wood with simple turned legs, plain side rails and had lockable drawers. The tops overhung the frame and had an insert of enamelled canvas, possibly an inexpensive substitute for leather. ¹² While most seated 16 readers (8 per side), smaller tables were used such as in portions of the rotunda and alcove areas to fit the appropriate space (Fig.4). During the course this research, one of the original Alcove tables was found located in the basement of the Library. It seated four persons per side and one on each end (Fig.5). ¹³ The original enameled canvass has been removed, and the inset area replaced with plastic laminate on plywood. Each end contains a single drawer which was lockable.

One table not listed in Furness and Evans specifications was found in the basement of the Library during this research. The "Modern Gothic" table first appears in a photograph of the Main Reading Room taken after 1922, but may well date from the Library's early years. (Figs.6) Some design motifs on the table such as the chamfers and horizontal bands on the legs are similar to those used on pieces of Furness furniture and to a surviving glass-front case on the main level of the stair



Figure 4. A small reading table in the Rotunda Reading Room. c.1898. Courtesy University of Pennsylvania Archives.



Figure 5. An original reading table from one of the Alcove Reading Rooms, 1891. Measures 72" X 42" X 29"H. Basement of the Furness Library, Photo. 1988.

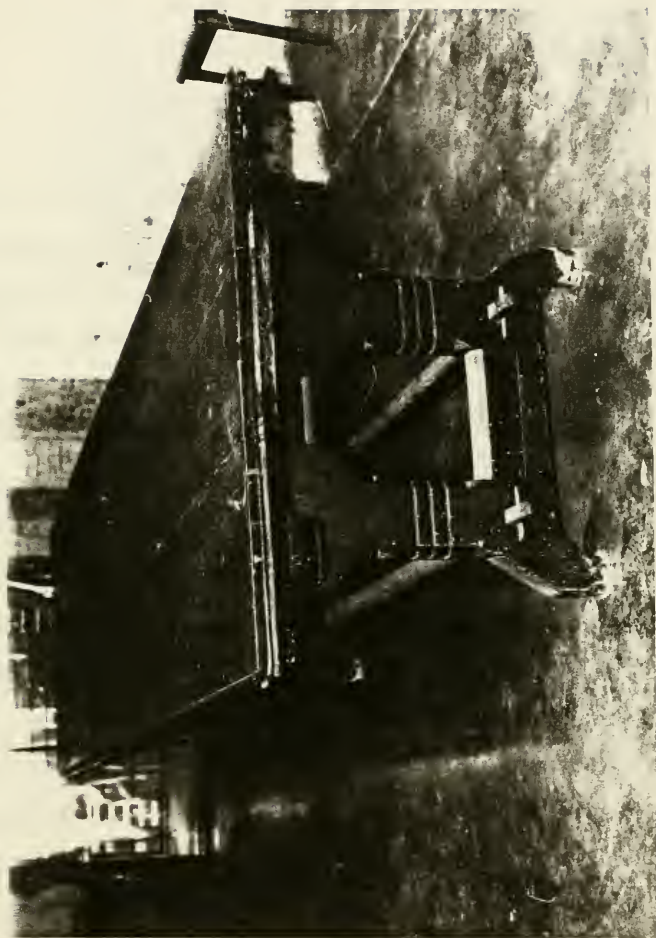


Figure 6. Gothic Revival table in the basement of the
Furness Library. Measures 156" X 42" X 29 1/2"H.
Date of manufacture is unknown. Photo. 1988.

tower (Fig.7). Whether or not Furness was in any way responsible for designing the table, it is one of the few "gothic" pieces in the Library. Unfortunately the table is very uncomfortable to use as a reading table. It is 29 1/2" high, standard height for nineteenth century reading tables, but is uncomfortable to sit at because leg movement is restricted by the height of footrests and the depth of the apron. Its dimensions are 42" wide by 156" long, suggest the table was intended for ceremonial rather than reading purposes.

In 1898, the furniture layout in the Rotunda Reading Room was redesigned to provide study areas with task lighting, and while it is unclear exactly when this change was implemented, photographs of about 1904 show reading tables replaced by reading carrels arranged in single and facing rows (Fig.8 & 9).¹⁴ Each carrel had a low raised divider to separate it from the next. Although study carrels had replaced the existing tables in the Rotunda about 1898, the original tables remained in the Main Reading Room until no later than the 1960's, by which time the reading tables had been replaced by other wood tables which were plainer in design (Fig.10).¹⁵

In general, reading tables in other libraries contemporary with the Furness Library tended to follow



Figure 7. Glass fronted case located on the main floor of the Furness Library which dates from the early years of the building. Photo. 1988.

Figure 8. (Overleaf) Plan of the Main Floor showing the rearranged seating. Furness and Evans, 1914. Reprinted from Venturi, Rauch and Scott Brown, Master Plan. Vol.IV. Bookstack Building Analysis. Clio Group Inc. January, 1988.

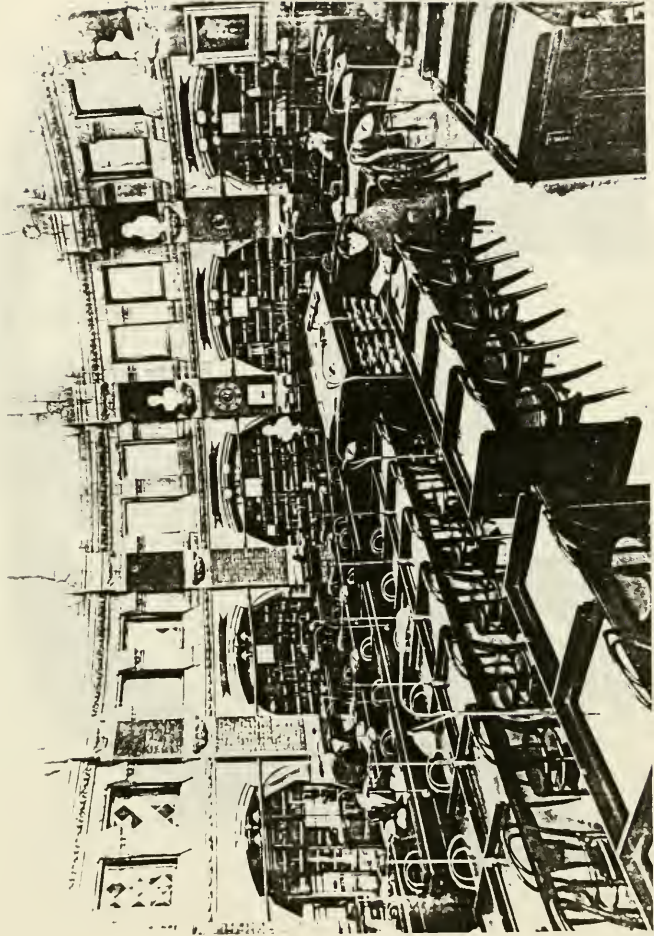


Figure 9. Rotunda Reading Room showing the carrels in use
c. 1904. Photo courtesy University of
Pennsylvania Archives.

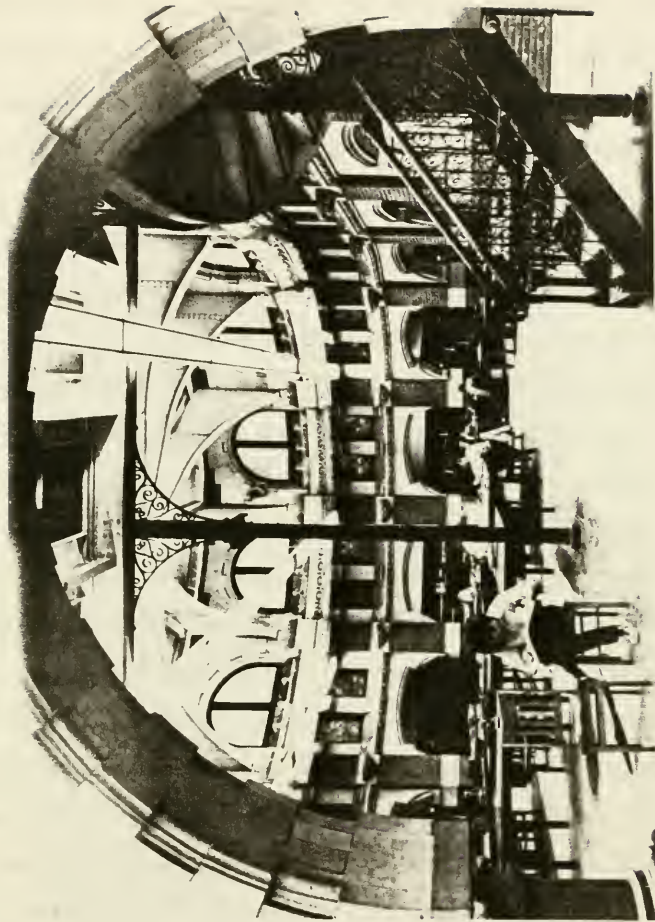


Figure 10. View of the Rotunda Reading Room and the plainer tables used by the early 1970's. James F. O'Gorman, *The Architecture of Frank Furness Catalogue of Selected Buildings* by George E. Thomas and James F. O'Gorman. p.170.

similar formats and designs. Strength of construction and practicality in design seem to have been the guiding principles with less emphasis on decoration. For example, library tables designed by H.H. Richardson were mostly rectangular, seating four, six or eight people depending on the space. They have Solid wood tops, decorative turned legs and a foot-rest built into the sub-frame, a feature that appeared in most of the tables Richardson used (Fig.11). Tables in the Boston Public Library by McKim, Mead and White in 1887-1898 were eight-seaters, built with a solid top over a plain apron mounted on two heavy, ornamental end supports (Fig. 12). These supports had scrolled tops with ball-and-claw feet, and their position promoted seating on the long sides only, since the tables were arranged on each side of a central aisle and end-seating would have disrupted traffic-flow through the reading room. These tables are classically styled, in much the way the Boston library is itself a classical building. An almost identical table was used in the Public Library at Madison, New Jersey, designed by Boston architects Charles Brigham and William P. Adden. 15

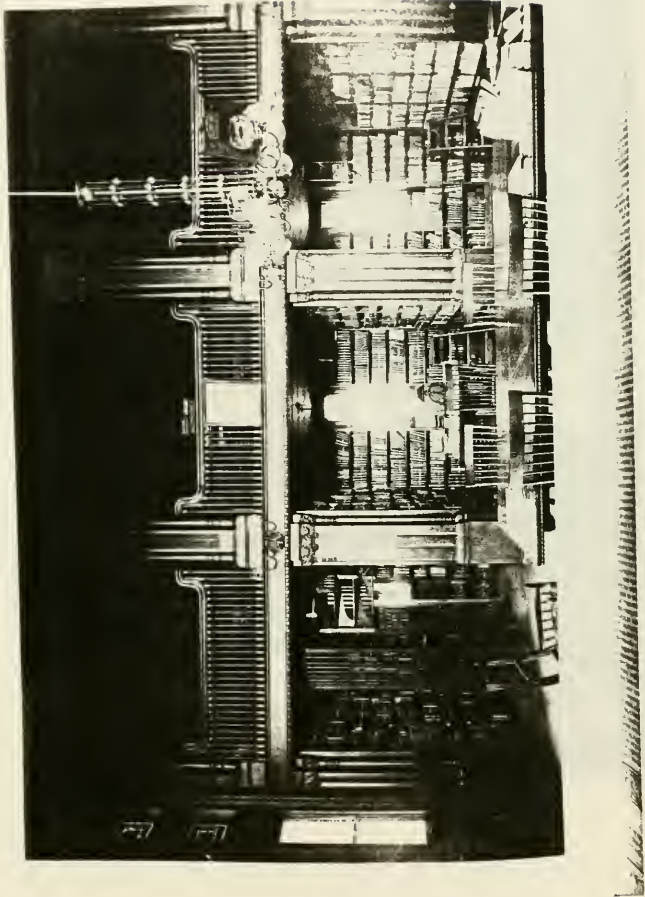


Figure 11. Furnishings in the Crane Memorial Library by H.H. Richardson 1892. American Architect and Building News Vol. 37, 1892.



Figure 12. Bates Hall, the main reading room of the Boston Public Library by McKim, Mead and White (1887-1898). The American Architect and Building News April 6, 1895. No.1006.

Reading Chairs.

