

Reinvented/Decentralized/Digitized Tomorrow's Academic Library

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Summer 2010

Submitted towards the fulfillment of the requirements for the Doctor of Architecture Degree.

School of Architecture
University of Hawai'i

Doctorate Project Committee

Raymond Yeh, Chairperson

James Dator

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Reinvented/Decentralized/Digitized

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We certify that we have read this Doctorate Project and that, in our opinion, it is satisfactory in scope and quality in fulfillment as a Doctorate Project for the degree of Doctor of Architecture in the School of Architecture, University of Hawai'i at Mānoa.

Doctorate Project Committee

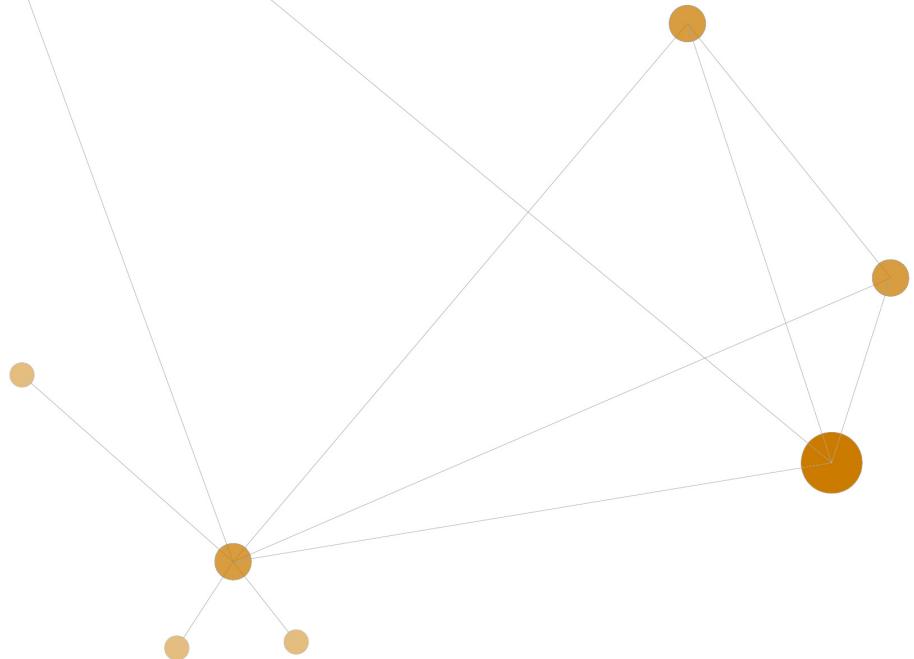
Raymond Yeh, Chairperson

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David Brier



REINVENTED/DECENTRALIZED/**DIGITIZED**
TOMORROW'S ACADEMIC LIBRARY



Dedicated...

To my Parents, Family and Friends for all their inspiration, encouragement, love, support and patience these past 7 years.

To the Architorture Family at the SoA for their support, input, encouragement, and help in keeping my sanity through this 7 year journey.

To my Doctorate Committee, for their constant support and encouragement and contributions to my research endeavors and explorative pursuits of the future(s), both near and distant.

And to those from the libraries of UH Mānoa, UC Berkeley, the University of Minnesota and Yale University who made this research possible.

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Abstract

This project advocates the notion of academic libraries thriving in the future, with the purpose of promoting and providing research through establishing personal relationships between librarians and students, faculty and patrons, as well as to develop building/spatial solutions for the University of Hawai'i at Mānoa Libraries, accommodating for change/transformation within the next 15+ years.

Introduction

Established and renowned as authorities of trustworthy knowledge and information, academic libraries have held an important, central and supportive position within their institutions, dedicated to individual enhancement, educational progress, intellectual, social and economic development, and fulfillment of the fundamental roles of "assembling, organizing, [preserving] and distributing the products of intellectual endeavor, which [the library] has done since the beginning of civilization."¹ Emerged and developed over centuries ago from that of monastic traditions, "temples of scholarship," to lavishly and ornately designed yet "dim and confining" repositories², these roles, along with the notion of the library as the 'heart of the university', have been the primary basis and tradition upon which academic library buildings and spaces have been sited and designed.

Entering the 21st century, the academic library is changing amidst changes on physical, cultural and social levels due to advancements and developments in technology as well as the changes brought forth by them, transforming and revolutionizing the ways in which we live, communicate, teach, learn, store and obtain information, challenging the library's traditional roles as the "center of the information universe."³ Looking into the future, despite these challenges, changes and trends in technology, education, society, and the economy, academic libraries will continue to be essential, physically and digitally, however in a different form and function.

From quiet, contemplative, and static space to space of interaction, collaboration and activity; from a preservatory and secure storage space for books to a collective of services and space supporting and reflecting the visions, values, missions, ideals and needs of their respective institutions⁴ and students, today's libraries are now caught in a state of transition, stepping away from that of traditional libraries. In order to sustain and continue its physical presence in the future, the library must reinvent itself, much as libraries of the past, adapting and responding to "changes in the format of human records, the way in which those records are used by society,"⁵ as well as the academic needs of the future.

¹ Gerard B. McCabe and Ruth J. Person, *Academic Libraries: Their Rationale and Role In American Higher Education* (Westport: Greenwood Press, 1995), xi.

² Geoffrey T. Freeman and others, CLIR Publication No. 129: *Library as Place: Rethinking Roles, Rethinking Space* (Washington: Council on Library and Information Resources, February 2005), 2.

³ University of Minnesota Libraries, "ACRL 2009 Excellence in Academic Library Award Application - The University of Minnesota Libraries: Changing the Paradigm," American Library Association, <http://www.ala.org/ala/mgrps/divs/acrl/awards/excellenceaward/UofMinnesotaLibrarie.pdf>, 2.

⁴ Wayne A. Wiegand and Donald G. Davis, *Encyclopedia of Library History* (New York: Garlan Publishing, 1994), 356.

⁵ Freeman 2005, 2.

Introduction

In changing its roles, the next generation library, may no longer be called the 'library' in the future per se. Rather, a name suitable for its evolution from "the principal building on campus where one can truly experience and benefit from the centrality of an institution's intellectual community"⁶ to one promoting intimate connections between librarians and students, looking into the possibility of a dispersed but unified information access system. Specifically, the state of Hawai'i, its higher education institutions and the academic libraries within them, as foreshadowed by its educational models of prestigious institutions in the mainland United States, are too experiencing the effects of today's technological, educational, economical and societal evolutions.

Project Statement, Purpose and Goals

Although the future is uncertain and unpredictable, the academic library as a physical entity will continue to exist, regardless of advances and outside influences in our ever changing world. However, in its existence in the future, the academic library transform in its role, centrality, physicality and functionality.

The purpose for this project is to assert the continued need for academic libraries in the future, and to provide solutions for a future 'library' or information center/commons based upon what the academic library was, what it currently is, and what it can potentially become in the future as it shifts in its physical form and needs as well as in the expectations and needs of the students, faculty and patrons it serves.

The goal of this project is to explore the possibility of the implementation and adaptation of a decentralized library service system for the University of Hawai'i at Mānoa in the near future (15+ years), through the design and development of a prototypical space, adaptable to any location/existing building within the UHM campus (e.g. School of Architecture), and to future changes demanded by evolving technologies and user needs.

⁶ Freeman 2005, 2.

Part I: The Past

Background and History

"We cannot look to the future without remembering the past. The world is going to continue to change, but without looking through the lens of the historical human perspective, we are doomed to chasing waterfalls. Dreaming is great for ideation, but insight is what fuels the future."⁷

To a certain extent, our past influences how we design for the present and for the future. Before we can design academic libraries for the future, we must investigate and understand not only their histories, roles and designs in the past and the present, but their roots and development stemming from the importance of research, higher education and their outside influencing factors.

⁷ Jon Burg, "When a series of tubes go tubeless – The evolving natural web," Jon Burg's Future Visions Blog, posted June 11, 2008, <http://jburg.typepad.com/future/2008/06/when-a-series-of-tubes-go-tubeless---the-natural-web.html> (October 1, 2009).

Chapter I

A Brief History of Higher Education and the Academic Library

"The link between education and libraries is well defined and logically rooted in the fact that both educational institutions and libraries work with knowledge. The former spread knowledge, values, and beliefs through a system of schools, whereas the latter provide individuals with access to information resources in publicly accessible archives of knowledge."⁸

Higher education institutions and academic libraries are complementary and interrelated. "Information resources are at the foundation of effective research, teaching and learning,"⁹ and as mentioned in the introduction, academic libraries have played the essential supporting role for the ideals of the missions of the institutions they serve, providing a vast repository of reliable information supporting the subjects offered and taught at them. Simultaneously, the collections these institutions have provided are invaluable resources serving a broader community¹⁰ as "repositories of knowledge, art and expression, functioning as key components of the cultural memory of society."¹¹ With this, the academic library has purpose, as integral parts of the "politics, culture, the response of their parent institutions,"¹² and of their campuses and communities as places and centers of knowledge. As professor and author John M. Budd puts it: "whatever affects higher education, affects academic libraries."¹³

⁸ Jaroslav Šušol, "Higher Education and the Academic Library: Perspectives for Slovakia." *EDUCAUSE Review*, vol. 44, no. 4 (2009), <http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume44/HigherEducationandtheAcademicL/174200> (September 29, 2009).

⁹ "Resolution H: Library Facilities" (University of California Systemwide Library and Scholarly Information Advisory Committee, November 1, 2004) http://www.slp.ucop.edu/consultation/slasiac/SLASIAC_Resolution_H.html (April 29, 2009).

¹⁰ Ibid.

¹¹ Ibid.

¹² John M. Budd, *The Academic Library: Its Context, Its Purpose, and Its Operation*, (Englewood: Libraries Unlimited, Inc., 1998), 6.

¹³ Ibid, 6.

Higher Education & Academic Libraries in the United States

The library preexists the college and university, being in existence “a couple millennia or so” earlier than institutions of the sort. Although learning and scholarship were the basis of even “the earliest libraries, such as those of Alexandria and Pergamum,” they lacked the formal structure, organization, and “existence to an educational mission”¹⁴ like that of the university we now know.

Today’s modern colleges and universities, particularly in the United States, originated from that of Western institutions established and developed throughout western Europe, the earliest dating back to medieval Europe and the European Renaissance in the 12th century, with the first noteworthy universities housed within the cities of Paris and Bologna. Predating the invention of the printing press, textbooks were a rarity and library collections were small and based by the curriculum of these early institutions typically consisting of the seven liberal arts of mathematics, astronomy, geometry, music, grammar, rhetoric and logic. Taught primarily by means of lecture and recitation in which students were required to “present a disputation of the lecture’s content”¹⁵ in order to receive a degree, the instructional methodology these disciplines reflected the basic functions of the library, as lectures as well as textbooks were made available only to students for a small fee.

The development of “new forms of humanistic scholarship”¹⁶ began to emerge during the 15th century, emphasizing the usage of books, and therefore appointing the library a more prominent role in academia. Upon the invention of print, by means of the printing press, in the 16th century, libraries increased in both holdings and importance to their institutions both physically and intellectually, taking the position as the primary “source of supplementary reading and individual study.”¹⁷ With the technology of printing enabling the communication and spread of ideas and book titles beyond the spectrum of standard curriculum, universities by the 17th century had already begun to expand in enrollment and curriculum, which would provide as a model, as Dr. O. Lee Shiflett describes as “rigid in its orthodoxy, structured in its methodology and approach, and one that rested on the faculty view of psychology, which held that the mind was, in essence, a muscle to be exercised,”¹⁸ for higher education institutions in America.

¹⁴ Budd 1998, 24.

¹⁵ Ibid, 26.

¹⁶ Wiegand and Davis 1994, 8.

¹⁷ Budd 1998, 26.

¹⁸ Wiegand and Davis 1994, 8.

17th Century

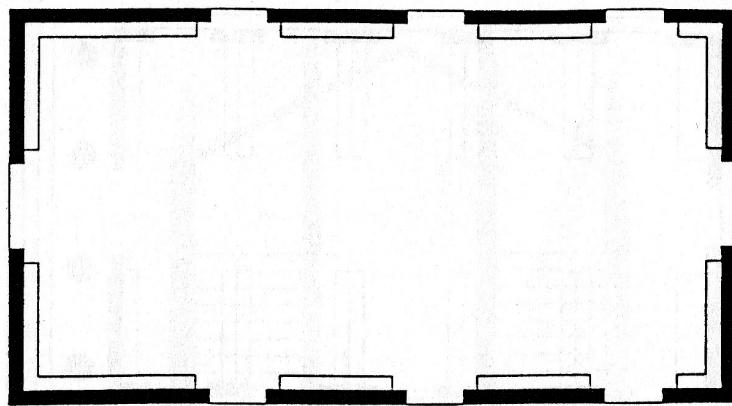
As mentioned earlier in this chapter, higher education institutions in the United States originated from established Western institutions, specifically those of England, whose universities provided the models and basis of higher education in America. 17th century British colonies brought forth the nation's first nine institutions founded during colonial America, prior to the Revolutionary War: Harvard College, the College of William and Mary, the Collegiate School in Connecticut (Yale University), the College of Philadelphia (University of Pennsylvania), the College of New Jersey (Princeton University), King's College (Colombia University), the College of Rhode Island (Brown University), Queen's College (Rutgers University), and Dartmouth College. As all these colleges were founded in the Protestant faith, each were heavily influenced by the religious and secular needs of the newly established and developing colonies they were a part of. Although rooted in religion, the pedagogy of these institutions "demanded adherence to the text and an intellectual, moral, and religious orthodoxy that avoided views and opinions contrary to those held by the churches which sponsored and supported the colleges,"¹⁹ which necessitated the adaptation of a broader mission and curriculum beyond that of church schools.

Given the prescribed nature of the curriculum of colleges during colonial times, libraries played a peripheral role within each institution, as the books contained within them were donated by generous benefactors. These libraries were present within the college, however due to small collections space was minimal, therefore were often located within a single room in the college's main, or only, building. Upon the arrival of the Revolutionary War, the colleges and their accompanying libraries suffered physically and in enrollment. Of the nine colleges established prior to wartime, only one was salvaged (Dartmouth), while the rest had to start anew.

18th Century

Post Revolutionary War began a process of change and recovery for the already established institutions of the colonies. Recovery came by way of public funding, a first, since all nine colonial colleges were privately funded. It was also during this period educational expansion as migrating religious sects continued to found colleges in their where publicly founded institutions were established, the first two state funded universities being the University of Georgia, and the University of North Carolina. Change came by way of curriculum and expansion as the newly formed United States brought forth westward expansion of a rising population as well as journey

¹⁹ Wiegand and Davis 1994, 8.



[Figure 1: Perimeter shelving pattern.]

to the west, however most of these colleges were “small and poorly funded,” in some cases closing shortly after opening.²⁰

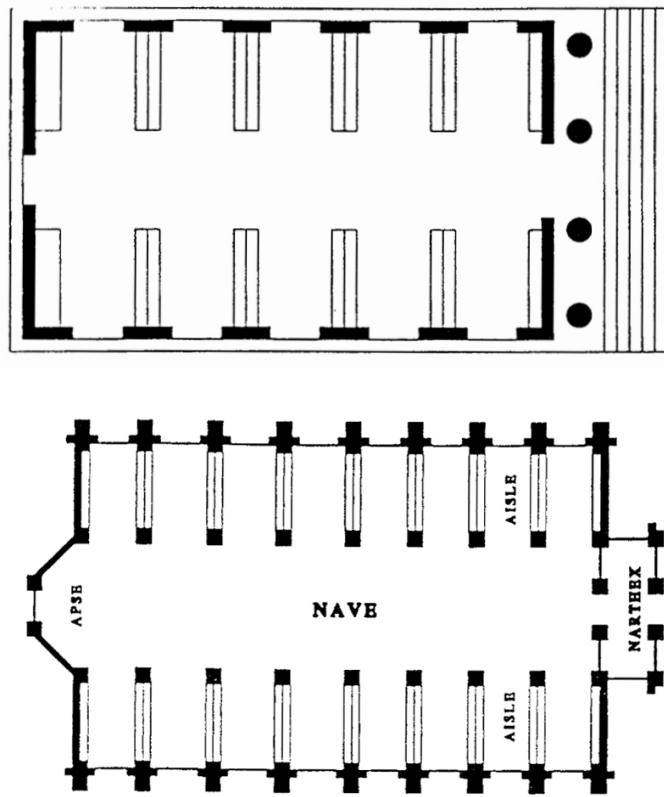
The Enlightenment during the 18th century brought forth changes in the curriculum of both colonial and newschools, with an approach to “thinking characterized by an intellectual skepticism, the belief in perfectibility of humankind and an openness to science and its attendant potential for progress.”²¹ For the colonial schools, curriculum continued to follow classical learning views. On the contrary, new universities adapted and advocated a progressive curriculum, adding to classical and religious courses in modern literature, science, medicine and agriculture, through the influence of external and internal governing forces.

19th Century

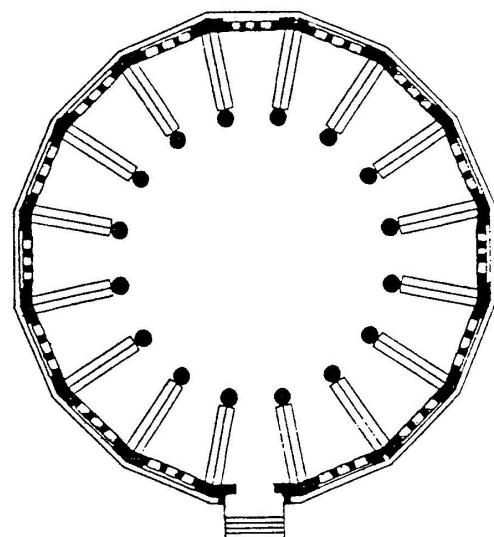
Although curricular change began during the latter part of the 18th century, universities remained small at the beginning of the 19th century due to institutional limitations brought forth by society, such as the exclusion of women from higher education institutions, as well as segregation. The small, inadequate and useless (in the fulfillment of faculty and student needs) characteristics of libraries during this time reflected that of the colleges and universities they served, however it was at this time, that buildings specifically used as libraries began to be erected, the first at the University of South Carolina in 1840. Architecturally, the library building planning and design of this period up until 1875, was composed of three fundamental shelving patterns: perimeter, transverse and radial, housed within buildings designed typically in Classical revival and Gothic

20 Budd 1998, 31.

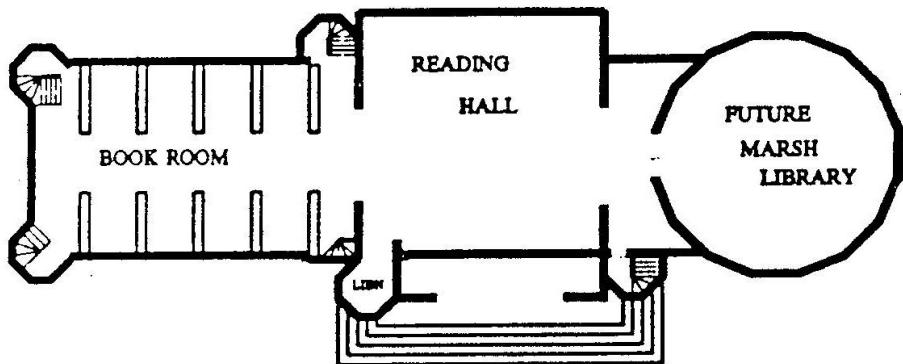
21 Budd 1998, 31.



[Figure 2: Transverse shelving patterns.]



[Figure 3: Radial shelving pattern.]



[Figure 4: Tri-partitioned building plan for the University of Vermont, 1886.]

revival styles, functioning only as book halls that contained mostly materials irrelevant to the curriculum offered at their institutions, as much of the collection at the time consisted of donations.

It was not until after the Civil War where American society would make a radical transformation, bringing forth racial equality, changing the face of higher education and libraries. Amongst the social and curricular changes occurring during this period, the Morrill Act, also known as the Land Grant College Act of 1862 was enacted, which made “specific provisions for agricultural education and [public] lands to be used for that purpose.”²² As a response to the Industrial Revolution as well as progressivism, the public lands and the money acquired from them were distributed in order to establish or continue agricultural and mechanical programs of the colleges and universities that received them. A second Morrill Act of 1890 was passed in efforts to aid the established land grant movement set upon the 1862 passing through providing continual appropriations for land-grant colleges, but more importantly advocating societal change, stating “no student could be denied admission to land-grant institutions on the basis of race.”²³

The founding of both the American Library Association (ALA) and the Johns Hopkins University in 1876 marked an important and influential year for that of higher education and libraries. With the growing amount and size of libraries in the United States, the establishment of the ALA brought attention to the need for librarians, which would eventually lead the title in becoming a profession. More significantly, instructional methods began a shift from that of lecture to self-motivated investigation and problem-solving, also known as the seminar style of teaching. This rapid shift eventually lead to the establishment of the Johns Hopkins University as the nation’s

²² Budd 1998, 35.

²³ Ibid, 36.

first institute driven by research, heavily influenced by German universities, science, and three ideals of freedom: freedom to teach, freedom to learn, and freedom of inquiry, which placed more emphasis on the student's own investigations, and less emphasis on the teacher. Changes in teaching methodology also brought change upon the design, planning and functioning of the library building, transforming that of singular function as book hall, to that of multi-partitioned structures accommodating for collections, readers and special rooms. Library buildings between 1875 and 1910 were partitioned in two ways, tri and multi; tri-partitioning divided the building into three allocated spaces for three separate purposes: book storage, reader accommodations and staff work areas, while multi-partitioning divided the building into more complex spatial arrangements to accommodate the rapidly evolving functional requirements²⁴ of academic libraries at the time, including expanding collections.