Earliest photographs show that Thonet pattern chairs were used in all three Reading Rooms of the Furness Library (Fig.13). Thonet furniture was generally of bentwood using a technique developed by Michael Thonet in Vienna from about middle of the 19th century. Thonet's sons formed the 'Gerbruder Thonet' company in 1853, and began to mass-produce a variety of bentwood designs. ¹⁷ They were strong for their light weight, had woven cane seats, and because they were made in component parts, could be shipped flat anywhere in the world and assembled with less than skilled labor at the point of sale. Coupled with an affordable price-tag and an exclusive patent, Thonet's chairs sold in the hundreds of thousands. ¹⁸ Although the Thonet company made a wide range of furniture, the simple bentwood chairs were the most popular. These were being sold in America by 1871. ¹⁹ As well as genuine Thonet imports, the bentwood process was widely copied by other manufacturers when the original patent ran out in 1869. ²⁰ The Thonet chair which most closely resembles the ones used in the University Library is the Chair No. 18 designed in 1876. It was the second to least expensive Thonet chair, and eventually became the largest selling model in the Thonet

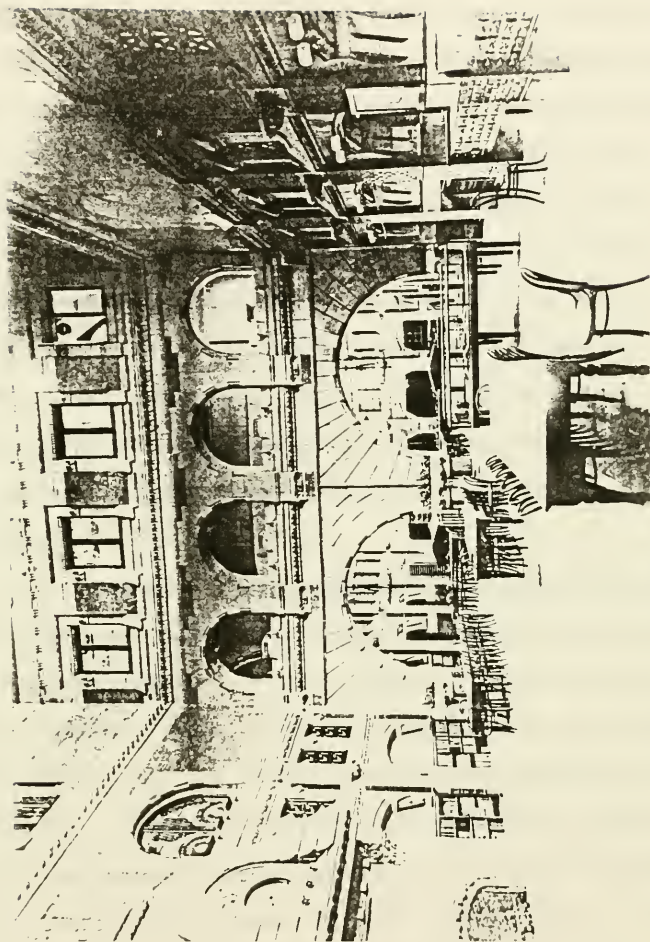


Figure 13. The Main Reading Room prior to 1898. Courtesy University of Pennsylvania Archives.

catalogue. Today it is widely associated by many as the Vienna cafe chair. ²¹ It had supports to the back from the seat, and an inner back insert giving back support for the sitter and additional strength to the chair. Bentwood chairs based on the Thonet patents were manufactured in Philadelphia by the Heywood Chair Manufacturing Company.²² Frank Furness had chosen such chairs for the Pennsylvania Academy of Fine Arts building in Philadelphia (1876) to be used by visitors for viewing works of art. Similar chairs were also selected by the architects Cope and Stewardson for the University of Pennsylvania Law Library (1897) and the Thomas Library at Bryn Mawr (1901). ²³

The bentwood chairs used in The Furness Library were apparently not well suited for heavy continuous use, and photographs of the early 1900's indicate substantial sag in many of them. (Fig.9) Perhaps coinciding with the 1922 renovation the Thonet chairs were replaced by heavy, office-type chairs with solid wooden seats, which were later augmented by metal chairs of a similar design. Until the library closed in 1987 for renovation, these wood and metal chairs were the only ones in use.

Library chairs came in more variety than reading tables, but like the tables, emphasis was still one of

practicality and durability. Perhaps for these reasons, the most widely used library chair in the late 19th century was the Windsor. This chair was strong, inexpensive, and available in a variety of patterns. An early 20th-century photograph of the Library Company building in Philadelphia by Furness (1880), shows sack-back Windsor arm chairs in the Reading Room. ²⁴ The same type of Windsor chairs were also used in McKim, Mead and White's Boston Public Library of 1887-1898. ²⁵ The Architectural Record published a special edition on libraries in 1902, and many of the illustrations showed this type of chair. ²⁶ H.H. Richardson used fan-back Windsor arm chairs in the Billings Memorial Library of c.1886, but in the Crane and Converse Memorial Libraries, (c.1882 and 1885) he used chairs of his own design. ²⁷ For the Winn Memorial Library (c.1879), Richardson used an armless chair with a padded seat. ²⁸ If one compares the Thonet chair used at the University Library to chairs in other libraries (for example the Windsor type), they appear less durable and lighter in weight.

Lighting.

The history of lighting in the three reading rooms of the Furness Library is far more complex than the history of the furniture alone. When the library first opened for limited use in 1890, the reading rooms relied upon natural light for illumination (Fig.14). Vol. III of the architects' report offers an explanation of possible sources for the use of the skylight in the Library building. ²⁹ Furness planned to flood the reading areas on the first floor with so much natural light that artificial illumination would not be required. ³⁰

To accomplish this, he provided a large central skylight four levels above the first floor to allow light into the Main Reading Room and placed many additional windows in the vertical walls. This created a kind of lighted shaft with the reading tables at the bottom (Fig.15). The Rotunda Reading Room gained light from windows at the second level and indirectly from the central skylight and the alcove skylights. The Study Alcoves around the apsidal end of the Rotunda Reading Room received light through a lay light (the flat glass area directly above the alcove) with a skylight above on the roof.

During the fall of 1890, as the number of daylight



READING ROOM UNIVERSITY LIBRARY

Figure 14. A c.1893 view of the Main Reading Room with reliance upon natural lighting. Francis Newton Thorpe, Benjamin Franklin and the University of Pennsylvania 1893. Facing p.392.

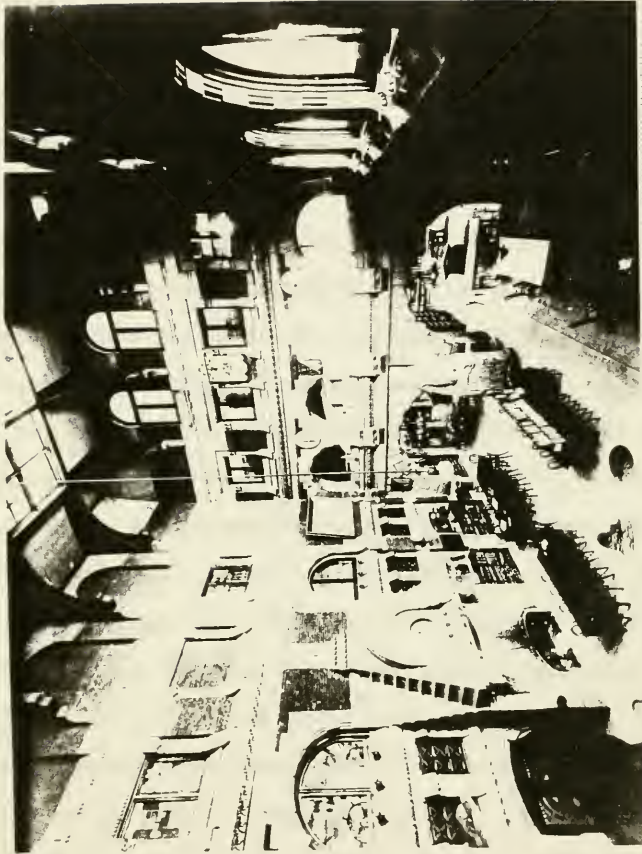


Figure 15. Main Reading Room c. 1898. Courtesy University of Pennsylvania Archives.

hours decreased towards winter, light in the reading rooms was found to be inadequate. ³¹ To compensate, gas lighting fixtures were installed; gas wall sconces were placed around the perimeter of the Main and Rotunda Reading Rooms and a gasolier was suspended under each of the four main arches in the Main Reading Room (Fig.13).

Further modifications followed. Philadelphia was generating electricity by 1889, and had a city-wide electric system in 1902. ³² Before 1902 there were individual electrical power generating plants in the city, and in 1893, the University of Pennsylvania opened its own generating plant on land immediately south of the Library. The plant provided electric power and heat to the campus. ³³ With the introduction of electricity, electric fittings were added to the existing gas fixtures by 1896. While the gas lights were directed upwards, the electric lights were attached under the gas mantles and pointed downwards (Fig.4). In period photographs they appear as smaller points of light. These fixtures used hairpin-loop carbon-filament bulbs. This type of bulb was an early form of electric light and was Edison's first commercially successful lamp developed in 1879. ³⁴ The bulbs had a characteristic nipple on the end, created in the manufacturing process by the drawing out of air to

form a vacuum inside the bulb. Early bulbs of this type were brighter than gasoliers but compared with modern lamps, were still of a low-intensity. ³⁵

The center of the Main Reading Room, which remained dark from mid-afternoon in fall and winter months, received a single lamp suspended from the central skylight. Photographs show it in place by 1898. Figure 15 shows a carbon arc lamp similar to those used in street lighting, a glass shade surrounding the light bulb itself. It is possible that installation of this light was carried out in 1897 when the electric lamps were proposed. ³⁶

In the late 19th century electricity was still an uncertain form of energy prone to failure, which explains why many buildings were often fitted with both gas and electricity. ³⁷ Once electricity had proved itself by about 1910, existing gas fixtures were converted to electricity or replaced. A 1903 photograph of one of the upper seminar rooms in the Library shows gas fixtures converted to electricity (Fig.16). This seems to indicate that the switch to the exclusive use of electricity was already underway. When the carrels were installed in the Rotunda Reading Room about 1898, each carrel had a single shaded bulb for task lighting. The combination

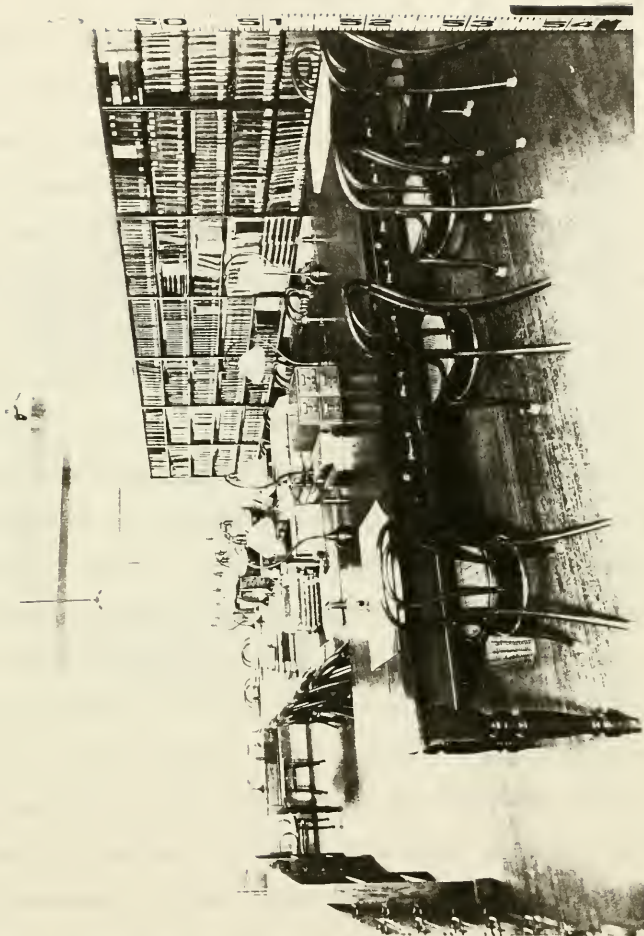


Figure 16. Upper Seminar Room, c.1903. Courtesy University of Pennsylvania Archives.

gas/electric fixtures around the perimeter walls were still in use by the early 1900's.

Period photographs of libraries contemporary with the University Library show a similar developmental history concerning the lighting of reading rooms. As electricity became more available, existing gas fixtures had electrical light sockets attached to them. As electricity became reliable about 1910, the gas fixtures were converted completely or replaced by new electrical fixtures. This is particularly noticeable in Richardson's libraries, where both wall sconces and chandeliers are used in a way similar to the Furness Library. The Boston Public Library appears to have used electric lighting from its beginning (fig.12). Floor lamps reached the height of wall sconces around the perimeter of the room, task lights were attached to the reading tables, and a generous amount of natural light entered from large windows in the reading room (fig.17). The presence of task lighting at the point where it was most needed (at the reading tables) meant that strong ambient lighting was unnecessary. Task lighting was also used extensively in other libraries and usually featured a single stem which branched into two light units. The top of the fixture was invariably ornamental, with scrolled tubing

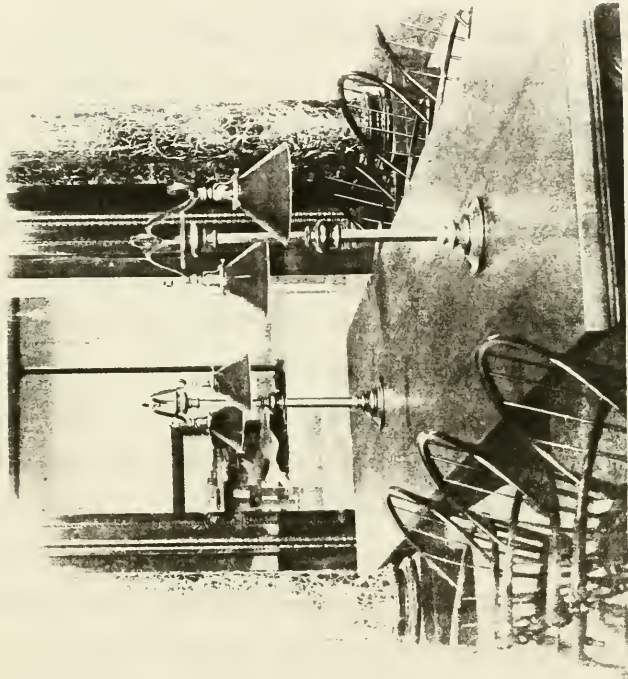


Figure 17. Task lighting in the Boston Public Library by McKim Mead and White (1887-98). The American Architect and Building News April 6, 1895, No.1006.

supporting the lamps which had shades of colored glass. Other varieties used four lamps in tandem to illuminate the entire reading table from a single point. ³⁸

The skylights in the six Study Alcoves of the Furness Library became problematic and were altered although the exact date is uncertain. According to George E. Thomas, who has made extensive examination of the Library's records, the lay lights were painted over as a method of reducing cleaning maintenance on the glass. ³⁹ Apparently there was a continual problem with dust particles and condensation settling on the upper glass surface of lay light (the area between the skylight and lay light). Painting the glass prevented those below from seeing the dirt, but at the same time eliminated the natural light. Furness's original concept for the library was for increasingly quieter areas the further one penetrated the reading rooms. ⁴⁰ The quietest areas were the Study Alcoves, and across each hung a portiere (curtain) to buffer sounds. ⁴¹ These appear in a photograph taken between 1898 and 1904, but they do not appear in later photographs (Fig.4).