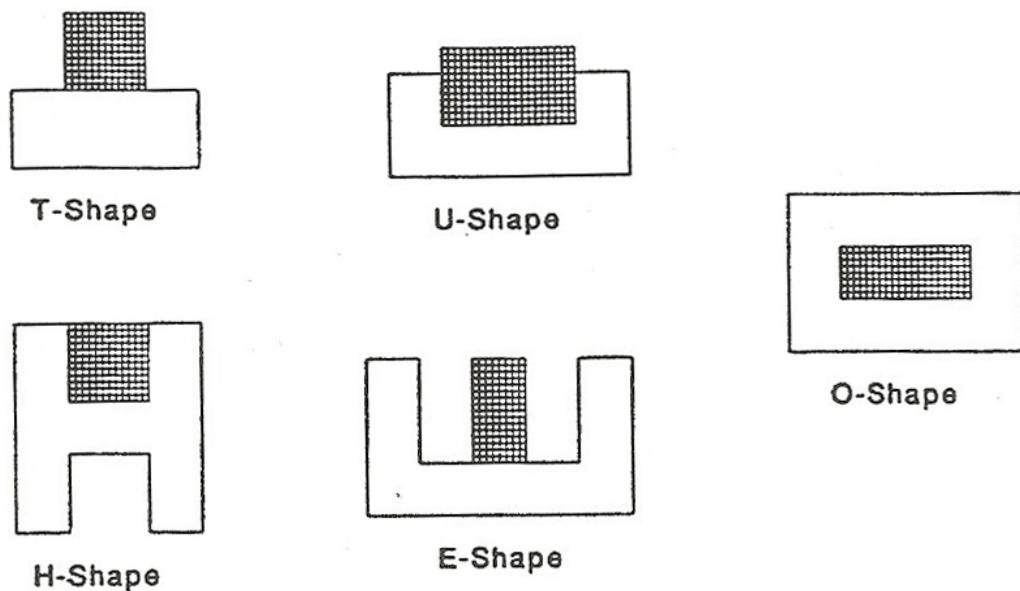
The presidents of established universities, beginning in the second half of 19th century, became the shapers of their institutions as they were typically the “product of their visions, minds and personalities” and overseers of the growth of their universities as social forces and as places of teaching and learning. These characteristics were reflected in their library collections, which varied from expansive to inadequate, as well as foreshadowed transformations in education and the libraries closely associated with them.

20th Century

Higher education in the late 19th century and the beginning of the 20th century began an overall transformation, as institutions were no longer ‘the teacher and student’ as they had been in centuries past, and were now composed of infrastructure, campus, laboratory, budget, and government intervention, as Progressivism continued to develop and promote governmental financial support for research. By this point in time, research had transformed from a phenomenon in higher educational development to a characteristic of newer universities of the 20th century, influencing educational changes, such as the professionalization of disciplines, the diversification of curricular offerings beyond that of the traditional arts and sciences, and emphasizing the importance and invaluable quality of libraries and their strong and growing collections in support of research.

In design, libraries in the first half of the century became increasingly large, as academic library

²⁴ David Kaser, *The Evolution of the American Academic Library Building*, (Lanham: Scarecrow Press, Inc., 1997), 32.



[Figure 5: Typical stack locations, 1910-1945.]

buildings “depended on an interactive mix comprising three factors: the size of the book collection, the size of enrollment, and the predominant teaching style used in the institution,”²⁵ and were categorized as “fixed-function” buildings as the utilization of multi-tier stacks lacked spatial flexibility for other functions.²⁶ As institutions transformed, developed and varied in curriculum and teaching methods, their libraries too reflected the changes occurring within the institution through their spatial designs, varying from radical, accommodating the needs of the faculty housing collections departmentally, to conventional solutions, accommodating for the seminar style of teaching, housed within one central building. With the innovation and development of the structural stack, library buildings were no longer of rectangular layout, varying in different configurations including T, U, H, E and O shapes, as multilevel stacks and stack towers constructed of steel were developed and utilized. Although stacks provided the compaction of books to provide enough space for growing collections, these structures had no intention of facilitating public access to them, which was changing as library use became an integral factor in succeeding in college, and more and more students stressed the necessity of having direct access to the collections. By World War II, the libraries of colleges and universities throughout the United States had open access to their materials, but were limited to their fixed function buildings.

²⁵ Ibid, 85.

²⁶ Kaser 1997, 85.

Post World War II, continued change and increase were experienced throughout higher education institutions, with the passing of the G.I. Bill in 1948 and governmental global security interests, which provided for a surge in enrollment, a concern for “academic preparedness and competitiveness,”²⁷ and pressure and demands for newer facilities, including libraries, both new or additions. These libraries were composed of flexible spaces, created through a break from the traditional fixed-function libraries at the beginning of the century which required structural reliance on steel stacks. Rather, stacks became a separate component from that of structure, in what would be known as modular construction, which was composed of uniform rectangular, box-like components, allowing for the integration of book and reader spaces and the ability to meet changing functions and needs brought forth by emerging and new innovations, including seating arrangements and computer technologies, which were beginning to make its presence in universities and colleges during the 1960s. This revolutionizing rapidly developing technology would eventually lead to automation and even greater technological impacts felt in the present and to be felt in the near future.

From the mid-1970s to the late 20th century, the design and construction of new library buildings dramatically decreased due to lack of funding and high costs. However, as information and collections continued to increase, “anti-building” motives resulted in four types of alternatives were developed: 1) building additions, 2) on/off-site material compaction, 3) utilization of the provision of access to information and 4) use of non-codex information formats²⁸ such as microfilm and electronic texts, which would be a precursor to the planning and organization of academic libraries as we know them today.

²⁷ Budd 1998, 44.

²⁸ Kaser 1997, 155.

Chapter II

Higher Education and the Academic Library in Hawai'i

So where does Hawai'i fit in to the rich history of higher education and academic libraries? In the first chapter, three main categories were investigated: higher education, academic libraries, and library architecture within a national context, illustrating how higher education techniques, trends and needs, and the political, economic and social climates of their respective periods were translated architecturally into their academic libraries. Similarly, although younger in comparison to most of the prominent and significantly larger colleges, universities and library collections throughout the nation, Hawai'i has also demonstrated how these factors, along with heavy influence from established American universities have shaped its academic libraries.

A Call for Higher Education: The College of Hawai'i

Higher education in Hawai'i, although modeled after the organizational and curricular customs and traditions of the Western world and the United States mainland, has always set itself apart, not only in location, but in culture and history. The development of education in Hawai'i in general stems from a unique mixture of the rich history and culture of native Hawaiians, the discovery of the islands, contact with and influence from Westerners, missionaries, and other foreigners, governmental influence and eventual assimilation into the United States, which set the stage for the importance, necessity and desire for institutions of higher learning in the Pacific.

Up until 1906, the educational system of Hawai'i, then as a territory of the United States, had provided education up to the high school/secondary level. Though education had developed successfully from the "zeal for universal literacy"²⁹ brought by Calvinist missionaries and had been well established throughout the islands, the secondary level could not suffice the greater educational needs of the territory's populace. The desire for an institution of higher learning had been brought about primarily by advocates of the American political and cultural development within the territory as it continued its integration into the United States. However, by the beginning of the 20th century, daughters of families that could afford to send their sons off to

²⁹ Robert M. Kamins and Robert E. Potter, *Malamalama: A History of the University of Hawai'i*, (Honolulu: University of Hawai'i Press, 1998) 3.



[Figure 6: First building of the College of Hawai'i, the William Maertens' House.]

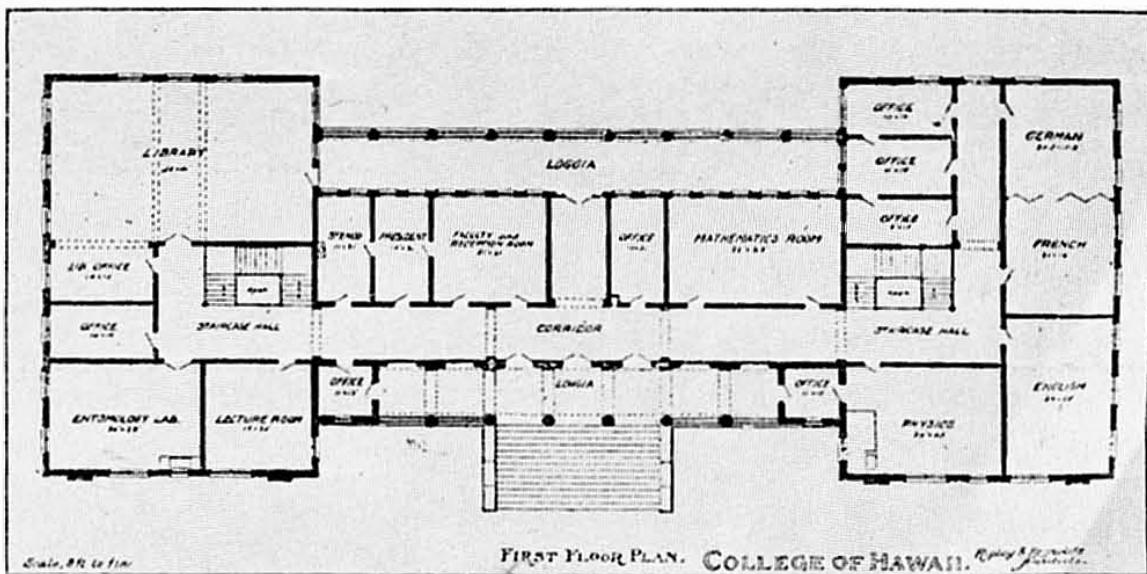
college, as well as the families of a growing, ethnically diverse middle class and those of the plantations had educational aspirations for their own children.³⁰

With the "determination to maintain the standard of progressive education,"³¹ in Hawai'i, the aid and support from various ethnic communities and the Morrill Act of 1890, the establishment of the College of Agriculture and Mechanic Arts of the Territory of Hawai'i followed in 1907, which would be renamed three years later to the College of Hawai'i. Highly influenced by the core values of Cornell University in the state of New York through the employment of a Cornell-educated faculty, the territory's first higher education institution focused on an agriculturally based curriculum encompassing subjects revolving around the study of advanced scientific agriculture, and the languages in which information on those subjects were published.

As higher education in Hawai'i was just beginning, its library played only a minor role, encompassing characteristics of academic libraries established during colonial America: books/volumes donated by benefactors, small collections, small spaces and placement within rooms of multipurpose buildings, often the main or only building on campus. The collections of the University of Hawai'i began at the establishment of the Library of the College of Hawai'i in 1908 which consisted of "an

³⁰ Kamins and Potter 1998, 3.

³¹ Willis Thomas Pope, *A Brief History of Higher Education in Hawaii*, (LahainaLuna, 1931), 10.



[Figure 7: Original first floor plan of Hawai'i Hall.]



[Figure 8: Hawai'i Hall.]

atlas, a dictionary and a sixteen volume set of the Encyclopedia Americana, housed in a thirteen by eighteen foot parlor of an old frame house.”³²

From a mere eighteen books, the collection had expanded to “five thousand books and seven thousand pamphlets,” consisting of “mostly U.S. government agricultural publications.”³³ Also acquired during the ‘college’ years, included the collection of Thomas Thrush, an antiquarian bookman, as well as a generous amount of gift books from Japan’s Prince Akihito³⁴, both of which began the library’s focus and emphasis on collecting Hawaiiana and Asian materials. By 1910, plans were underway for future campus and curricular expansion as enrollment continued to increase, moving the college from its temporary home in central Honolulu adjacent to Honolulu High School (now McKinley High School) to a more appropriate location to serve its purposes in Mānoa Valley in 1912, its first permanent structure Main Building (now known as Hawai‘i Hall) completed the same year. Upon the college’s move to its permanent home in Mānoa Valley, the library collection was moved into two rooms, totaling 1,430 square feet, of the new and only building on a traditionally Western planned campus.