In 1922, a floor was built above the main reading room to create much needed extra floor space in the building. ⁴² The insertion of the floor excluded

natural light from the main skylight and additional artificial lighting was required. A photograph taken after 1922 shows new incandescent lamps suspended from the underside of the new floor (Fig.18). There is no evidence of the earlier gas lighting and it is assumed the sconces and gasoliers were removed as part of the 1922 renovation. (The points where the sconces attached to the wall are still visible today). About 1960, industrial fluorescent strip lighting replaced the incandescent fixtures, giving a wide and more even distribution of light than previously available. Since wall sconces, task lighting, and natural illumination disappeared from the reading rooms in 1922, strong ambient lighting was required.

Conclusions

The history of the furnishings in the reading rooms reflects an ad hoc approach to the changing needs of the University Library. The original furnishings were not custom designed for the architectural space and as pieces wore out they were replaced by similarly utilitarian chairs and tables. The end result after nearly a century



Figure 18. A view of the Main Reading Room and the circulation area after the floor had been inserted in 1922. Courtesy University of Pennsylvania Archives.

of incremental changes was a visual jumble of often uncomfortable tables and chairs. The lighting systems reflect a continual process of experimentation and change. Underlit from the beginning, attempts were made to adapt the latest advances in lighting technology. The repeated changes and modifications throughout the reading rooms resulted in a system which supplied a quantity of light at the expense of the architectural space. There are strong similarities between the original furnishings of the Furness Library and those of other libraries of the period. Furnishings in the Furness library were not reflective of furniture that Furness is known to have designed and therefore should be considered only one of the many possible choices of furnishings available at the time.

In making a final comparison of furnishings in the Furness Library with other libraries, the reading tables appear to be very conventional and ordinary in quality and design. The Thonet chairs, which appear in few period reading rooms, were probably chosen more for their economy than durability. Furthermore, artificial lighting in the Furness Library was an after-thought, which meant that its placement was decided by the layout of the existing building. However, the gas fixtures were typical of

the period, and their conversion to electricity followed the pattern similar to other libraries of the time.

Chapter 2.

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3. O'Gorman, The Architecture of Frank Furness Catalogue of Selected Buildings by George E. Thomas and Hyman Myers. p.123.

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11. Venturi, Rauch and Scott Brown Masterplan Volume III, Clio Group, Historic Structures Report 1986 prepared by George E. Thomas et al. p.83.

12. Furness & Evans, Specification. p.2.

13. Furness & Evans, Specification. p.2.

14. Venturi, Rauch & Scott Brown, Master Plan Vol. III Clio Group Inc. Historic Structures Report compiled by George E. Thomas et al. p.87.

15. George E. Thomas. Dr. Thomas, who used the Furness Library while a student at Penn in the 1960's, and recalls that none of the original reading tables remained in the Reading Rooms by that time. Discussion, November, 1988.

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27. Jeffrey Karl Oschner. H.H.Richardson: Complete Architectural Works. (Cambridge, Mass: MIT Press, 1982), p.305. 107f & 107g. Interior photographs of Billings Memorial Library, c.1888; p.230. 83e, photograph of the interior of the Thomas Crane Library; p.317. 112e, photograph of reading room furniture in the Converse Memorial Library; p.204. 43g, sketch for Wooden Armchair for the Converse Library by H.H.Richardson.

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39. Discussion with George E. Thomas. November 1986.

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Chapter 3.

FORMULATION OF DESIGN PERAMETERS.

The approach for formulating designs of reading tables, chairs and table lamps in the Main Reading Room requires careful balancing of different criteria. This chapter studies the architects' proposed plan for new furnishings and considers modern ergonomic requirements for physical comfort and other factors which affect design. Using modern ergonomic data, use-specifications and materials are defined which outline the approach necessary for combining contemporary needs with designs that are sympathetic with their historical architectural setting.

Furnishing Plan

The preliminary furnishing plan by Venturi, Rauch and Scott Brown, architects, indicate a layout for the Library Reading Rooms similar to the original arrangement of 1891 (Fig.19). ¹ Because of the close similarity to the original plan, the proposed furniture plan offers an


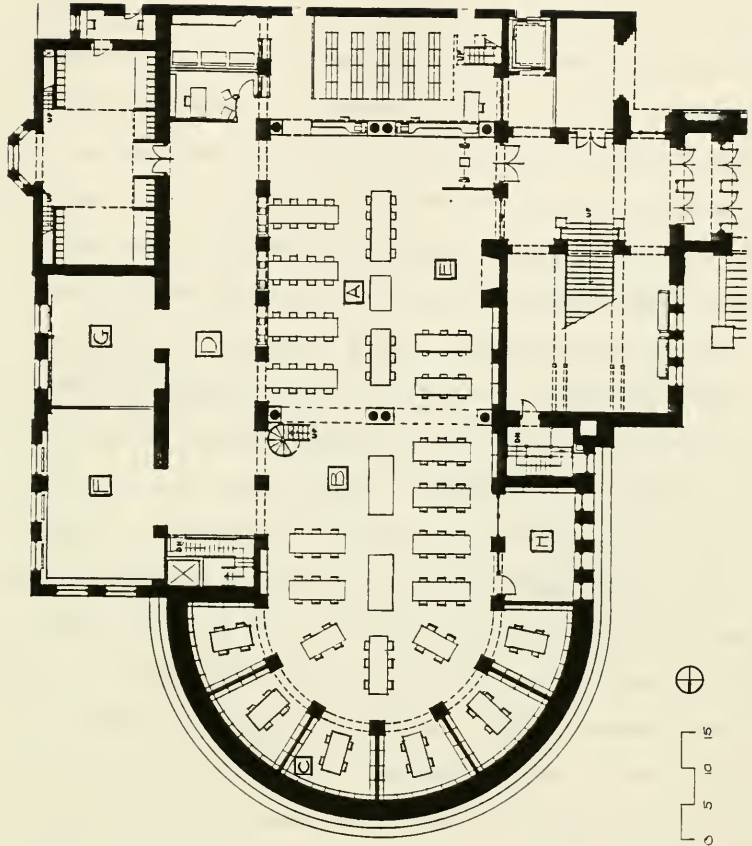
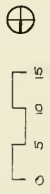


Figure 19. (Overleaf) Furness Library. Partial
First Floor Plan of the Furnishings.
The plan indicates the furniture plan for
reading tables and chairs only (June, 1988).
Re-drawn from "First Level Plan (Main Floor).
Venturi, Rauch and Scott Brown, Master Plan
Vol.IV. Bookstack Building Analysis.
Clio Group Inc. 1988.



KEY

- A MAIN READING ROOM
- B ROTUNDA READING ROOM
- C ALCOVE READING ROOMS (6)
- D CATALOGUE ROOM
- E FIREPLACE SEATING
- F PERIODICALS ROOM
- G WORKROOM
- H QUIET STUDY ROOM



FURNESS LIBRARY

PARTIAL FIRST LEVEL PLAN OF FURNISHINGS, 1988

ideal opportunity for reintroducing 19th century library furniture. The contemporary plan however, allows for an increased number of readers. This has been accomplished by rearranging the layout of the furnishings, largely as a result of the renovation and conversion of other areas in the building to Library use. The periodical reading area is to be moved from the Main Reading Room to the north-east of the main floor; card catalogue and computer display terminals which occupied a large portion of the Main Reading Room will be moved to an adjacent cataloging area. In addition the number of display cases have been reduced allowing additional reading space in both the Main Reading Room and the Rotunda Reading Room. The six alcoves remain unchanged, with a reading table in each, as was the case in 1891.

Reading tables are spaced so that readers face one other from each side of the table with no use of the table ends. Photographs of reading tables in the Furness Library of 1891 show some chairs on the table ends (figs. 4 & 13). The June 1988 revision to the proposed furniture plan indicates the following five different sized tables for the Reading Rooms:

Table Size	No. of Tables	No. Possible Readers	Total No. of Readers
3'6" X 7'0"	8	4	32
3'6" X 9'0"	8	6	48
4'0" X 9'0"	2	6	12
3'6" X 12'0"	4	8	32
4'0" X 12'0"	1	8	8

Total number of reading spaces available in the Main, Rotunda and Alcove Reading Rooms: 134

The general recommendations for lighting in the Reading Rooms have been outlined in a section of the architects' report entitled Approaches to Lighting and Natural Light.² The plan suggests a system of ambient and task lighting to attain desired lighting levels, which also lends itself to the "picturesque quality" of the nineteenth-century space. This study focuses only on task lighting for the reading tables in the three Reading Rooms.

Ergonomic and Human Factors

Ergonomics.

Ergonomics studies the relationship between the human body and operative machinery (including furniture). In the late 19th century there were no formal standards for the design of library furnishings, but tradition seems to have set the height of desks and tables at approximately 29 inches. Furnishings used in public libraries of the period were chosen based on similar-use situations, available furnishings and an empirical working knowledge of design.

An out-growth of studies in machinery and weapons design during the Second World War, ergonomics has enabled designers in general to understand relationships between man and machine. Humanscale 1/2/3 by Niels Diffrient was developed using anthropometric data gathered from U.S. military and civilian sources by measuring the body in a number of different postures.³ Humanscale 1/2/3 became the definitive guideline for designers in the 1970's, covering a wide range of human activities and the ergonomic formulae for safe and comfortable parameters of operation.

Using the information in Humanscale 1/2/3, overall

working measurements required for reading table, reading chair, and lamp can be outlined based on dimensions for the average adult. ⁴ The averages are attained by measuring both male and female, and then averaging the results. The figures take into consideration differences between different races and their physical characteristics. For example an average Japanese male is shorter than the average U.S. white male, who is shorter than the average U.S. black male. ⁵ The University of Pennsylvania has a number of foreign students who represent a wide range of body heights and types, but as Humanscale 1/2/3 points out, it is unrealistic to expect all people to be completely satisfied with a piece of equipment. The best one can hope for is to expect satisfaction from 95% of the user population. A design created for the average adult may be uncomfortable for a very large or very small person, and yet it is impossible to accommodate the needs of all individuals in one design. ⁶

An additional consideration is use of the Reading Rooms by those in wheelchairs. The table height for wheelchair users is 31 inches which is uncomfortably high for none non-wheelchair users. While tables must be available for those in wheelchairs, it is not possible to

include both table heights in one design. While the following designs of the proposed reading room tables could be adapted for wheelchair users, the figures outlined below are based on the average adult.

Recommended Dimensions for Library Use.
from Diffrient's Humanscale 1/2/3.

Reading Table.

Table height.....	27 1/2"
Table width, for two facing readers.....min.	32"
Length of workspace required per reader.....min.	30"
Viewing angle of table top.....	0-20 deg.

Reading Chair.

Seat Height (front edge).....	16-17 "
Seat Width.....	16 "
Seat Length.....	15-16 "
Seat Angle (front to rear).....	0-5 deg.
Seat front edge, prefered padded radius.....	1-2 "

Reading Lamp.

Height of eye level of seated person, measured from top of table to determine approximate level of bottom of shade.....	16 1/2"
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The Importance of Personal Space.

A common problem in reading rooms is the individual who spreads his belongings out on the table, thus taking up more than the allotted table space. This discourages others from using the table, reducing valuable study space. The practice has been studied by behavioural psychologists, including Robert Sommer, author of Personal Space: The Behavioral Basis of Design (1969).⁷ According to Sommer, students observed using library reading rooms in colleges were found to be extremely territorial when it came to reading table use. A student would nearly always go to an unoccupied table if one was available, and "claim" a space to protect his privacy. This claim to private space was defended in the following two ways: firstly by placing books, coats or belongings on the surrounding seats, and secondly by adopting an expression or body posture which read "don't come near me, I want to be alone."⁸ Furthermore a student could demonstrate his willingness to share the table with others depending on where and how he sat. A student who sat in the middle of a table and spread his belongings out, was signalling that he was not as open to additional company as a student who sat in the corner seat and pulled his books close to him, thus effectively

displaying receptivity to others. 9

While a designer of reading tables cannot dictate where students will sit, it is possible to discourage territorial displays by more clearly defining each reader's space. For example, the Rotunda Reading Room carrels of c.1904 provided each reader with a low, raised partition effectively preventing book-sprawl and making maximum use out of available space (Fig.9). Re-introducing a low partition to define each study space would accommodate territorial needs. Furthermore, in providing a generous allowance of personal space, a reader might feel less inclined to demonstrate his need for it, with the result being that more reading space would be available to a greater number of students.

Lighting Levels.

Lighting levels in the reading rooms of the Furness Library have gone through numerous changes, and now that the central skylight and the alcove skylights are being restored, lighting levels must again be addressed. The general history of lighting in the Furness Library has been from from natural light to the addition of some artificial light and task lighting. After the removal of almost all natural light, stronger ambient lighting, was

installed, and finally the task lighting was removed for stronger general lighting, intended to give levels of light high enough to allow for the removal of task lighting. This last solution is furthest away from the intent of the reading room space, and seems the most insensitivity to the building's historic fabric.

Obviously one cannot return to natural lighting since this would reduce the usable hours, a problem recognized in the months before the Library opened in 1891. ¹⁰ In the interests of practical restoration, a combination of natural, ambient and task lighting can fulfill the readers' requirements and the need for a sensitive lighting system. By using task-lighting for the reading tables, a desirable lumin-level can be achieved without requiring high levels of ambient lighting. Ambient lighting may then be used to give a low overall lighting in times of low natural light levels, especially at night. The lighting system must be balanced in a way that it does not result in cave-like situation or one where a reader is overly aware of light sources other than his own. With only low ambient light levels during the hours of darkness, the reading room areas would become cavernous and without definition, a sensation which could be lessened by selective high-lighting from

well-located spot or flood lamps. Great care will need to be made as to their placement in order to minimize the visual intrusion both from lights and fixtures. Because this is a complex area of study, the services of a qualified lighting consultant have been engaged. ¹¹ The recommended level of task lighting for library study and note-taking is measured as not lower than 70 foot candles. ¹²

Acoustics.

Since the Library opened in 1891, there has been no covering on the concrete floor of the Reading Rooms, although at times in the building's history floor covering had been used in other areas. ¹³ Bare concrete floors in the Reading Room areas offer little protection from scraping sounds produced by shuffling feet or moving chairs. This is a significant problem for a library where an acceptably quiet atmosphere is required. There is almost no other noise which can unravel the concentration of a reader quite so quickly as the screech of furniture being dragged across a hard-surfaced floor. If one of the goals of the Library is to encourage students to study, then suppression of distracting and unnecessary

noises will rank high even if the solution conflicts with certain preservation ideals.

Noise appears to have been a problem shared by other libraries contemporary with the Furness Library. Photographs taken in 1895 of McKim, Mead and White's Boston Public Library show a floor covering in the center aisle which served as the main corridor of the reading room. ¹⁴

A c.1888 photograph of the Billings Memorial Library by H.H.Richardson also shows carpet in the traffic corridors on either side of the reading room. ¹⁵ These two examples indicate a preference for reducing sound in the traffic areas alone, rather than carpeting entire floors including the areas under reading tables and chairs. Economy and maintenance may have dictated this solution and remain considerations affecting the choice in floor coverings today.

Following late nineteenth-century precedent, carpeting only the traffic areas in the Furness Library Reading Rooms would eliminate some of the noise. Of course the carpet would become worn, dirty and discolored over time, which would be especially noticable near the exit to the main door where exterior dirt is tracked inside. Although maintaining a floorcovering would be more difficult than cleaning a concrete floor, the

advantages of audio comfort should be weighed against them. Furthermore, "traffic only" area carpet would be far easier to maintain than a whole floor covering and only a fraction of the replacement cost. While no photographs show carpeting in the Reading Rooms of the Furness Library portieres, which hung across the openings of the six Alcove Reading Rooms, offered those spaces some acoustical protection from noise. However, their re-introduction might only discourage entry to the Alcove areas that--besides being used for individual study--contain important reference material. Their use may also conflict with issues of life-safety including fire and personal security.

Reading Tables.

The furniture plan calls for tables of slightly different sizes within the three reading areas. These should allow for these different sizes without change in the basic design. Whether the table be for four, six or eight readers, it should be recognizable as being a derivative of the design. The original tables in the Furness Library had drawers for storage. Drawers should

be omitted, however, because they increase the depth of the apron and the drawers would quickly become depositories for unwanted papers and other material. The raised partition defining the study spaces is attached from below the table top with screws. It should be low, no higher than 1 1/2" at the highest point, and 1/2" wide. This provides both a physical and visual definition of the reading space. The wooden bases of the lamps serve as the intersections for the partitions.

Care should be taken in the design to locate additional supports between reader positions so that no one would have to "straddle" a leg. On the six-seater table this is an issue and one way to create needed support is to place a fifth leg beneath the center of the table. To give strength to the lower portion of the table frame, especially the legs, a brace should be inserted between cross-rails. This does two additional things. It provides a foot rest if a slight change of body position is required, and it discourages use of the table ends for seating which would block the traffic ways in the Reading Rooms.

Main table frame, top edge, partition and subframe should be made from a stable, close-grained hardwood capable of taking a stain and finish. Oak appears to

have been the wood used in the original table found in the basement of the Library during the course of this research. While oak has good qualities of strength and grain figure, it has a tendency to splinter, especially on table edges where it receives abrasion. Other woods with equal characteristics might be considered for the construction material, such as northern birch, beech, ash or similar. ¹⁶ These examples can also accept stain and be readily turned or steam-bent. ¹⁷ The center part of the table should be of similar (or contrasting) wood veneer over a particle board base secured to the sub-frame. ¹⁸ In this way, a table top can be re-finished if necessary simply by removing the lamps and lip sections. Small repairs may be easily carried out without dis-assembly. Plastic laminate, although highly durable, might be difficult to match if repairs were necessary to the surface and partial repairs are nearly impossible.

Reading Chairs.

Windsors were one of the most common library chairs, used during the late nineteenth century. They were available in different styles, with and without arms. The

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Reading Chairs.

Windsors were one of the most common library chairs, used during the late nineteenth century. They were available in different styles, with and without arms. The

arms provided comfort as well as adding to general strength and stability. The main disadvantage of armed reading chairs is that the chair must be drawn out from the table to enable a user to sit in it. To get up from an arm chair, the user must clutch the chair and move away from the table until there is sufficient clearance from the adjacent seats. Since most chairs will be occupied at least 50% of the time the library is open, this will be a disadvantage. In a chair without arms, the user can swivel the body around and exit with a minimum of chair-reversing. Arms on reading chairs in a collegiate setting might also limit the number of sitting positions a student wishes to adopt. For example arms prevent sitting side ways to the table or turning the chair around and sitting on it backwards to read.

Padded seats are recommended for library use in Human Scale 1/2/3. A hard, flat seat can be tolerated for approximately one hour before the user experiences discomfort. ¹⁹ A student who spends a large part of the time seated requires a level of comfort while doing so. Effective study demands concentration with the minimum of distractions or discomforts. While research recognizes the desirability of padding for chair seats, there are strong arguments against its use on the reading chairs in

the Furness Library. First, the present student environment does little to discourage such practices as putting feet on chairs. Seat covers would quickly become soiled or worn and require replacement. Maintenance would likely be a constant problem. Second, a large number of spare seat pads and covers would be required to replace those which were dirty, damaged or missing. Other considerations involve fabric flammability ratings and abrasion resistance, to name only two. An alternative approach is to use a contoured seat similar to the dished surface (saddle seat) of windsor chairs. The shape of this seat is generally contoured to fit the body in the seated position and offers more comfort than a flat surface. Such a compromise is also easy to clean and maintain.

In addition to satisfying ergonomic considerations, the chair must tolerate heavy use, such as being tilted back by occupants or used as a coat and bag rack. From observation, students will rarely use a coat check to hang belongings unless they feel it is secure. Since coat racks tend to be located away from users, the chair-back is the next safest place for coats and bags which students may need while studying. Any chair will fall backward if overlaid, but it should be capable of

remaining upright while supporting a coat or light bag. The woods, stains and protective finishes used should match the table especially if a matched set is desired.

Reading Lamps.

The form of the task lighting should be sympathetic with the period of library design in which the Furness Library was built. The original reading lamps were only for shedding light on the reading tables, and were not part of the ambient lighting of the Reading Room space. Although it is entirely feasible to combine task (downward) lighting with ambient lighting (upwards) in the same fixture, this arrangement seem inappropriate. First, unless the upward-pointing lamps were above eye-level, passers-by would be distracted by brightness. Second, dust would gather in the opening, as might other material. Third, this sort of lamp is hardly based on historic design. Photographs of period electric task lighting used in libraries provide examples on which to base new fixtures. The standard task lighting was apparently two down-lights branching from a single vertical stem secured through the table top (fig.17).

This arrangement was typically made from solid brass or brass plated tubing. Covering each bulb was a glass shade, the traditional color being green. To replicate this lighting in the Furness Library today, the floor receptacles below the tables would have to be wired through the concrete floor from the vaulted basement ceiling or from channels cut in the concrete floor for the electrical conduit. For reasons of safety, the wire will need to be conveyed from the floor recepticle to the lamp in a steel conduit run up the inside of one table leg following UL and local Fire Code specifications. The height of the light bulb and glass shade are important for the efficiency of the lamp and to prevent glare. The bottom of the shade should be just below eye level which for the average adult, is 16 1/2" above table height. Switching lamps on and off should be possible from two locations, first at the lamp itself and second from a "Master Switch" allowing all the task lighting to be "on" or "off" from one location. This would prevent the person closing up the library at night, from having to attend each light and switch it off manually (the open hours of the Library sometimes extend all night towards the end of a semester and task lighting would not need to be switched off). While using three-way bulbs would give

students a choice of lighting levels, it has been noticed that in library situations users tend to experiment with the different bulb intensities by turning the switch. The flashing of bulbs can be very distracting to other students and it is therefore recommended that a single intensity bulb of the correct wattage be used.

Fixtures would attach to wooden bases which are fastened to the table surface. The bases would also provide a solid connection for the ends of the low wooden partitions. On the four seater table, a single two light fixture would be sufficient. On the six-seater table, two fixtures would support three lights, the middle one suspended between the other two. The eight seater table would have two separate fixtures.

Conclusion.

In general, the restoration of the Reading Rooms in the Furness Library has been towards removing changes made since 1891 and returning to Furness's original designs. Selecting modern library furnishings would appear to detract from the general restoration scheme. Therefore, this thesis recommends library furniture--the

reading tables and chairs--and task lights that are strongly suggestive of nineteenth-century designs. Furthermore, as this study suggests, adherence to rules of ergonomics, issues of personal space, light levels, acoustics and maintenance need not compromise the creation of furnishings sympathetic to the unique nineteenth-century architectural space of the Furness Library.

Chapter 3.

ENDNOTES

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DESIGN PROPOSALS

This chapter reviews some of the furniture which Furness is known to have designed, and discusses the sources available to him. The furniture of Furness, like his buildings, underwent a process of change as his style developed, important aspects to consider when designing furniture for the Furness Library. The chapter continues with design proposals for reading tables, a reading chair and reading lamps, accompanied by explanatory notes.

Furniture by Frank Furness.

Frank Furness designed several pieces of furniture, some of which survive in museums or private collections. Of the examples found during the course of this research, almost all were designed for personal acquaintances or wealthy clients, often for interiors he had also designed. In many respects, the furniture of Frank Furness resembled scaled-down versions of his buildings, with use of strong geometric forms and ornate detailing. ¹

A strong use of ornament pervades all of Furness's work, and one finds a wide assortment of natural forms in both the designs of his buildings and his furniture. These include floral motifs, stars, birds, and Gothic forms in a number of variations, which are most often abstracted rather than naturalistic. In addition to these, he used several methods of surface decoration. The corner chamfer occurred in a number of designs as did a three line motif in both raised and encised forms. The simplicity of this approach was often masked by sheer number and density, for the overall effect is one of "business" and complexity. Because of the amount of skill and handwork required in the execution of Furness pieces, his furniture was unsuited to large-scale production. A Philadelphia cabinet maker, Daniel Pabst was employed to make much of his furniture.²

Frank Furness used many of the same resources in his furniture designs as he did in his buildings. Like other architects of his time, he evidenced an interest in Gothic design. English and American architects were influenced by similar design books, published during the third quarter of the nineteenth century. Furness is known to have been influenced by three in particular: Bruce Talbot's Gothic Forms Applied to Furniture (1867),

Charles Eastlake's Hints on Household Taste , (London 1868: Boston 1872), and Christopher Dresser's Principles of Decorative Design (1873).³ Eastlake strongly encouraged traditional woodworking joinery which he defined as the honest use of the materials and simple angular construction. Both Furness and his contemporary, H.H. Richardson, were influenced by these appeals for reform to simplicity and based their own designs on the Gothic Revival style.⁴ The furniture by Furness is hardly simple, however, and this may suggest that Furness used these ideas as only a basis for his designs before adding his own unique touch.⁵ Furniture designed by Furness has a solid and geometric quality. He often allowed the open construction details of a building to show themselves (particularly in iron work), and this approach is sometimes displayed in his furniture. Geometric form is emphasised, especially in the horizontal seats and vertical backs of the chairs. During the early years of his furniture designs in the 1870's, Furness saw ornament as intrinsic to the design and not as something applied to it.