The Need for a Greater Institution: The University of Hawai‘i

Although the territory had taken the first step to offering higher education beyond the high school level through establishing the College of Hawai‘i, its citizens still called for a greater institution, offering a wider array of courses and disciplines, “affording young men and women the opportunity for the training of their minds that fit them to be citizens of the highest type, thus enabling them to become useful members of any community.”³⁵ Additionally, in further support of the need for a university, advocates placed education as a priority to succeed in the pan-pacific movement, stating:

“We have witnessed many efforts by promoting Committees to make Honolulu the centre of Pacific interests in the way of finance, travel, commerce and shipping, but we cannot hope to succeed in any pan-pacific movement if we neglect to make Honolulu a centre also of education.”³⁶

³² Nancy J. Morris, “A History of the Libraries, University of Hawaii, Manoa,” University of Hawaii at Manoa Library, http://library.manoa.hawaii.edu/about/library_history.html.

³³ Ibid.

³⁴ Ibid.

³⁵ William Kwai-fong Yap, *The Birth and History of the University of Hawaii*, (Shanghai: Kwang Hsueh Publishing House, 1933), 4.

³⁶ Ibid, 34.

Part I: Chapter II

In response to the community's call for a greater institution of higher education, the bill establishing the University of Hawai'i was passed on January 7, 1919, with the Act of Establishment effective on July 1, 1920,³⁷ with the object of fostering "mutual respect amongst its diverse cultures"³⁸ of its student body, and providing "thorough instruction and conduct researches in and disseminate knowledge of agriculture, mechanic arts, mathematics, physical, natural, economic, political and social sciences, language, literature, history, philosophy, and such other branches of advanced learning...[through] a standard of instruction, equal to that given and required in similar universities on the mainland of the United States."³⁹

The fundamental elements, standard of American colleges at the time were present on the newly established university's campus by the mid-1920s. These elements included a standalone library building, specifically for books and library functions, which was opened on March 19, 1925. Now known as George Hall, the building was originally designed for a book capacity of one hundred thousand volumes, and for library seating of up to one hundred twenty patrons, reflecting library planning styles of its time, utilizing a U shaped configuration, with "a series of staff offices, conference rooms [and study rooms] set around three sides of the central [steel frame] stack area."⁴⁰

Although Western based in curriculum, campus plan and building design, the university separated itself from that of most mainland schools in its orientation towards Pacific and Asian studies. By 1928, Hawai'i had achieved academic acceptance obtaining accreditation from the Association of American Universities, which would recognize the degrees and course credits earned from the university, throughout the academic world,⁴¹ its first doctoral program being tropical agriculture. The Great Depression years brought forth financially difficult time, however it failed to cease the continued expansion of the university. By the 1930s, the university was composed of three colleges: the College of Applied Sciences, the College of Arts and Sciences and the newly established Teachers College, created from the merger of the Territorial Normal School and the university in 1931. An increase in enrollment and the library's collection in its assimilation of the large preexisting collections of the Federal Agricultural Experiment Station and the Territorial Normal and Training School⁴² resulted from the merger, following in a steady recovery from the

³⁷ Yap 1933, 4.

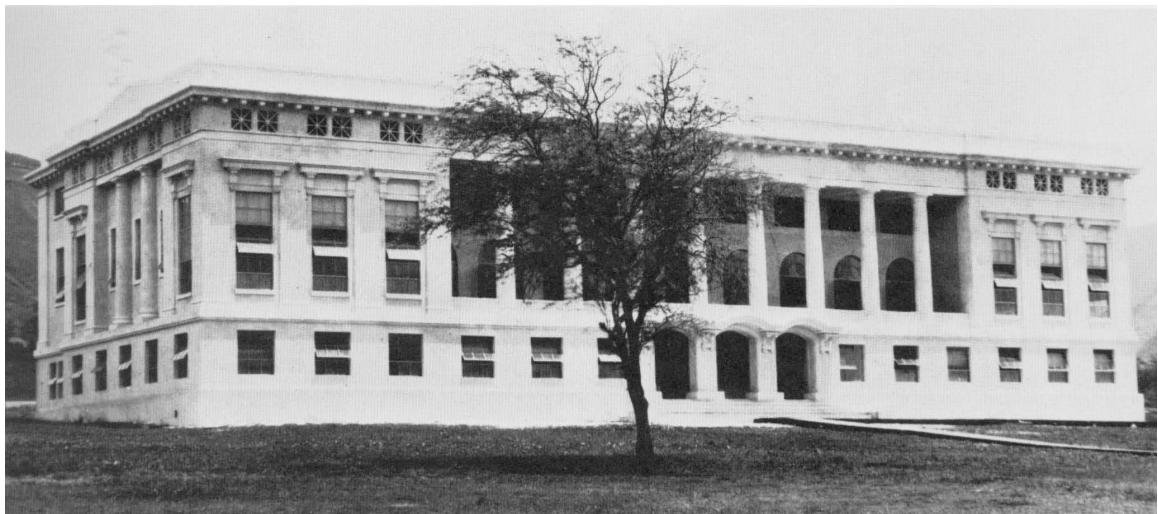
³⁸ Kamins and Potter 1998, 3-4.

³⁹ Ibid, 18-20.

⁴⁰ David Kittleson, "The University of Hawaii Library, 1920-1941," Hawaii Library Association Journal 30 no. 1 and 2 (December 1973): 18.

⁴¹ Kamins and Potter 1998, 29.

⁴² Morris, "A History of the Libraries, University of Hawaii, Manoa," University of Hawaii at Manoa Library.



[Figure 9: First campus library building, now known as George Hall.]



[Figure 10: George Hall reading lanai, 1931.]

years of the Depression and a desire for Asian/American relations.

With the institution's vision of creating a better understanding between the United States and Asia, the development of a strong Asian collection, influenced by the Oriental Institute, founded in 1936, further added to the library's increase in Asian materials. Although the collection continued to grow, the dawn of World War II upon the islands and the United States brought the progression of the library, programs and the institution to a halt as wartime called for military services from half the student body and military occupation and use of buildings on campus. Two years after the attack on Pearl Harbor, the university began its restoration of normalcy, with the reorganization of its curriculum, and integration of the curriculum of its three colleges, which was now composed of twenty-two academic departments, offering courses in thirty-six subject areas.⁴³

Post World War II and Statehood Impacts

After World War II, growth in enrollment increased tremendously with the passing of the G.I. Bill of Rights, which provided war veterans with financial support for continued education. Although a surge in the student body was occurring, no funding was available yet for new construction, resorting to the use of barracks and other temporary structures left by military on campus as housing for students and faculty and learning facilities. The campus once largely devoted to



[Figure 11: Sinclair Library's main entrance.]

43 Kamins and Potter 1998, 50.

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agriculture was now evolving, as postwar expansion and development would eventually lead to new facilities, new program sites and curriculum including social work, nursing and business administration, as a response to the need for better-trained professionals outside of its three core fields/colleges.

By mid-century the push for the university to take on an “international role as a Pacific crossroads” lead to the development of new doctoral degree programs and “a linguistic base more capable of serving broader areas of scholarship.”⁴⁴ Like its reflection on the curriculum, the crossroads of the Pacific ideal was also reflected within the library with the establishment of a Pacific Island/area specific collection. With an expanding collection and student body, the Library Building (George Hall) had been outgrown and outdated, resulting in the need and construction of a new library building.

The following year, the Gregg M. Sinclair library was completed and opened, utilizing four basic principles in its design:

- 1) *The building should be adapted to the Hawaiian climate and be made as comfortable for readers as is possible without air conditioning.*
- 2) *The interior must be arranged for efficient operation.*
- 3) *The interior would be as flexible as possible, so that the organization could readily be changed to meet new needs and conceptions of library services.*
- 4) *The books and other library materials would be readily accessible and convenient for use.*⁴⁵

As a result, the library structure would employ these standards through modular construction, in the Modern Movement’s International Style, addressing the needed flexibility and integration of reader spaces, as well as natural ventilation through a cross shaped building, considered one of the largest open-stack libraries in the United States in 1956.

Followed by the completion of the new library, statehood had been attained in 1959, leading to the enlargement of the university and the library as the islands had become more easily accessible via air travel, political changes and more significantly the establishment of the East-West Center in 1960 to “promote and improve relations among the peoples of Asia and the Pacific and the

⁴⁴ Kamins and Potter 1998, 65.

⁴⁵ Victor N. Kobayashi, *Building a Rainbow: A History of the Buildings and Grounds of the University of Hawaii's Manoa Campus*, (Honolulu: Hui O Students University of Hawaii at Manoa, 1983), 100.



[Figure 12: Sinclair Library's open reading lanai.]



[Figure 13: Sinclair Library's study lounge.]



[Figure 14: Hamilton Library.]

United States,” transforming the university from a respectable college to a major center for higher education.⁴⁶ With the expansion, reclassification and reorganization of the library collection “closer to the standard for a university of excellence,”⁴⁷ Sinclair Library although “spacious, open to Hawaiian trade winds, and appealed to aesthetic senses, [it] proved less successful as a shelter for books,”⁴⁸ and had quickly become undersized.

1968 marked the completion of Phase I of the, what was then known as the graduate research library (now known as Hamilton Library), assigning Sinclair Library as the undergraduate library. Designed similar to that of Sinclair in terms of flexibility and modularity, Hamilton Library differed in its holding capacity, size, air-conditioning and architectural style, “Hawaiian-scale and person-oriented Sinclair, with its extensive use of floor to ceiling glass, and Hamilton with its Medieval Monastic style...turn[ing] the scholar’s eye inward from the world, focus[ing] it upon the book.”⁴⁹ The following year, UH’s university library attained membership in the Center for Research Libraries, aiding the “expansion [of] the work of the university in two directions: horizontally to reach out to many more undergraduate students around the state; vertically to create the research and graduate programs necessary to establish UH as a respected “first-class” university.”⁵⁰

⁴⁶ Kobayashi 1983, 91.

⁴⁷ Kamins and Potter 1998, 90.

⁴⁸ Morris, “A History of the Libraries, University of Hawaii, Manoa,” University of Hawaii at Manoa Library.

⁴⁹ David Kittelson, “The University of Hawaii Library, 1960-1983.” Hawaii Library Association Journal (1984): 62-3.

⁵⁰ Kamins and Potter 1998, 87.

As numerous administrative changes (people and policies), expansion of the university with placement of community islands throughout the state, and a slow, incremental growth of academic programs continued to occur during the school's mid and late-century years, financing had become a large impact, physically and in curricula and faculty, as expansions "had to be fitted into constricted funding."⁵¹ Upon opening in 1968, the graduate research library had not been complete, as Phase II of the building was completed in 1977. Upon its completion, majority of the research collections once housed at Sinclair Library were moved to Hamilton Library, assigning the undergraduate library the research collections for music and architecture, and media center.

The Dawn of the Computer Age

Late 20th century marked more significant changes to the university, fiscally, technologically and unceasingly in curriculum. Technologically, the computer age had arrived mid-decade as the library converted from the traditional card catalog and microfiche catalog to automation and shared online cataloging. As the curriculum had increased with the development of forty new programs through the "profusion of research and instructional programs in the sciences, humanities and social sciences...stimulating departmental amalgamation."⁵² Impacts of these mergers also had an effect on the institution's libraries as the separation of undergraduate and graduate libraries came to an end in 1993, with the permanent housing of the major collections in Hamilton Library and the conversion of Sinclair Library into a music and media center.

Fiscally, autonomy from the state had been granted upon the university in order to maintain accreditation, however budget and finance would prove to be a constant issue, in the library's and university's vulnerability to a fluctuating economy. Upon the collapse of the sugar and pineapple industries in the state in 1995, financial crisis struck the university, impacting its library as well, however expansion of its collection remained incessant. In response to the "worst financial crisis in [UH] library history,"⁵³ and lack of funding, like other institutions across the country and the 'anti-building' movement, UH looked to other alternatives for access to information via technology advances, interlibrary loaning and the expansion of the Hamilton Library, with the construction of Phase III, Hamilton addition.

⁵¹ Kamins and Potter 1998, 110.

⁵² Ibid, 124.

⁵³ Morris, "A History of the Libraries, University of Hawaii, Manoa," University of Hawaii at Manoa Library.

Summary

Once just a supplementary role in the development of higher education, academic libraries have transformed into essential resources, strengthening institutions in support of striving for a constantly evolving level of high quality academics and research. Intertwined with influences within and outside the realm of higher education and their affiliated institutions, these libraries have been shaped into what they once were and what they are now.

For the most part, higher education and the academic library in Hawai'i have followed the traditional path of its colonial predecessors from which they were developed from: a lecture based curriculum, continued growth and large monumental libraries containing (for the most part) all or the bulk of the university's collection/holdings. Architecturally and spatially, as mentioned in the first chapter based on David Kaser's observations in *The Evolution of the American Academic Library Building*, four different types of academic library buildings/configurations have emerged and developed throughout the course of the existence of higher education in the United States, each reflecting that of their time periods and resulting in the architectural styles of the library buildings erected during that particular time.

Academic libraries have continually reflected the societies, governments, politics, economies, cultures, educational and built environments, and curricula of which they are a part of. Moving into the 21st century, the dynamic natures of the universities that they are a part of as well as these impacting factors now call for a fifth building type and/or space for academic libraries of the future. However, before delving into exploring solutions for the continued evolution of the academic library in the future, the current issues of today's libraries will be investigated and discussed to identify how problems are being solved as well as future trends and needs that can very well reshape the library, or whatever it may be called in the future, for the future.

Part II: The Present Transition

*"School libraries are in transition, and this process is affecting the design of our school library environments. School libraries have changed from places of resource ownership and storage to places where information is accessed, challenged, and created; from centers of curriculum support to extensions of the classroom; from places designed primarily for quiet, individual use to active learning environments."*⁵⁴

Living in the 21st century, academic libraries have continued to reflect that of their institutional, political and social environments however have been placed in a state of transition as newer influences, ideas and problems unceasingly emerge. Further, the roles, functions, necessities and usage of libraries in the future are now in question as they shift from traditional to unconventional and nontraditional library trends, reshaping and reconfiguring library buildings and spaces of today's libraries.

⁵⁴ Rolf Erikson and Carolyn Markuson, *Designing A School Library Media Center For the Future*, Second Edition, (Chicago: American Library Association, 2007), 1.

Chapter III

Problems of Today's Academic Libraries

"The academic library of today is in an extraordinary period of transition and change, a change which is rapid, constantly shifting, and unpredictable. Library operations and learning services reflect that change; and, people are required to manage it."⁵⁵ In its unpredictability, "all is not well in academic libraryland. We've got a few problems. But knowing what the problems are allows us to fix them."⁵⁶

As discussed previously, there are a multitude of factors that influence the academic library. From economics and politics, to academics and technology, academic libraries have "depended upon an interactive mix"⁵⁷ of these influences. In their associations, aside from the positive, they too have contributed directly to today's academic library problems and conditions that they have had and now face not only affecting them currently, but also the manner and direction in which they are transitioning into the future.

Of the influx of influential aspects of academic institutions and outside factors, technology, service, higher education, and cost/funding, have emerged as prevalent and persistent problems upon which libraries are currently facing. Though each individually contributes problems directly related to the academic library, observed are the blurring of dividing lines as these aspects overlap and correlate to each other, posing substantial problems today and in the future.

Technology

"Since the advent of the Internet, the library has become one of the most transformed departments on most campuses. It may look very much the same on the outside, but the resources and services have been and continue to be significantly altered."⁵⁸ "For more than a century, planning for library space was driven by the need to put shelves under books, and to provide space for services. One of those things is probably history, as we move more and more information resources into ubiquitous

⁵⁵ McCabe and Person 1995, 167.

⁵⁶ StevenB., "Formula For Academic Library Success," ARCLog, posted May 14, 2007, <http://acrlblog.org/2007/05/14/formula-for-academic-library-success/> (accessed November 20, 2009).

⁵⁷ Kaser 1997, 85.

⁵⁸ Patricia Senn Breivik and Gordon Gee, Higher Education in the Internet Age: Libraries creating a strategic edge, (Westport: American Council on Education Praeger Publishers, 2006), 167.

Part II: Chapter III

virtual space...the other is going to become history as we get around to moving many library resources into that virtual space.”⁵⁹ With this, “there is no consensus as to what the future holds for research libraries except that technology will play a profound role.”⁶⁰

In its transformation of all aspects of society since the dawn of the computer age, technology has been the major underlying factor in the current problems and paradigm shifts of the academic library. This rate of technological change has progressed tremendously from paradigm shifts occurring thousands of years to only a few years, maybe even months. As described by Ray Kurzweil,

“The first technological steps—sharp edges, fire, the wheel--took tens of thousands of years. For people living in this era, there was little noticeable technological change in even a thousand years. By 1000 A.D., progress was much faster and a paradigm shift required only a century or two. In the nineteenth century, we saw more technological change than in the nine centuries preceding it. Then in the first twenty years of the twentieth century, we saw more advancement than in all of the nineteenth century. Now, paradigm shifts occur in only a few years time. The World Wide Web did not exist in anything like its present form just a few years ago; it didn’t exist at all a decade ago.”⁶¹

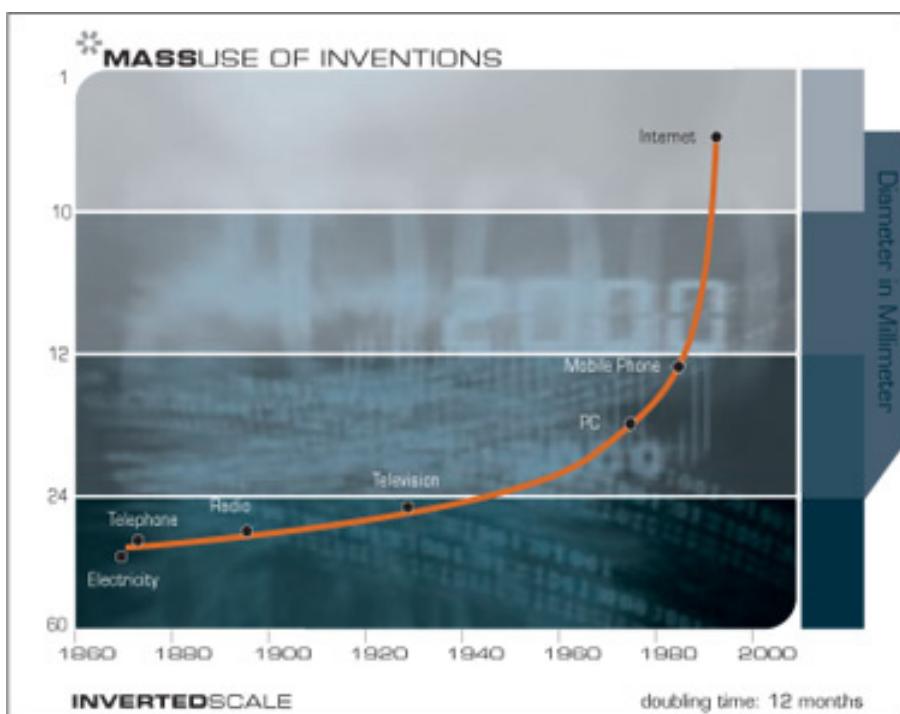
Today, technology has developed tremendously in the last three decades at a phenomenal rate producing the technologies, computers, wireless and worldwide connectivity and communication, and immediate access to information via the internet/world wide web, of which society has become dependent on.

Of the immediate problems arising from technological change is information literacy, as information has become widely and freely accessible – no longer limited within library walls, appearing on computer screens in homes, and practically any location worldwide. Although this may seem as an advantage and a breakthrough, validity and ability to determine useful information have been and continue to be major issues. This is shown especially in the conduction of research, one of the major supporting elements of academic libraries and higher education, as more and more institutions are finding that students are “overwhelmed with information

⁵⁹ John K. Waters, “The Library Morphs,” Campus Technology, April 1, 2008, <http://campustechnology.com/Articles/2008/04/The-Library-Morphs.aspx>, 1.

⁶⁰ McCabe and Person 1995, 167.

⁶¹ Raymond Kurzweil, “The Law of Accelerating Returns,” KurzweilAI.net, posted March 7, 2001, <http://www.kurzweilai.net/meme/Reinvented/Decentralized/Digitized/> / 36



[Figure 15: Mass use of technological inventions, 1860-2000.]

sources, [do not] have skills to discern quality, and fell “bounced around” from one academic service to another⁶² in their research endeavors.

The rapid advancement quality of technology has proven to be another issue, although positively viewed and coveted in contributions to the advancement of mankind – not to mention the popularity of technology in the future due to Hollywood-sized, science fictitious visions and portrayals – the speedy rate of development has become problematic. Particularly for academic libraries, positive advancements have come by means of digitization and digital archiving, however the faster newer technologies emerge and develop, the quicker facilities and spaces within them age and become technologically deficient.

In addition to impacting the academic library building and spaces, technology has posed problems through generational impacts, as “no generation is more at ease with online, collaborative technologies than today’s young people—“digital natives”, who have grown up in an immersive computing environment...where a notebook and pen may have formed the tool kit of prior

⁶² University of Minnesota Libraries, <http://www.ala.org/ala/mgrps/divs/acrl/awards/excellenceaward/UofMinnesotaLibrarie.pdf>, 3.
Reinvented/Decentralized/Digitized / 37

generations, today's students come to class armed with smart phones, laptops and iPods."⁶³ With the technological knowledge of today's students, youth, and forthcoming generations, more problems transpire in other influential facets of the library: higher education and library services.