As Wendy Kaplan has noted, Furness's furniture tended to reflect the architectural styles of the period.⁶ Therefore one would assume that as his architectural

styles changed, so did his furniture. One of the earliest pieces of furniture known to be designed by Furness were the two ceremonial chairs for the Rodef Shalom Synagogue in Philadelphia by Fraser, Furness and Hewitt (1871).⁷ The chairs were heavy with high backs for ceremonial use only, and almost every surface was covered with ornamentation (fig. 20). Buildings by Furness such as the Pennsylvania Academy of Fine Arts, (1876), offer a profusion of geometric detailing which is also apparent in his furniture of the period. A good example is the desk designed for his brother, Horace H. Furness about 1875, which exhibits an abundance of surface decoration including use of a moorish arch (fig. 21). A side chair, also designed by Furness for his brother's house is shown in figure 22. For the interior of the house for Theodore Roosevelt, Sr. in New York (1876), Furness designed many of the furnishings including a dining room table with dining chairs (figs. 23 and 24).

These pieces are all of the 1870's, however, and research revealed only a few pieces of furniture which would indicate the styles Furness might have designed in the late 1880's and 1890's. From his buildings, however, a change is more clearly noticable. His buildings cons-

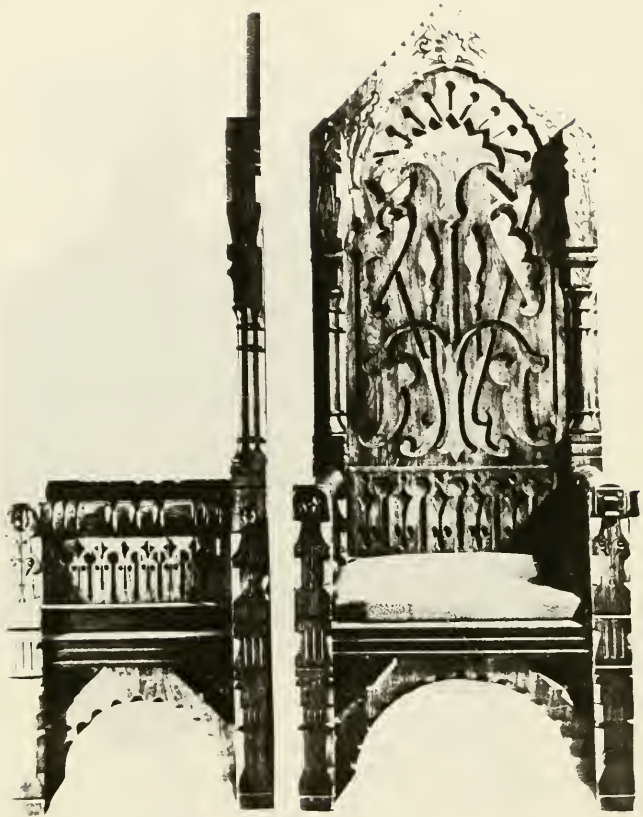


Figure 20. Pair of chairs designed by Frank Furness for the Rodef Shalom Synagogue, Philadelphia, 1869-71. Marion Page, Furniture designed by Architects. (New York: Whitney Library of Design, 1983) p.71.



Figure 21. Writing desk designed by Frank Furness for his brother, H.H.Furness c.1875. Courtesy of Philadelphia Museum of Art, Philadelphia.



Figure 22. Side chair, c.1875 designed by Furness for his brothers house. Marian Page, Furniture Designed by Architects. p.74.

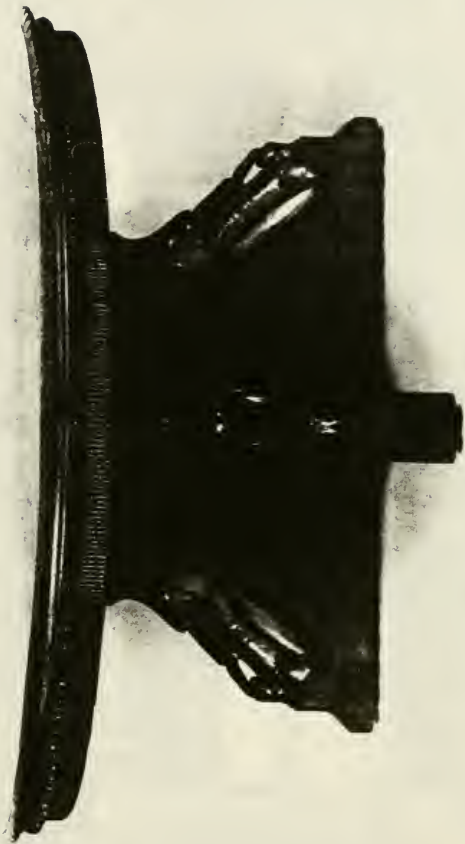


Figure 23. Round dining table designed by
Furness for Theodore Roosevelt, Sr.
c.1876. David A. Hanks and Donald Peirce,
The Virginia Carrol Crawford Collection:
American Decorative Arts, 1825-1917.
(Atlanta: High Museum of Art, 1983).p.79.

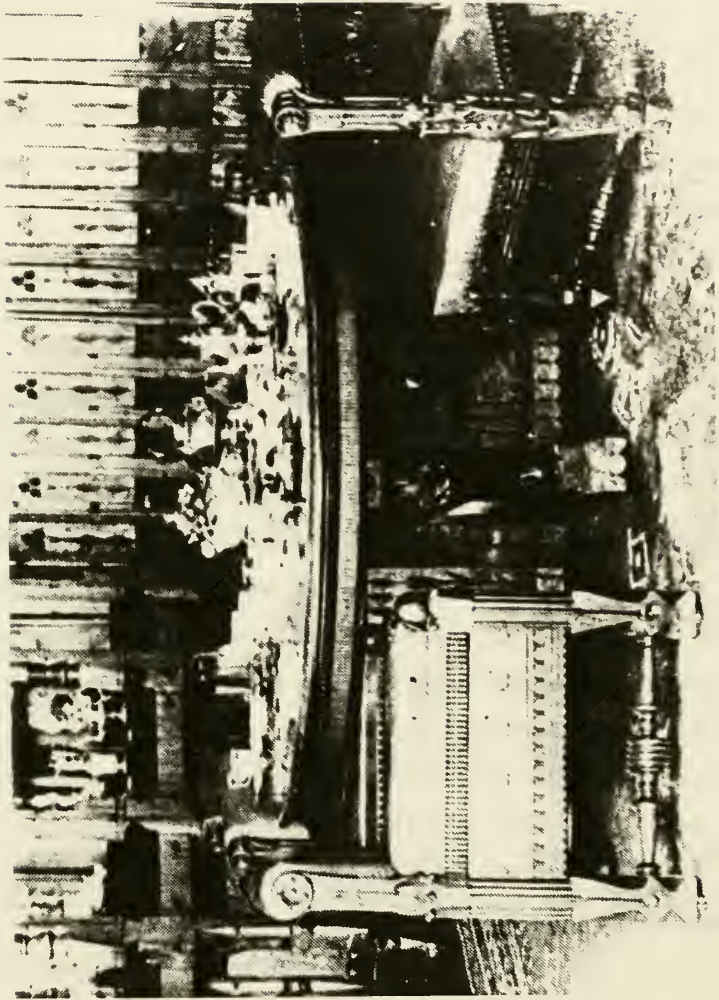


Figure 24. Chairs (and interior) designed by Furness for the round dining table for Theodore Roosevelt, Sr. c.1876. Wendy Kaplan, "The furniture of Frank Furness" in *Antiques* May, 1987, p.1091.

tructed in the 1870's contain more surface detail and ornament coupled with variations of Moorish designs than do his later buildings such as for the Library for the University of Pennsylvania built in 1891. The nearest example of documented furnishings to the later date may be the First Unitarian Church of Philadelphia by Furness and Evans (1886). The example, a reading desk which supports a lectern (a later addition), is unlike a conventional table or chair and therefore only limited information can be applied to the design of reading tables and reading chairs for the Furness Library.⁸ In buildings of the late 1880's and 1890's, Furness apparently used less ornament. These simplified designs used more semi-circular and elliptical curves for arch and window details, especially noticeable in the Library for the University of Pennsylvania (1891) where such curves are greatly in evidence. Here all available space is not ornamented. This simplicity accentuates the feeling of mass achieved in the Library. If the early furniture designs of Furness were complex like his architecture, then we can hypothesize that his later furniture designs would have tended towards simplicity.

It is difficult to know the best method to use in combining known designs of Furness's earlier furniture

with the few examples of his furniture of the 1890's- possibly non-existent furniture of the 1890's; the period of the Furness Library. The assumption made in this thesis is that his furniture designs like his architecture were taking a simpler direction.

Based on what we now know about modern ergonomics (discussed in Chapter 3 Formulation of Design Parameters) little of Furness's surviving furniture appears comfortable. The right-angle in many of the seats and backs is generally uncomfortable for sitting over long periods of time. In the following proposals, an attempt has been made to incorporate current ergonomic data in the designs.

Design Proposals.

Methods of production affect the cost of furniture. If the number of pieces to be produced are too limited to economically tool up for, or involve an excessive amount of hand-work, the finished price will be high. Choice of materials can also affect the final cost. While explicit

methods of manufacture are up to a manufacturer, the designer can aid the process by eliminating unnecessary or labor-intensive work. A successful approach combines ease of manufacture with aesthetic goals, including in this case, historic precedent as well. This chapter proposes designs for furnishings in the Reading Rooms of the Furness Library incorporating all three goals.

The designs stop at the point where full-size mock-ups and prototypes would be constructed and tested based on the scale drawings. The designs would then go through an "editorial" process to eliminate any problems in the aesthetic, ergonomic and production requirements. The scale drawings included here would then be modified as necessary to become production working drawings and passed to the manufacturer as building plans.

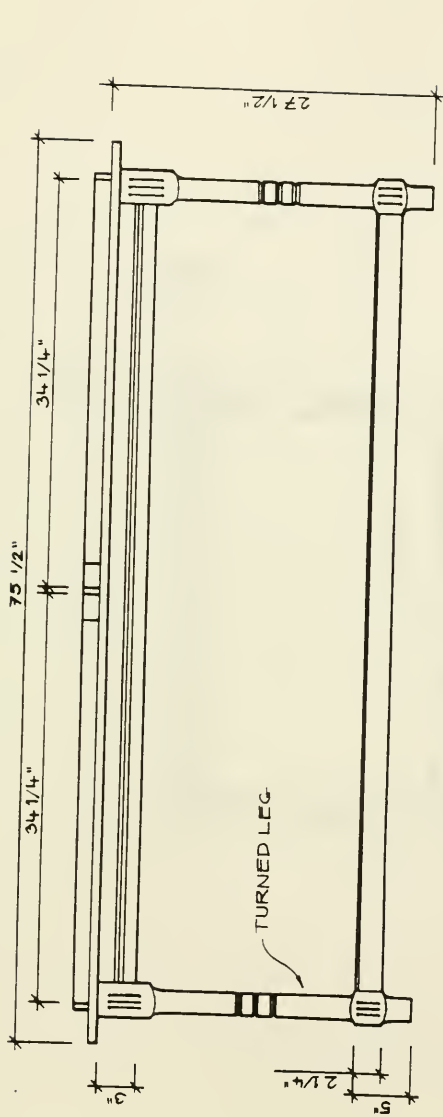
Design for Reading Tables.

The size of the Reading Tables are based upon multiples of the space required for an individual reader. The furnishings plans of Venturi, Rauch and Scott Brown, indicate reading tables seating four, six and eight

readers. While only three groups of tables, there are six different table sizes. A simplification of the sizes will grant equal space to students, and produce fewer components of different sizes for manufacture. All the reading tables have chairs along two sides but not at the ends, and therefore the table width can remain constant. Varying the length of the reading table by "adding" another space allowance, the desired number of readers may be accommodated. The length-measurements for four, six and eight reader-tables occur as multiple lengths of one work-space: 34 1/4" (fig.25 & 26). The length of the work spaces when combined is intended to conform as closely as possible to the architects' specifications for table length without sacrificing the space uniformity for each student. As a result, fractions enter into some of the basic overall measurements. The dimensions for the tables are as follows.