Higher Education

*"Academic library history has of necessity been a reflection of the development of higher education throughout the world. In the Western world this development has generally been a process of growth, assimilation, and diversification as the institutions of higher education have at various times attempted to follow, lead, and survive the changes undergone by the political, cultural, social, and religious entities which have supported them."*⁶⁴

Pedagogy/teaching methodology and student and faculty needs compose just a few of the many facets of higher education that are evolving, posing current problems and potential challenges and issues to the functionality and future of higher education institutions and their affiliated libraries. Up until this point, higher education has remained a lecture/seminar and individual, self-motivated investigation/problem-solving based method, rooted in physical text, memorization, research, writing and reading. Now, these pedagogies are gradually becoming outdated, as [new model of learning is developing] an instructional shift is occurring from teaching to learning; individual to collaborative work; static to interactive/integrated learning.

Given that technology plays an overall major transformative role with the belief that "technology will become ever more interwoven into the fabric of academic life,"⁶⁵ its influence on higher education has been through "technological innovations [having] a major impact on teaching methodologies,"⁶⁶ currently as well as in the near future. These have the potential to make a shift to pedagogies incorporating dynamic multimedia assignments and presentations, e.g. from traditional text research papers to text papers embedded within multimedia.

In the previous section, it was determined that the immediate issue brought forth by technology was that of information literacy, which also has direct relation to the pedagogies utilized in institutions in that:

⁶³ Marie Glenn et al., "The Future of Higher Education: How technology will shape learning," The Economist Intelligence Unit (2008), [http://www.nmc.org/pdf/Future-of-Higher-Ed-\(NMC\).pdf](http://www.nmc.org/pdf/Future-of-Higher-Ed-(NMC).pdf), 5.

⁶⁴ Wiegand and Davis, 1994, 5.

⁶⁵ Glenn et al. 2008, 5.

⁶⁶ Ibid, 5.

*"There is little doubt that we are rapidly moving toward a future in which conversations between diverse peoples and belief systems will be commonplace. We will have (to some extent we already have) immediate access to information of all sorts from all corners and crevices of the world, and from a wide range of belief systems. The possibilities for learning will be immense. But so will the dangers. As the experience of the ERIC database demonstrates, we run the risk of being overwhelmed with so much information of such variable quality that meaningful shared discourse will be constrained, not advanced. All our citizens, but especially those who are likely to occupy positions of influence, must acquire the intellectual capacity to sift and discern, to weigh and consider, re-consider and even re-re-consider what meaning to draw from the forthcoming deluge of voices."*⁶⁷

As observed by Victor Tinto, distinguished Professor of Education at Syracuse University, in his 2003 Pullias Lecture on the Future of Higher Education,⁶⁸ the abundance and accessibility of information, attributable to the internet and technology, has established a need for a pedagogical reformation, as leaders and citizens of today and tomorrow must "be prepared for lifelong learning, active citizenship"⁶⁹ and the necessary "abilities to locate, evaluate, and effectively use information for any given need,"⁷⁰ or what has come to be termed, 'information literacy'.

Also emerging from new technologies and antiquated higher educational methods and academic libraries are today's generation of net/technologically savvy youth and students, in their necessities for newer ways of instruction and learning. However, these issues in educational needs are not limited to transitions in pedagogy, but also affect the libraries that support their institutions, in the services provided and roles of the individuals that run them.

Services and the Role of the Librarian

*"Providing quality services in academic libraries is now a major issue among academic librarians; they see the library more in terms of the provision of and access to service quality than as just a physical place. Technology and automation have also changed the way people perceive libraries. As a result the role of libraries and librarians is also changing."*⁷¹

⁶⁷ Victor Tinto, "Taking Student Learning Seriously: Rethinking the University of the Future," Charting the Course: Earl V. Pullias Lecture Series on the Future of Higher Education (Los Angeles: University of Southern California Rossier School of Education, Fall 2003), <http://www.usc.edu/dept/chepa/pullias/2003/pdf/2003PulliasBooklet.pdf>, 35.

⁶⁸ Breivik and Gee 2006, 45.

⁶⁹ Ibid, 45.

⁷⁰ Ibid, 46.

⁷¹ Patience L. Simmonds and Syed Saad Andaleeb. "Usage of Academic Libraries: The Role of Service Quality, Resources, and User Characteristics." *Library Trends* 49, no. 4 (Spring 2001): 628.

Part II: Chapter III

Library services and the librarians providing them have always had a vital role in ensuring the academic library's support of its institution and academic community, through collecting, storing, organizing, preserving, providing access to, and disseminating valid information. Throughout history, "the role of the library...has evolved with the needs of the institutions and with the evolution of librarianship as a distinct occupation with a set of professional ideals, objectives, and commitments within the academic community,"⁷² implying that the academic library is no stranger to developmental problems. In its familiarity with conforming to newer needs of its users, the role of the library itself poses as the major problem, as a transition must occur from its traditional roles, as access to information is no longer an issue with the development of the internet and other new technologies, giving rise to newer demands.

In a different, yet valid, insightful and influential perspective, "Yale's groundbreaking Librarian Emeritus Scott Bennett explains that though people talk about integrating the services delivered by librarians, information technologists, and even student tutoring services, "The result can be a useful space that integrates these services, but it's still a space in which the 'service providers' call the shots. We're very slow to break away from that model and admit that what these spaces should be about is the students taking responsibility for their own educations,"⁷³ thus, posing another problem in the changing role of the library.

The role of the librarian has also been challenged, and has become an issue in terms of necessity and its close relations to library services and the problems generated by them. Traditionally, the primary role of the librarian has revolved around collection and service, as observed by Michael Keresztesi, Professor Emeritus of Library Information Science, in 1982, stating:

*"...we seem to have slipped into a new pattern. The library's function is being transformed from that of a public warehouse of cultural goods to one of a social dynamic institution of communication and knowledge dissemination."*⁷⁴

Written at the dawn of the information age, the transition at the time of Keresztesi's article was being made from collection and organization of material to the "recognition of the primacy of the user"⁷⁵ and the emphasis on services. Now, another transition is occurring, with influence

⁷² Wiegand and Davis, 1994, 5.

⁷³ John K. Waters, "The Library Morphs," Campus Technology, April 1, 2008, <http://campustechnology.com/Articles/2008/04/The-Library-Morphs.aspx>, 5.⁷⁴ Glenn et al. 2008, 5.

⁷⁴ Betsy Baker and Mary Ellen Litzinger, ed., *The Evolving Educational Mission of the Library*, (Chicago: Association of College and Research Libraries, 1992), 10.

⁷⁵ Ibid.

from today's technologies and higher education instructional trends, as librarians must respond to new needs of their institutions, patrons and changes in usage, in order to maintain presence and necessity within their libraries.

Fiscal Issues

*"The library is a part of the challenge facing higher education, as it is a complex, often undervalued, underutilized, yet expensive part of the collegiate environment. At the same time the library represents enormous opportunity, serving as a key resource for intellectual inquiry and a conduit to information that will prepare students for the vastly different future."*⁷⁶

Fiscal issues have always been problematic for academic institutions, their libraries and the states that fund them. As "higher education's perceived 'financial black hole,'"⁷⁷ academic libraries are "resource-intensive organizations, require[ing] an influx of resources, especially financial resources, to fulfill their missions,"⁷⁸ and to maintain their services to the institution's community and physical maintenance of its facilities and abundant collections.

Funding for universities has been categorized into two parts: public and private, with the general belief that "private institutions struggle to meet funding needs" and that "public funding for public higher education, [is] the dominant source of support."⁷⁹ As this may have been true in the not too distant past, with today's economy, it has come to an end, as more and more public institutions are now being supported with private funds, and as public funding has been decreasing in the current downturn of the economy.

The affect that the current economy and this funding shift on universities has been evident through the administrative decisions and institutional adjustments that have been made in response to these financial fluctuations, impacting the various departments and academic libraries that they are comprised of, as they control, constrain, justify and allocate funding to maintain and support them. Library services are now reflecting these decisions and adjustments, as budget cuts hinder them, forcing libraries to minimize collection development and physical growth, reduce staff, and cut hours/days of operation, in efforts to operate within minimized budgets. These smaller budgets and the effects of them upon the academic library also pose

⁷⁶ McCabe and Person 1995, ix.

⁷⁷ James G. Neal, "College sports and library fundraising," *The Bottom Line: Managing Library Finances* 10, no. 2 (1997): 58-59.

⁷⁸ Budd 1998, 194.

⁷⁹ Breivik and Gee 2006, 251.

even more problems for patrons, as faculty and graduate students lose valuable research time and opportunities alongside service cuts.

As another alternative, many institutions have turned to technology (e.g. digitization and online services) to ease budget woes. Paradoxical in its nature (as technology has been the main cause to the problems at hand) technological solutions have not necessarily been the appropriate solution to fiscal needs and savings, as they have proven to be expensive and risky, as they offer “no simple solution to the problems posed by the continuing exponential increase in information and its inherent cost”⁸⁰ and as

“...there is little information about how library users behave in a network environment, how they react to online library services, and how they combine those services with others such as search engines like Google, bookstores like Amazon, Internet gateways like Voice of the Shuttle, instructional technologies like WebCT or Blackboard. Digital libraries are still relatively immature – most are still at a stage where limited experimentation is more important than well-informed strategic planning.”⁸¹

Although this project will not be going into a great level of detail in the discussion of funding and fiscal issues, what is certain is that it is an “emerging danger that threatens the very viability of higher education [and academic libraries] as [they] exist today.”⁸² In order to continue financial support, academic libraries must ride out the fluctuating fiscal rollercoaster that the present economy brings, and look toward other means of funding, as it is a constant problem that libraries and higher education institutions will continue to face well into the future.

Collections and Space

“Physical collections require space, and space is limited and costly. Throughout this century, academic library collections have grown continuously, which has created space problems for many libraries.”⁸³

Collections and the spaces that house them have constantly been problematic throughout the history of both public and academic libraries, as “the effectiveness of libraries has often been

⁸⁰ Breivik and Gee 2006, 180.

⁸¹ Denise Troll Covey, Usage and Usability Assessment: Library Practices and Concerns (Washington D.C.: Council on Library and Information Resources, 2002), 1.

⁸² Breivik and Gee 2006, 251.

⁸³ Baker and Litzinger, ed. 1992, 10.

measured by the volume of library materials available to clients, the amount of use of services and resources, and the apparent or quantified satisfaction of clients.⁸⁴ This has been observed in a comparison of recent rankings of the 2008 *Top American Research Universities* and the American Library Association's (ALA) Fact Sheet Number 22, entitled "The Nation's Largest Libraries: A Listing by Volumes Held," as 42 of the 54 listed institutions ranked in the top 25 nationally on at least one of nine measures are also listed within the top 100 of the nation's libraries, in terms of collection size, which can be referred to in Appendices A and B.