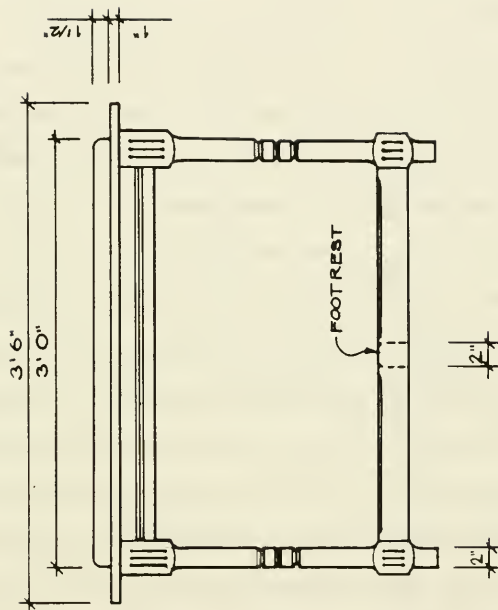
Standard Height.....	27 1/2"
Standard Width.....	42"
Length for four readers.....	75 1/2"
Length for six readers.....	110"
Length for eight readers.....	144 3/4"
Height of footrest.....	5"

To allow for uncomplicated extension of the different



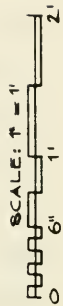
FRONT ELEVATION

FIGURE 25
READING TABLE
 BASIC DIMENSIONS
 OF FOUR-SEATER



END ELEVATION

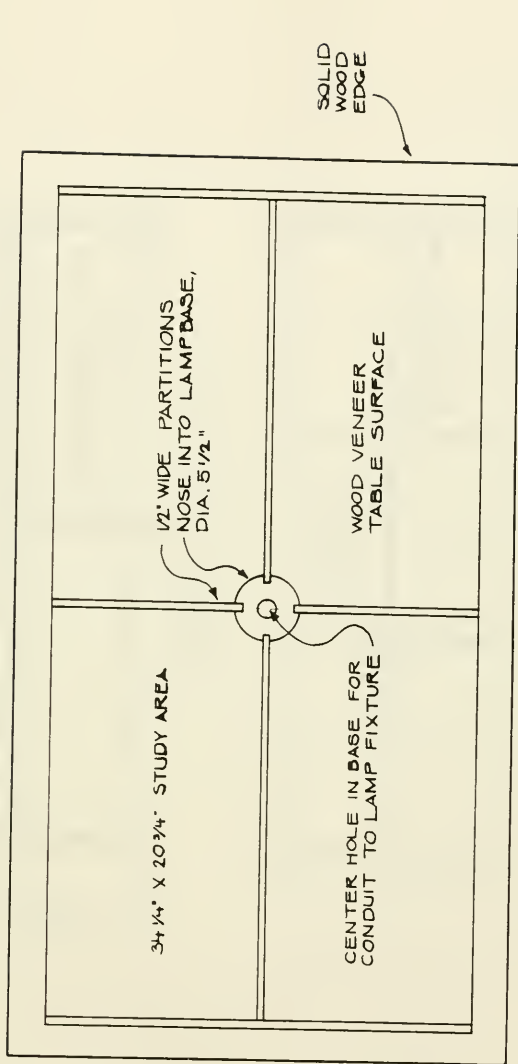
FIGURE 26
READING TABLE
 BASIC DIMENSIONS
 OF FOUR-SEATER



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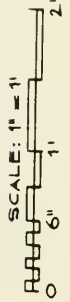
lengths required for reading tables, the edge of the table top does not extent out far from the apron. If the table-top extends too far, space would be lost to leg room at the side nearest the end. The readers' study space, which defined by the raised partition, needs to remain within several inches of the leg position.

The type of top used on the original tables in the Furness Library consisted of a framed edge with a painted canvass insert. The edge, about one inch thick by three inches wide held the middle panel with the canvassed surface. The advantage in this design, apart from cost, was that solid wood was reserved for the area most abraided and worn, while the inner part of the table was for placing books and other materials. Using the same concept of materials/space differentiation the edge is also solid wood, while the infill panel is wood veneer over particle board (fig.27). The particle board is resistant to movement, and receives support from additional cross framing between the side rails. (Not shown in the drawings). The six-seater reading table requires a fifth leg for support in the center of the table, held rigid by the foot-rest and a rail between between the side rails (fig.28), while the eight seater is simply a repeat of the four-seater version (fig.29).

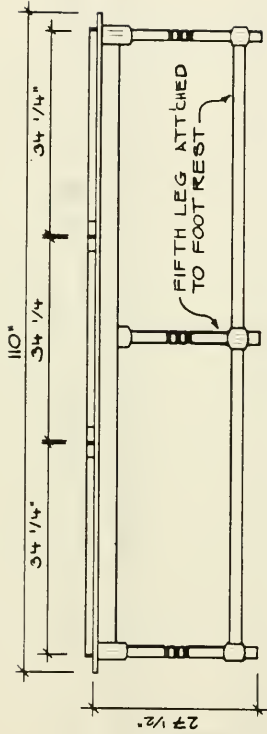


PLAN

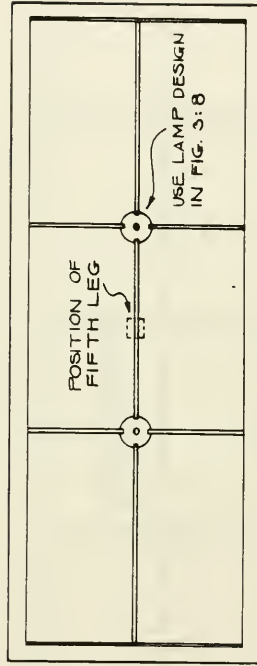
FIGURE 27
READING TABLE
 BASIC DIMENSIONS
 OF FOUR-SEATER



© 1988

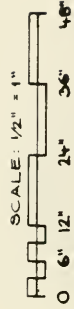


FRONT ELEVATION

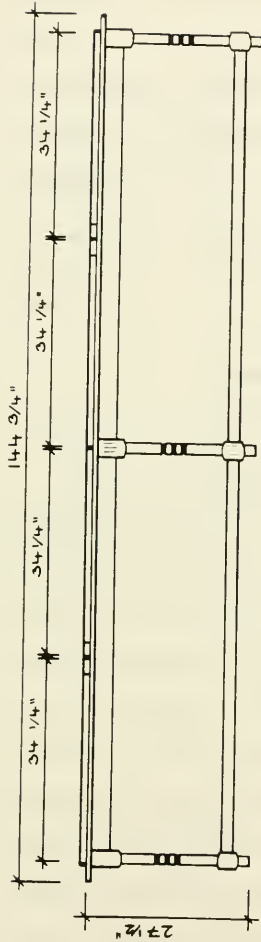


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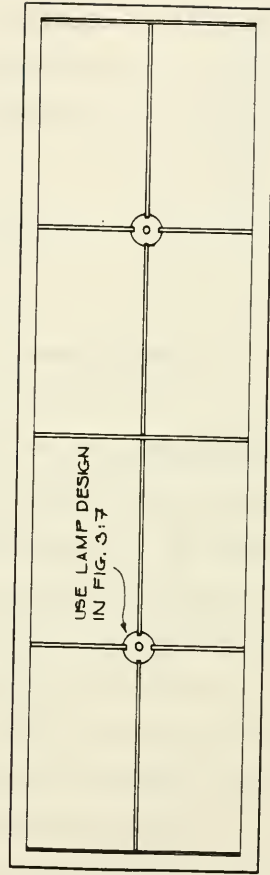
FIGURE 28
READING TABLE
 BASIC DIMENSIONS
 OF SIX - SEATER



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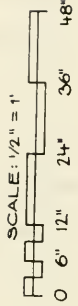


FRONT ELEVATION



PLAN

FIGURE 29
READING TABLE
BASIC DIMENSIONS
OF EIGHT - SEATER



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Because the raised partition on the surface of the table is attached after assembly and is not a structural component, the same basic table may be used in other parts of the Library, for example offices, thereby providing an element of consistency, which also decreases the cost of production because of the number of tables required.

Design for Reading Chair.

Chairs are designed for the average adult based upon Humanscale 1/2/3 specifications. With the design of a "Furness Library" reading table, it is appropriate to design a chair which complements the table. The ornamental surfaces of the chair face toward the table. While the scale of ornament on the chair is "lighter" than that of the table, there are three ornamental details in the chair which are derived from the table. First is the three-ring design which forms a slightly bulbous center on the side stretchers (fig.30). This also provides a stronger joint for the cross-rail connecting the two sides of the chair. Second are the

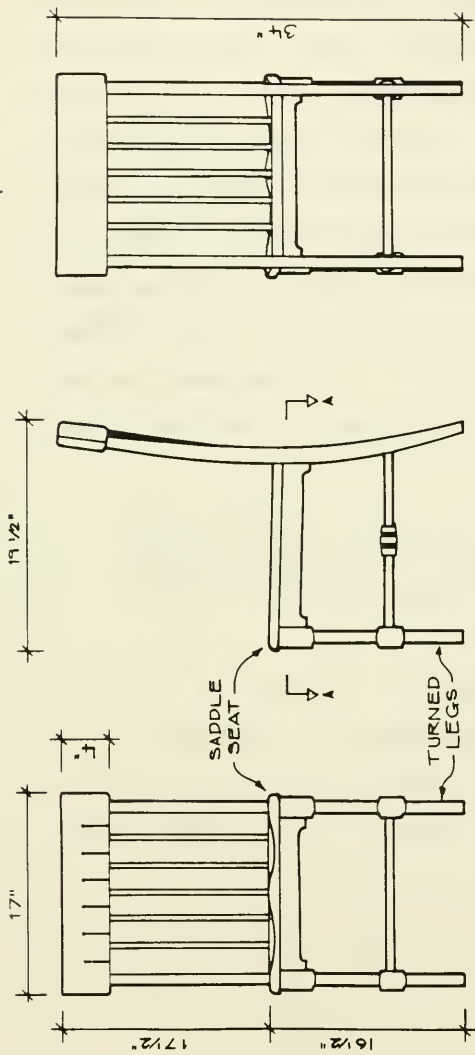
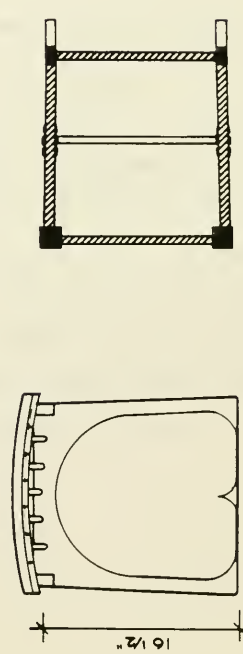
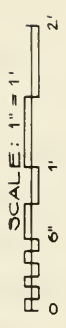


FIGURE 30
READING CHAIR
BASIC DIMENSIONS

© 1988



squared tops and leg intersections, and third are the six "pin-head" darts on the inside of the head rail. The darts are shallow indents, and do not go through the thickness of the back. The rear (room-side) of the backrest is plain. The chair draws its strength from the shaped solid wooden seat, and a near right-angle joints at the intersection of stretchers, seat rails, and legs. The slight reverse angle towards the back of the seat, combined with the angle of the seat back create a good body position (95 deg.) for both forward-leaning and upright reading. 9

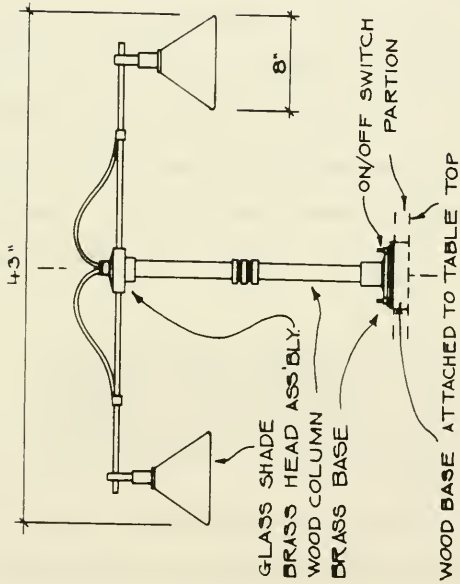
The dimensions for the reading chair are as follows:

Seat height.....	16 1/2"
Height of Back from seat...	18"
Width of seat.....	17"
Degree of back-slope.....	2 1/2 deg.
Combined angles of seat/back...	95 deg.

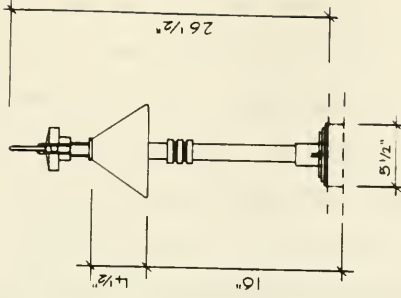
The chair is made from the same wood as the table frame; a beech hardwood is recommended, except the seat, which may be of either the chosen hardwood solid white pine, stained and finished to match the table frame.

Design for Reading Lamps.

The design of the lamp is intended to harmonize with the simple lines of the table and chair while also echoing known historic examples illustrated in Chapter One. This is accomplished by including elements of the motifs used in the table and chair. The turned-wood column of the lamp is also made using birch (or other chosen hardwood), and finished to match the table and chair frames. The three-ring design placed in the middle of the column, is a continuation of the ornamental theme (fig. 31). The lamps are made from component parts and can therefore be assembled on site if necessary. The advantage of this design is principally one of shipping and storage, but also facilitates repair and maintenance. Plated brass is used instead of solid brass increase the stability of the whole fixture because it is less likely to bend if maltreated. The lamp consists of a plated brass base, turned wooden column and a plated brass top piece through which the main arm is secured. Attached to this main arm are a pair of curved supports which prevent deflection over the length the arm. The lamp fixtures and glass shades attach to the end of the brass arm by sliding over the solid ends of the main arm tubing.



FRONT ELEVATION



SIDE ELEVATION

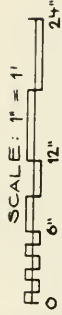


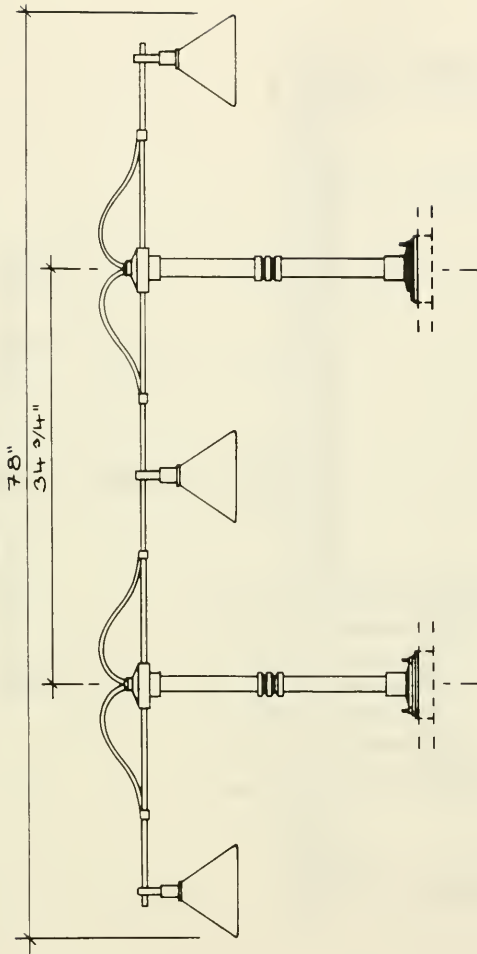
FIGURE 31
READING LAMP
 BASIC DIMENSIONS OF FIXTURE
 FOR USE WITH 4' x 8' SEATER
 READING TABLES.

Wiring is carried through approved electrical conduit in the wooden column to the main arm tubing, and from there to the lamp fixtures. Switching for the lamp is on the top of the lamp base rather than on the lamp itself to ensure easy reach and minimal contact with the area around the glass shade. Persons on both sides of the reading table may easily reach the on/off switch. Finally, the assembled lamp attaches to the turned wooden base (which also holds the raised partitions) by means of screws through the plated brass base.

The same table lamp design is used unchanged for the four and eight-seater, but requires special adaptation for use with the six-seater table, by the suspension of a third (middle) lamp for the two center readers (fig. 32). Switches for use by the center readers are located on one of the the other lamp bases. Dimensions for the lamp are as follows:

Width between lamp centers.....	34 3/4"
Height to glass shade.....	16 1/2"
Diameter of glass shade.....	8"
Total Length of single fixture.....	43"
Total height of lamp fixture.....	28"

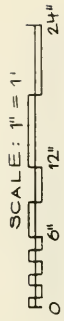
The last set of drawings (Figs.33, 34 & 35) show the combination of complete reading table, chair and lamp for a four-seater study table.

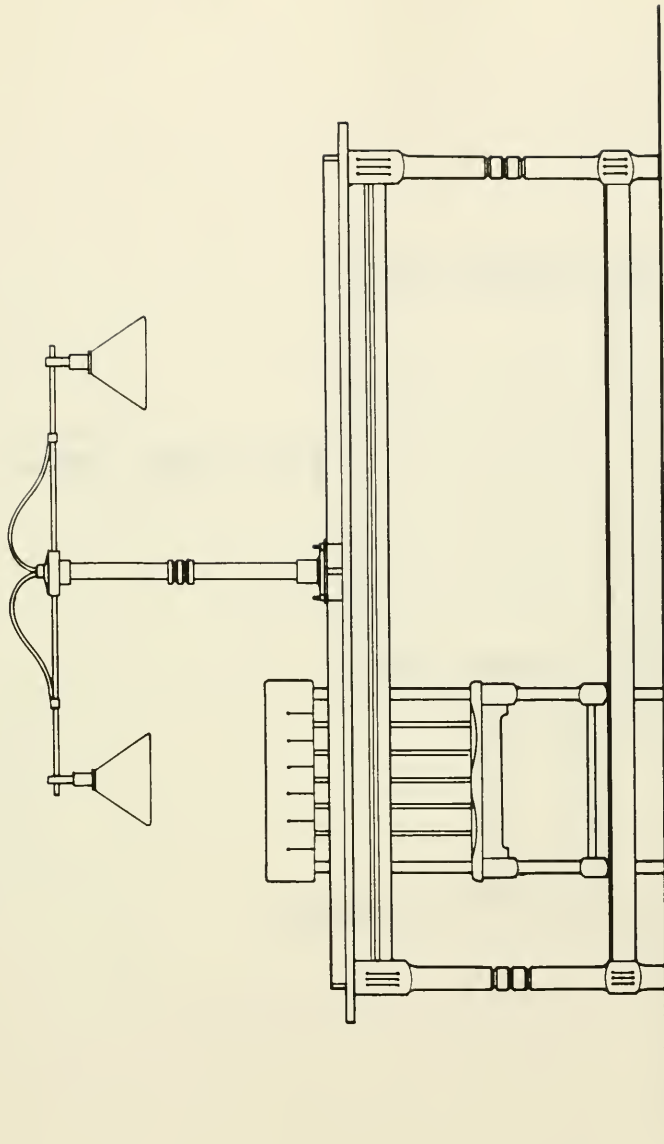


FRONT ELEVATION

FIGURE 32
READING LAMP

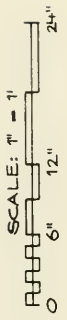
BASIC DIMENSIONS OF FIXTURE
FOR USE WITH SIX SEATER
READING TABLE



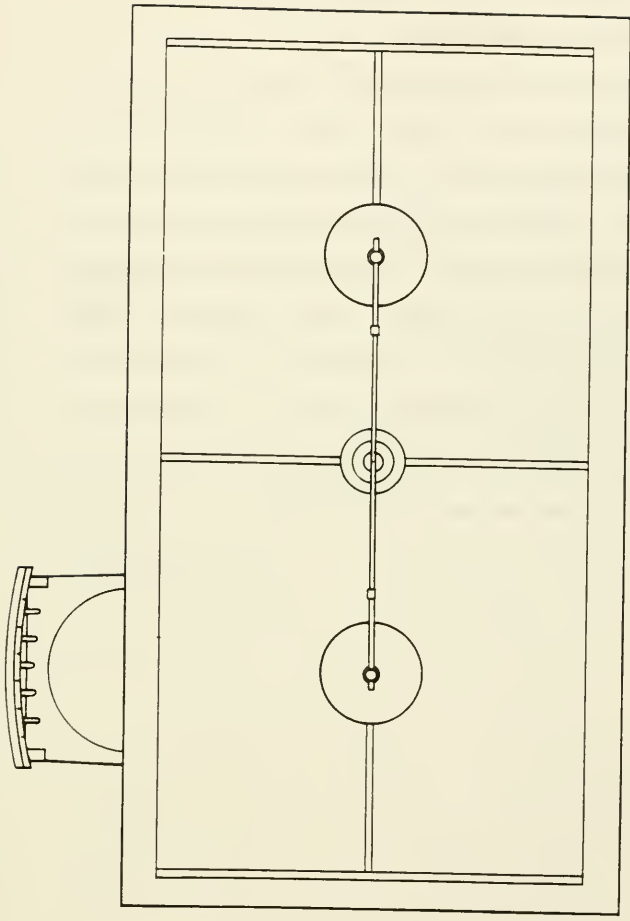


FRONT ELEVATION

FIGURE 33
READING TABLE
READING CHAIR
READING LAMP

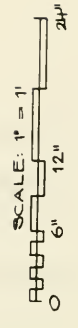


© 1960



PLAN

FIGURE 35
READING TABLE
READING CHAIR
READING LAMP



© 1908

Conclusion

While Frank Furness did not design original furniture for the Library, these proposals are readily mass-produced and in the spirit of functional, unfussy furniture for student use. Since some abuse of the furniture is anticipated, maintenance and repair by solid construction using quality materials. (While quality construction may have an initial higher cost, the pay-back is evident when repairs must be made). The designs compliment the motifs in the building and are also sympathetic to the architectural spaces. Comfort for the reader is aided by use of ergonomic principles and inclusion of study spaces making best use of available table space.

Chapter 4.

Endnotes

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6. Wendy Kaplan, "The furniture of Frank Furness" Antiques May, 1987. p.1090.
7. James F. O'Gorman, The Architecture of Frank Furness Catalogue of Selected Buildings by George E. Thomas and James F. O'Gorman and Checklist of the Architecture and Projects of Frank Furness by George E. Thomas and Hyman Myers. (Philadelphia: Philadelphia Museum of Art, 1973), p.79.
8. Wendy Kaplan, "The furniture of Frank Furness" Antiques May 1987, p1094. A photograph of the reading desk for the First Unitarian Church (1886) also appears in James F. O'Gorman's book, The Architecture of Frank Furness Catalogue of Selected Buildings by George E. Thomas and James F. O'Gorman, Checklist of the Architecture and Projects of Frank Furness by George E. Thomas and Hyman Myers, (Philadelphia: The Falcon Press, 1973). p.148
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Chapter 5.

SUMMARY

It would be easy to reintroduce the furnishings of the Furness Library that first greeted the public in 1891: simple work tables and Thonet chairs. Equally, there are sufficient reasons to use similar tables with other chairs which were widely used in other libraries such as the Windsor. A third possibility was to use modern furnishings designed by architects such as Marcel Breuer's Cesca chair. The fourth possibility was to design appropriate furnishings for the Library using ideas gleaned from Frank Furness and combine them with requirements necessary to students using the Library today. Of all the possibilities available, designing replacement furniture for the Furness Library Reading Rooms seemed the most challenging.

A review of the history of the furnishings in the Reading Rooms of the Furness Library reveals that many factors influenced the initial and subsequent choices for reading tables, chairs and especially the lighting. The results after nearly one hundred years of incremental changes were not ideal. However, the rehabilitation of

the Library offers the University an ideal opportunity to reverse this trend.

As discussed in the Introduction, there are three possible routes one may take in refurbishing the Reading Rooms: reintroduction of the nineteenth-century designs; using modern furnishings; or creating a custom design specifically for the Furness Library. While no Furness furniture designs were found for this Library, historical examples give a rich source of possibilities for finding suitable designs for the Library by Frank Furness. Other libraries of the late nineteenth-century have been a valuable source of example in compiling information and ideas leading to the proposals given in this paper.

In Chapter 3, different criteria for the rehabilitation were outlined. The scientific basis for the library furniture was discussed along with such realities as student behaviour and a number of guidelines formulated which helped define the type of designs suitable for the Library. Chapter 4 pulled both the historical and practical aspects together into the designs in a way which served both the needs of the students and the requirements for furnishings to compliment the architectural space.

Appendix

Copy of the Original Specification of Furnishings for the Furness Library:

Furness, Evans & Co., Specification of Furniture etc. for Library Building, University of Pennsylvania.
Philadelphia: Paul Brown, Stenographer. (Undated).

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S P E C I F I C A T I O N

Of furniture etc. for Library Building, University of Pennsylvania.

FURNESSE, EVANS & CO.,

Architects,

209 SO. 3rd St., Phila.

M A I N F L O O R .

Mr. Keen.

Grilles
GRILLES:- Iron grilles in all arches between Rotunda Reading Room and Alcoves six (6) on the round. Two (2) straight (into Prof. Fullerton's alcove.)

CURTAINS:- Each grille to be curtained.

DOOR:- Each grille to have a door 2' 6" wide in the centre of archway.

Book cases
BOOK CASES:- Book Cases for alcoves to be like present ones in Old Library, those now in old building to be taken down and put up in these alcoves as far as they can be used.

These book-cases to be placed against side walls and outside wall on the round, the cases to radiate properly with the curve of the wall.

PERIODICALS:- The cases in one of these alcoves to be fitted up with an extra number of shelves to be used for "Periodicals."

TABLE:- Each alcove to have a table 3' 0" x 6' 0" (36 inches) to have in them one drawer at each end with lock, key and drawer

pulls with shelves between drawers underneath top of table. Table to have enameled canvas tops. Drawers to be 3 in. deep. 2 ft. long. (Four students on each side of the table and one at each end, ten in all.)

CHAIRS:- Four (4) bent wood chairs without arms to each alcove.

One (1) arm chair for each alcove.

Six (6) alcoves to be as above.

Large alcove (Prof. Fullertons)

TABLES:- To have table 8' 0" x 11' 8" (140 inches) (to allow seven students at each side one at each end, 16 in all.)

One drawer at each end with lock key- drawer pulls with shelves between drawers underneath top of table.

BOOK CASES. Book Cases against the side walls only of this alcove same design as those in other alcoves.