Although academic libraries are now transitioning, revolving around service, technology, research and instruction, abandoning the inclusion of the amount of physical materials as a means of effectiveness, as clearly shown by the Top American Research Universities Report and its "nine different measures: Total Research, Federal Research, Endowment Assets, Annual Giving, National Academy Members, Faculty Awards, Doctorates Granted, Postdoctoral Appointees, and SAT/ACT range,"⁸⁵ growth nonetheless remains incessant. In a report conducted by the ACRL on the top ten assumptions of the future of academic libraries, the committee stated that:

*"...higher education, including academic libraries, has experienced robust virtual and physical growth, and the importance of research library collections only continues to increase..."*⁸⁶

further supporting the notion of continued library development, physically and virtually. But what does this mean for the building? Furthermore, what library system should be utilized to organize these collections?

Aside from the issue of library collections, library facilities, though heavily influenced by their collections, face another set of problems, based upon the ages, physical conditions, conformities to building codes and current institutional needs, as they are typically housed within older structures. Combined with today's technological, instructional and fiscal problems wholly affecting the academic library, their buildings are now undergoing numerous physical transformations, undergoing technological updates, seismic updates, reconstruction and renovations, and reprogramming for new instructional and patron needs, such as conversions

⁸⁴ Simmonds and Andaleeb 2001, 628.

⁸⁵ Elizabeth D. Capaldi, John V. Lombardi, Craig W. Abbey and Diane D. Craig. 2008. The Top American Research Universities 2008 Annual Report. The Center for Measuring University Performance, Arizona State University. <http://mup.asu.edu/research2008.pdf>, 5.

⁸⁶ James L. Mullins et al., "Top ten assumptions for the future of academic libraries and librarians: A report from the ACRL research committee," *College and Research Libraries News* 68, no. 4 (April 2007) <http://www.ala.org/ala/mgrps/divs/acrl/publications/crl-news/2007/apr/tenassumptions.cfm>

Part II: Chapter III

to larger, open spaces such as the information commons. Though valid solutions, challenges and issues arise not only through the alterations made, but also, more importantly, through the duration/extent of their lifespans, as technological advances and patron needs are occurring at a staggering speeds, making recent changes seem like temporary solutions for today's needs, calling for better solutions for the long-run into the future.

Chapter IV

Academic Library Systems and Solutions

So how are institutions and academic libraries reacting to these problems and challenges? Throughout the development of higher education and academic libraries, institutions throughout the nation have been called to respond to ongoing spatial problems and the changes brought forth by new technology, new instructional methods and decreasing budgets.

As a result, academic libraries have taken various organizational approaches stemming from three major alternatives: "transfer of material from an overcrowded unit of the library to another unit; storage; and rejection of material."⁸⁷ But before delving into institutional and library solution analysis, an investigation into these approaches or current library systems is of utmost importance to understanding how library facilities function and are spatially planned and arranged.

Centralization vs. Decentralization

"To centralize or decentralize: that is the question."⁸⁸ "As long as there are universities with large libraries, the question of centralization or decentralization will be a live topic for discussion; and... the question will never be settled permanently one way or the other."⁸⁹

The organization of the academic library has been in long debate in the last century, and has revolved around two systems: centralization and decentralization.

Centralization

From just looking at the word 'centralization', one could fathom its meaning along the lines of central and concentrated. When speaking of the academic library, defining centralization is primarily on two levels: place and administration. Centralization of libraries in terms of place, has

⁸⁷ Michael J. Bruno, "Decentralization in Academic Libraries," *Library Trends*, January 1971, 311.

⁸⁸ Leon Shkolnik, "The Continuing Debate over Academic Branch Libraries," *College and Research Libraries* 52, no. 4 (July 1991), 343.

⁸⁹ Bruno 1971, 311.

resulted in the presence of large, often monumental scale main library buildings at the physical center of campuses throughout the nation.

Within these types of libraries, services, librarians, staff, and all, or the bulk of the collection, are housed within them, defining aspects of its administrative attributes, which has made centralized libraries the preferred system in higher education. Arguments in support of centralized library systems state that "centralization is necessary to care for books more economically and efficiently, to provide safety from fire and theft, and to promote interdepartmentalism,"⁹⁰ pinpointing the major advantages of the utilization of this type of system as: administrative, cost, efficiency, service, security, departmental unification and communications (otherwise known as interdepartmentalism), and educational significance.

Decentralization

On the contrary, decentralization achieves the exact opposite of centralized systems, dispersing the collections, staff, and services throughout university and college campuses rather than using the 'one stop shop' concept. Rooted in the ideals of the German seminar instructional method and the notion being the "natural outgrowth of the days when libraries were mere prisons for books,"⁹¹ decentralized libraries first emerged in the United States at the University of Chicago's William Rainey Harper Library, which divided literary sources by subject and distributed them to individual seminar rooms, calling for separated departmental libraries within the teaching departments, breaking away from the central library building.⁹² Although a catalyst in the development of higher education and the academic library, decentralization of academic libraries within university and college campuses in the United States has always been a radical approach to the planning and design of libraries, however has been another solution to the spatial problem of centralized libraries aside from the use of outside storage/stack facilities.

In its development, decentralized systems have been categorized them into three main 'species'⁹³:

⁹⁰ Shkolnik 1991, 346.

⁹¹ Ibid, 344.

⁹² Kaser 1997, 88.

⁹³ Shkolnik 1991, 343.

- 1) A collection-oriented pattern based on the kinds and format of the materials (e.g. map collections, rare books collections, government documents, audio-visual materials, etc.)
- 2) A user oriented pattern which exists to serve different categories of clientele (e.g. an undergraduate library)
- 3) A subject-oriented pattern which encompasses collections of different subject matter (e.g. departmental libraries within professional schools such as law and medicine)⁹⁴

For this project, mainly departmental branch libraries will be discussed as they are the predominant form of decentralization currently used in universities, which will later be explored through several case studies. In the meantime, with a general understanding of the concepts of the two systems, the great debate of which is best to implement will be investigated.

The Great Debate: Advantages and Disadvantages

*"In the twentieth century, the debate over branch libraries has centered on one conflict: librarians wish to centralize libraries to increase administrative control, while the faculty opposes centralization."*⁹⁵

Emerging from the great debate between the centralization and decentralization of academic libraries are the perspectives from both sides of the spectrum, discussing the advantages and disadvantages that have brought the argument to a standstill, which have revolved around (as mentioned earlier) key issues of administration, cost, service and access.

As there has been much literature on the subject, centralized libraries have been favored and utilized as its advantages are mainly administrative, as control, coordination and communication act as the backbone in the operation of the academic library, with the conviction that a central management "produces economies of time and money and provides more convenience to the greatest number of users"⁹⁶ and avoids unnecessary expenditures such as duplication of collections, and additional staffing and security.

⁹⁴ Paul W.T. Poon, "Centralization vs. decentralization in university library administration: Some reflections," International Reader in the Management of Library, Information and Archive Services. Paris: UNESCO, 1987. <http://www.unesco.org/webworld/ramp/html/r8722e/r8722eor.htm>

⁹⁵ Shkolnik 1991, 344.

⁹⁶ Ibid, 347.

With closer administrative control and all library services and collections housed within one location, other significant advantages of centralization encompass service, security, educational significance, and departmental unification and communications (otherwise known as interdepartmentalism). In terms of service, the same quality standard of service is provided to students, faculty and patrons because library administrators, librarians and staff are housed within the library building. With collections, services, supporting staff and librarians located in the same location, the ideas of interdepartmentalism and the library as the 'intellectual center of the university' are supported as all departments and departmental collections are present and accessible within the library, promoting interaction and communication between them, as well as allowing students, faculty and other patrons to access and explore other fields of study and disciplines within the collection.

Although favored amongst many institutions through its many advantages, centralization also has its share of disadvantages, which encompass the advantages of decentralized library: accessibility, ease of use, special services, and relief of the main library. Accessibility and relief of the main library are the primary arguments in favor of decentralization as collections are divided and dispersed by department/discipline and conveniently placed within close proximity to their departments, promoting the use of the collection, while relieving the main library from spatial problems (e.g. building expansion, additions) due to expanding collections.

As "departmental libraries save time directly and money indirectly"⁹⁷ through convenience and physical relief, ease of use and special services further support the utilization of decentralization as collections are reduced in size and reclassified. This in turn makes usability easier for patrons, as opposed to that of a main library, which houses a massive collection and utilizes a classification scheme that disperses many facets of a discipline⁹⁸ throughout its stacks. With smaller and specialized collections, decentralized libraries can provide special services to its patrons as librarians and staff would have relevant subject knowledge, placing them in a better position to be "more responsive to the research and instructional needs of faculty and students,"⁹⁹ acquiring needed and pertinent materials and information, as well as providing more effective, individual and personalized services for its department/discipline.

⁹⁷ Poon, 1987 <http://www.unesco.org/webworld/ramp/html/r8722e/r8722eor.htm>.

⁹⁸ Ibid.

⁹⁹ Ibid.

On the other hand, the main consensus in regards to decentralization is that *the main disadvantages are in the administrative area*:

- 1) *Administrative control (coordination, cooperation, and communication) is difficult to achieve.*
- 2) *The cost of administering such branches is "spent in staffing the many branches in less than adequate fashion. In addition, a very high cost incurred by catalog[ing]." Added to these is the expense of duplicating materials.*
- 3) *The problems of access and security increase.¹⁰⁰*

due in part to physical disconnect. Stemming from the separation and dispersion of subject-specific materials, librarians and staff throughout campuses, administrative control within a decentralized system has been argued as weak, inefficient and nightmarish in its hindrance of communication between departments, and lack of coordination and cooperation from them. In their lacking, the obstruction of prompt transmission of instruction and procedures has created a rift in the uniformity of university library services, with the potential refusing of instructional/procedural implementation.¹⁰¹

As administrative issues encroach on other influential facets/sectors of the library, cost has been an immediate and recognized disadvantage of decentralized libraries through additional financial burdens brought forth by duplication of materials, maintenance of multiple branch library locations, necessary increase in staffing and security, and administrative expenses – all these on top of the inconvenient trend of budgetary shrinkage. Likewise, location and accessibility in a decentralized setting have been viewed as inconvenient, isolated and inaccessible – to the extent of calling it “a “fractionalization” of knowledge”¹⁰²; as collections would no longer be housed within one central building, and patrons would be required to visit various locations in order to obtain information and services from other departments.

¹⁰⁰ Bruno 1971, 313.

¹⁰¹ Poon, 1987 <http://www.unesco.org/webworld/ramp/html/r8722e/r8722eor.htm>.

¹⁰² Shkolnik 1991, 346.

Case Studies: Decentralized/Branched University Library Systems

Although there have been many investigations into the centralized and decentralized system debate, most have concluded that “the questions of whether or not to decentralize, and to what extent, remain unanswered.”¹⁰³ As many of today’s colleges and universities utilize centralized library systems, as they each contain significantly large main or central library buildings, most have outgrown these buildings with the growth of holdings, and have expended the finances and physical space necessary to further develop them through additions and expansions. In turn, this has resulted in administrative decisions to disperse collections through branch and even decentralized libraries, illustrating the current transition that academic libraries are experiencing moving into the future.

The following case studies focus on university campuses that utilize decentralized and/or branched library systems, and were brought together from suggestions from committee members, web and literature searches to “present information for a geographically distributed set of libraries that would provide a snapshot”¹⁰⁴ of current decentralized library planning and programming to explore the potential of becoming the preferred option/solution for the future of academic libraries. Additionally, the branch libraries that compose the following decentralized systems and that provide the collection spaces and services for their respective architecture and/or architectural related schools/programs, will be examined by their physical and service transitions in response to the needs of the 21st century user.