CHAIRS:- Ten (10) chairs to this alcove bent wood.

One (1) arm chair.

Two grilles to this alcove with doors and curtains same as other alcoves. On the straight.

HOTUNDA READING ROOM.

TABLES:- To have ten (10) smaller tables 5' 0" x 8' 0" and three (3) larger tables 8' 4" x 8' 0". All tables to have one (1) drawer at each end with shelf underneath drawers with key lock and drawer pulls.

All tables to have enameled canvas tops.

CHAIRS:- Forty one (41) bent wood chairs without arms.

REFERENCE BOOK CASES.

BOOK CASES:- Five (5) blank arches to have Book Cases for Books of Reference.

Book cases to be as high as the lower edge of terra cotta brackets.

Shelves 12 in. deep wooden. Three (3) divisions shelves on racks.

Two arches in Large Reading Room on west wall. Three (3) arches in Rotunda Reading Room one (1) on west wall, two (2) on east wall.

LADIES DRESSING ROOMS.

Mirror, etc:- To have pin real mirror, one small round table, one lounge, two (2) bent wood chairs.

CARD CATALOGUES.

To be as high as the bottom terra cotta band.

DRAWERS:- 3-4 in. casing. 3-4 in. partition between drawers.

Drawers 21 in. in clear in length 8 $\frac{1}{2}$ in. deep in clear face 4 1-8 in.

Cards 5 $\frac{1}{2}$ in. wide, partition $\frac{1}{4}$ in. between cards.

Seven (7) rows of drawers three (3) rows deep. Twenty-one

(21)

8.

in each alcove. Sixty-three (63) in all three (3) alcoves.
These card catalogues to be placed in the three arches in the west wall nearest the counter of delivery desk.

HINGED SHELF:- Each alcove to have a shelf hinged projecting into Cataloguing Room each shelf to be larger than one Catalogue Drawer.

RODS:- Fifty cents (\$.50) additional for each drawer for rod through cards to be allowed in estimate.

CURTAINS:- The space above Card Catalogues to be curtained with rod and rings in the middle of the jamb to the lower edge of terra cotta brackets. The space below card catalogues to be curtained to the floor.

RAILS:- Rails and balustrade in all three of the arches remaining after those filled by card catalogues to be curtained to the same height as arches over card catalogues.

GATES:- Two (2) gates in the balustrades, one in the arch into Rotunda Reading Room, and one in the arch nearest to the card catalogue.

CATALOGUING ROOM.

TABLES:- To have three (3) large tables 11' 8" x 3' 6" on rollers with drawers at ends, lock, key and drawer pulls.

CHAIRS:- Six (6) bent wood chairs.

BOOK CASES:- Book cases (to be adapted from Old Library) to be put up here 7' 6". 3' 0" divisions along east and south walls.

LIBRARIANS ROOM.

To have one lock rolling desk.

SOFA, etc.: - Sofa, rug, book cases along south wall like those in old library 7' 6" high with curtains behind glass.

CHAIRS: - One revolving chair.

Four (4) Bank of England chairs with upholstered ~~seats~~

TABLE: - Office Table with drawers on either side to the floor.

COAT CLOSET: - Closet for hat and coats in east corner of book case. 2' 6" long, with drawer below and shelf above, space for coat.

PIGEON HOLES: - One half of adjoining book case to be fitted up with pigeon holes about 6" x 6".

RACK: - Mirror and towel rack.

DELIVERY ROOM.

RAIL: - To have rail with balustrade in east archway. Rail at height of the lower moulding to stone capital.

COUNTER: - Delivery counter to have desk in the middle of it with shelves below.

Shelf to be 3' 6" high counter shelf 8 ft. wide. Two loose drawers for counter to have the following dimensions: -

DRAWERS: - One drawer 1 ft. 6 in. long in the clear, containing three (3) compartments each 5 in. wide and 4½ in. deep in the clear.

One Drawer. 1 ft. long in the clear, with four (4) compartments each 8 in. wide and 8 in. deep in the clear.

CARPET.- Carpet back of counter.

Delivery Room to have four (4) revolving stools.

TABLE:- One (1) table 11' 8" x 8' 6".

CHAIRS:- Four (4) chairs, bent wood without arms.

C O A T R O O M.

RACKS:- To have pigeon-hole rack for coats 6 ft. high, and umbrellas. Umbrella rack to hold 80 umbrellas with drain to cellar. Two counters one for receiving and one for delivering; with desk in the middle.

STOOL, Etc.:- Stool and small table for boy attendant.

Rail with gate between space for attendant and rest of coat room.

L A R G E R E A D I N G R O O M.

TABLES:- To have four (4) large tables 11' 8" x 8' 6" with no drawers.

CHAIRS:- Forty (40) bent wood chairs, without arms.

B O O K S T A C K.

TABLES:- To have two (2) tables 2' 6" x 8' 6". Two (2) chairs to each table. (Four (4) chairs.)

6.



To have three (3) tables 11' 6" x 5' 0" in Basement of Book Stack with two drawers in each end of each table.

Four (4) chairs to each table (Twelve (12) chairs).

To have twelve (12) small tables 3 ft. long by 2' 0 in. wide.

CHAIRS:- Twelve (12) chairs bent wood without arms for small tables one chair for each table.

NEWSPAPER RACKS.

In basement of book stack.

To be 3' 0" high; 2' 0" deep; 3' 0" division shelves 7 in. in the clear.

Rollers in shelves.

Rows of shelves 27 ft. long. Six rows.

CONVERSATION ROOM.

To have stiles under West windows as shown in sketch.

TOILET ROOMS:- Tn. Entresol to have two (2) chairs mirror and towel rack.

Tn. First floor to have Mirror towel rack.

RUBBER MAT:- A large rubber mat at outside door.

IRON SCRAPERS:- Six (6) iron scrapers at top of steps two (2) in each archway.

ADDITIONAL CHAIRS:- Fifty (50) additional bent wood chairs without arms.

Twelve (12) additional arm chairs for Main Reading Room.

SECOND FLOOR. ROOM V. Prof. Jastrow.

(Radiators to be changed from North windows to North west windows.)

✓ SHELVES:- Book shelves in two (2) North windows from floor to window sill height.

Shelves the depth of jamb.

✓ *new* Book cases from old building, or new ones to be placed in or made for the east wall. Two cases 5' 6" high all the shelves of which are to be 1 ft. deep (no counter shelf.)

✓ TABLE:- One (1) table 11' 8" x 2' 6" with two drawers and shelf between drawers under table top lock, key and drawer pulls.

CHAIRS:- One (1) arm chair.

Ten (10) smaller bent wood chairs without arms.

SECOND FLOOR.

Dr. Abbott. Museum.

(The small lobby adjoining to be partitioned off with passage left for entrance into Museum from stair hall.)

✓ To have in small room,

✓ CHAIRS:- Two (2) chairs bent wood without arms.

✓ TABLE:- One (1) small round table.

MUSEUM FURNITURE.

Wall cases between windows 7 ft. high.

CASE A. Case A. lower part 48 in. deep upper part 18 in. deep.

Counter shelf 8' 0" from floor.

Counter shelf to be of glass hinged 8 ft. long to pitch from 7 in. to 4½ in. upper part to have movable shelves.

Lower part to have four (4) drawers of equal depth interchangeable drawers 8 ft. long.

All drawers to have Yale locks. Sides of upper part of case to be glazed for side light.

INTERIOR CASES:-

CASE B. Case B. to be like lower part of Case A. but doubled six (6) ft. wide at bottom.

Beveled top of case to be of same dimensions as Case A. sloping both ways. Cases on the round to be made polygonal.

CASE C. Case C. to be like shown on drawings with counter shelf glazed and drawers below like B.

SECOND FLOOR.

Assyrian Museum. Prof. Hilprecht.

Case No. 1. No. 1. Wall Case with counter shelf of glass and sloping to be 4' 6" wide 8' 4" high upper shelves to be adjustable. 1 ft. deep with glass doors. Lower shelves to be 8' 0" deep with glass doors. Counter shelf to be 8' 0" from floor.

9.

CASE NO. 2. No. 2. Two (2) show cases under smaller east windows.

These to be the middle section of case No. 1 set upon a table with legs. The top of case to be 5' 0" from floor to bevel from $4\frac{1}{2}$ in. at front to 7 in. at back.

Each case to be 6 ft. long and 3 ft. deep. Vertical front to be of glass.

CASE No. 2, A. No. 2, A. Three (3) show cases to be set against south wall. To be 8 ft. long 3 ft. deep, other dimensions to be the same as Case No. 2 and to be set upon a table in the same manner.

CASE NO. 3. No. 3. Two (2) show cases to be set under windows in north wall, to be 10 ft. long 3 ft. deep to sit upon a table in the same manner as Case No. ²3. The top of case to bevel from 6 in. at front to 11 in. at back.

CASE NO. 4. No. 4. Six (6) show cases to set back to back in centre of room. To be 7 ft. long 5 ft. deep to set upon a table in same manner as Case No. 2. The top of case to bevel from $4\frac{1}{2}$ in. at front to 7 in. at back. These cases to have shelf 3 in. wide along the top at the back.

CASE NO. 5. No. 5. Two (2) show cases to be set at the ends of cases No. 4; these to be polygonal as shown on drawings. The case at the west end to be 6 ft. wide and 3 ft. deep the one at the east end 6 ft. wide and 1 ft. deep. The top of each case to bevel from $4\frac{1}{2}$ in. at front to 7 in. at back.

CASE NO. 6. No. 6. Three (3) show cases to have three sides of glass back top and bottom of wood. To set upon tables or legs

the bottom of case to be 5 ft. from floor. Each case to be 4 ft. high 2 ft. 0 in. deep and 2 ft. 6 in. wide, to have doors in front. The shelves inside to be of glass and placed 1 ft. on centres.

SHELF NO. 6 a. No. 6. "a". Shelf for Assyrian Slab with two (2) pedestals for busts as shown in drawing.

Size of slab, 65½ in. high, 35½ in. wide. Shelf for slab to be 6 in. wide 1' 6" from floor 5 ft. over all pedestals to be 8 in. in diameter at top and 2' 6" from floor.

PEDESTAL No. 7. No. 7. One Pedestal of wood for obelisk, to have inscription in gold upon its base. To be 4 in. high from floor, the measurements at bottom to be 2 ft. 6 in. by 1 ft. 9 in.; at top to be 2 ft. 2 in. by 1 ft. 0 in. The sloping side for inscription to be at an angle of about 45 degrees.

PEDESTAL No. 8. No. 8. Six (6) pedestals for busts and one (1) Pedestal with beveled top for Rosetta Stone.

The pedestals for busts to be columns with bases and caps to be 3 ft. 3 in. from floor diameter of column to be 7½ inches.

The tops of three (3) pedestals to be square 18 inches on each side. The tops of the remaining three (3) pedestals to be rectangular with the following measurements:

Two (2) to be 20 in. by 14½ inches.

One (1) to be 13 in. by 9 inches.

ROSETTA PEDESTAL:- Pedestal for Rosetta Stone to be 3 ft. 3 in. at lower part of top from the floor. Top to be at an angle of

about 50 degrees. Size of Rosetta Stone is 55½ in. by 29½ in. and 8½ in. thick. Glass top over Rosetta Stone.

CASE FOR COINS. No. 9. Case for Coins. To be 4 ft. high and NO. 9. 8 ft. 6 in. wide, to set upon a base 8 ft. from floor.

Racks for coins to be of wood with place for label for name of coin. Racks to be 5 inches on centres and 3 inches deep, to bevel at an angle of 45 degrees.

SECOND FLOOR. Seminar.

Prof. Hilprecht.

WASH STAND etc. Wash stand to be set in South-East corner to be curtained with rod and rings north side to be of beaded boards. To have towel rack, mirror and pin rails for coats.

SHOW CASES:- Two (2) show cases one 18 ft. long set against south wall the other 11 ft. long against north wall.

Counter shelf to be 8 ft. from floor top shelf above counter to be 8 ft. high. All shelves to be adjustable the upper ones 1 ft. deep, lower ones 8 ft. deep.

All to be enclosed by glass doors.

REVOLVING BOOK CASES:- Revolving book case 8 ft. 6 in. square to be like sketch.

OFFICE DESK:- Office Desk 5 ft. by 5 ft. like sketch with two sets of drawers. Pigeon holes in all of one side.

STEPS:- Pair of ladder steps about 8 ft. 6 in. high.

CHAIR:- Two (2) revolving Desk chairs with arms.

12.

CHAIRS:- Three (3) small bent wood chairs.

STAND:- Umbrella stand for four (4) umbrellas.

DESK:- Standing writing desk. 8 ft. 6 in. wide 4 ft. 6 in. deep, as in sketch; pair of drawers with divisions in drawers for card catalogues divisions 6 in. wide, with rods for cards, drawers to have locks, keys and drawer pulls.

SHADES:- All windows in the rooms above specified to be curtained with shades, with patent spring rollers excepting in book stack, conversation room, coat room. Shades to be of muslin, color to be selected by architects.

Two bids in
me \$ 15,160.49
me 14,425.00

The P.M. has carefully examined and approved of items and estimates - Shows acceptance of Russell's bid -

Approved
P.M.

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