¹⁰³ Bruno 1971, 312.

¹⁰⁴ Charles Forrest and Martin Halbert, eds., *A Field Guide to the Information Commons* (Lanham: The Scarecrow Press, 2009), 67.

University of California, Berkeley

Location:	Berkeley, California
Year founded:	1868
Student population:	36,000
Total libraries:	3 main, 18 subject specific, 11 affiliated/special collections
Collection/holdings:	10 million book volumes, 90,000 publications, 415,900 pamphlets, 5 million microform items, 410,000 maps, 109,000 government documents, 60,000 sound recordings, 6,350 videos ¹⁰⁵

Background

Begin in 1868 at the time of the assimilation of the original College of California, the University of California, Berkeley Library was composed of 1,036 volumes. With great contributions from generous donors, and even the U.S. Government, the collections grew rapidly from the time of its establishment, “put[ting] tremendous pressure on the Library’s capacity to maintain its entire collection in just one location.”¹⁰⁶ In relief of this ‘pressure’, specialty libraries throughout the campus were established, beginning in 1924.

Currently, the University of California, Berkeley library utilizes two library systems, comprised of three categories: units comprised of what is referred as “the Library”, units referred to as “Affiliated Libraries” and departmental libraries and reading rooms.¹⁰⁷ Of these categories, the Library and departmental libraries and reading rooms compose the UC Berkeley’s branched university library system, which consists of The Doe Library, Moffitt Library, Bancroft Library and Gardner Stacks which serve as the main and central library, both in size and in location at the center of the Berkeley campus, and “twenty-four subject specialty libraries serving various disciplines in the humanities, sciences and social sciences.”¹⁰⁸ The university system alone holds over 10 million volumes serving a campus population of approximately 36,000, making it one of the finest and renowned research collections in the nation.

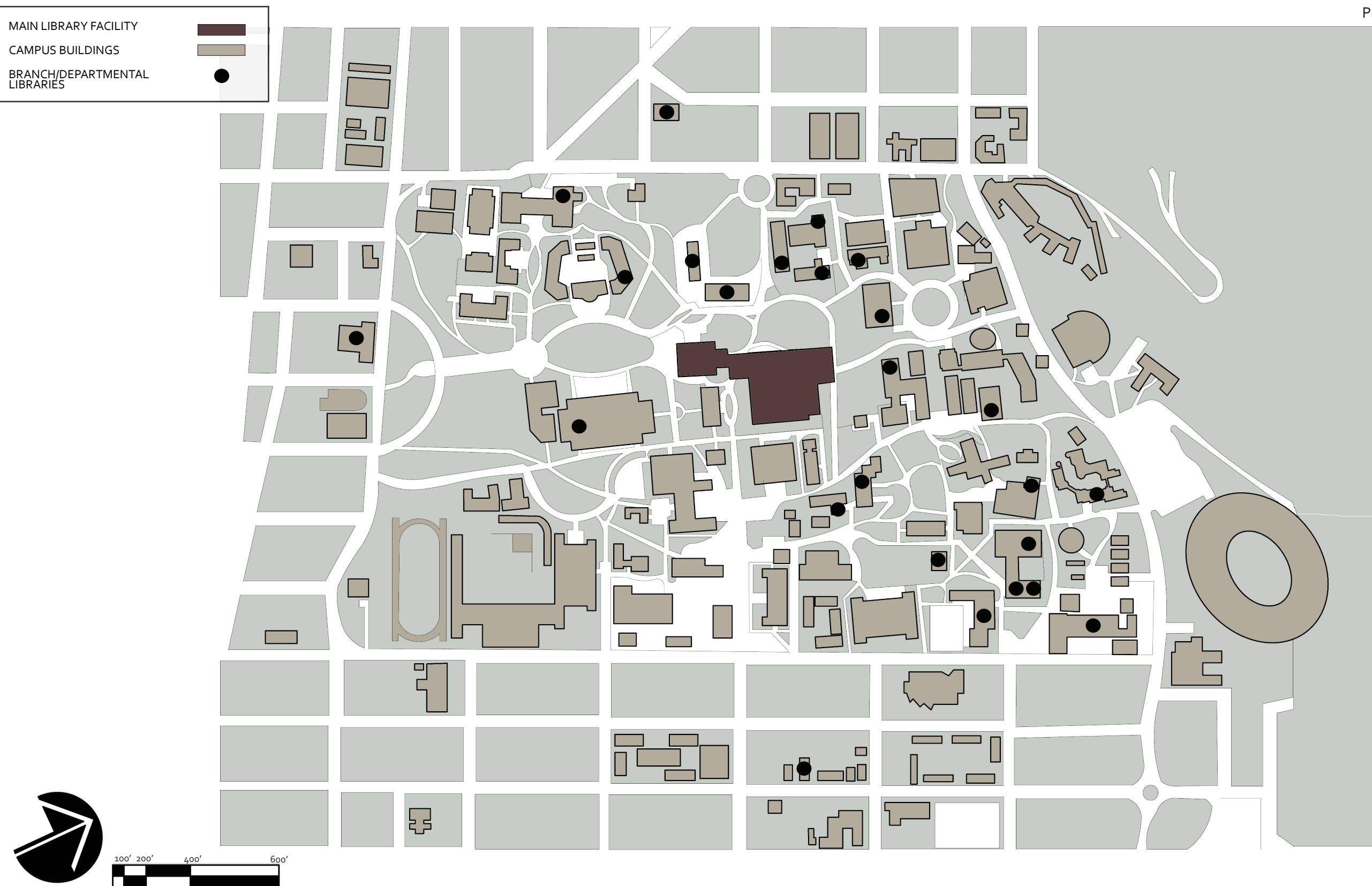
¹⁰⁵ The Regents of the University of California, “Description of the UC Berkeley Libraries,” University of California Berkeley Library, <http://www.lib.berkeley.edu/AboutLibrary/description.html#TheLibrary>.

¹⁰⁶ The University of California Berkeley Library. “UC Berkeley Library History Room.” Library Development Office, <http://www.lib.berkeley.edu/give/historyroom/panel4.html>.

¹⁰⁷ The Regents of the University of California, “Libraries and Collections A-Z - Cal Marketplace,” University of California Berkeley, <http://calmarketplace.berkeley.edu/profiles/libraries-and-collections-z>.

¹⁰⁸ Ibid.

UNIVERSITY OF CALIFORNIA, BERKELEY LIBRARIES



Part II: Chapter IV

The branches of the university system encompass the major academic departments, professional schools and colleges which compose the university. These branches libraries are:

- | | |
|------------------------------------|---------------------------------|
| - Anthropology | - Forest Products |
| - Art History/Classics | - Graduate Theological Union |
| - Bioscience and Natural Resources | - Mathematics Statistics |
| - Business and Economics | - Music |
| - Center for Chinese Studies | - Optometry and Health Sciences |
| - Chemistry | - Pacific Film Archive |
| - Earth Sciences and Map | - Public Health |
| - East Asian | - Science |
| - Education-Psychology | - Social Welfare |
| - Engineering | - South/Southeast Asia |
| - Environmental Design | - Teaching |

Although physically separated from the main library complex, the collections and administrative control of these branch libraries are still held by the main library and the university librarian, demonstrating a hybrid or combination of a centralized and decentralized library system. The collections held within them remain a part of the entire university library catalog, a specifically serve the needs of their respective disciplines.

The Affiliated Libraries compose the university's decentralized library system, which consists of eleven libraries:

- Architecture Visual Resources/CED Visual Resources
- Agriculture Economics
- Environmental Design Archives
- Ethnic Studies
- Earthquake Engineering Research
- Institute of Government Studies
- Institute of Transportation Studies
- Institute for Research on Labor and Employment
- Law Water Resources Center Archives

Genuinely decentralized, these libraries are both physically and administratively separated from the university library system and from each other. Although most of the listed affiliated libraries are present on campus, several are located off-campus, within the city of Berkeley and surrounding cities. Regardless of their locations, they support the specialized teaching and research needs of their respective organizations, reflected in their collections.¹⁰⁹

¹⁰⁹ The Regents of the University of California, "The Affiliated Libraries – University of California, Berkeley," University of California Berkeley Library, <http://www.lib.berkeley.edu/AFFIL/>.



[Figure 17: Doe Memorial Library, North Reading Room.]

Services and Facilities

Aside from the collections and branch library subjects, services and facilities give functionality to the library system. The main library complex at UC Berkeley holds a regular library staff to assist students, faculty and visiting patrons with “locating material and navigating online print collections via in-person, e-mail and phone reference,”¹¹⁰ as well as provide workshops, tours and course-related library instruction sessions, specifically tailored to research needs of students. Also offered is a specialized service, Research Advisory service, which offers one-on-one personalized research guidance for undergraduate students by appointment. For faculty, assignment consultations can be made with library staff to “design research assignments that make use of UC Berkeley Library resources [to] promote deeper connections with course material and [to] foster the development of [students’] research skills.”¹¹¹

¹¹⁰ The Regents of the University of California, “Information for Undergraduate Students,” University of California Berkeley Library, http://www.lib.berkeley.edu/services/for_users/undergrad_students.html#reference

¹¹¹ The Regents of the University of California, “Information for Graduate Students and GSIs,” University of California Berkeley Library, http://www.lib.berkeley.edu/services/for_users/grad_students.html

Part II: Chapter IV

Branch library services encompass similar services as the main library's general services, however are focused on specific fields of study, catered to the particular needs of the program/department, its students and faculty, e.g. the Environmental Design Library, which encompasses and serves the students of several environmental design related fields including architecture, planning, landscape architecture, etc. Specialized services provided at the Environmental Design Library include one-on-one research assistance by appointment as well as promotion of librarian-faculty/student engagement methods through social networking sites such as Facebook, participation of library staff in College of Environmental Design events and meetings, as well as e-mail notifications of happenings in the library and of new acquisitions.

In regards to the physical buildings, the main library complex facility, as mentioned earlier is composed of the historic Doe Library, the undergraduate Moffitt Library, and collection holding Gardner Stacks, each of which were designed, centered on the provision, growth and access of the collection and constructed prior to significant technological advances. The Doe in particular, built in the early 1900s, is also tied to historic preservation guidelines, adding additional constraints to any alterations.

In response to newer technologies and changes, plans are being made to renovate and technologically upgrade the Moffitt Library, while the Doe has been updated to meet some of these needs, via placement of internet nodes for wireless access and capabilities, installation of electrical panels to accommodate heavier electrical loads, and additional electrical outlets added e.g. to historically authentic custom tables and light fixtures in the North Reading Room, to combine the past with present/future technology without jeopardizing the historic integrity of the building.¹¹²

¹¹² Fred Yasaki, e-mail message to author, May 7, 2009.

Branch Library:	Environmental Design Library
Date established:	1964
Year building/space constructed:	1964/2001 Renovation
Collection size:	210,000 volumes, 800 serial subscriptions
Square footage:	14,846 SF
No. of floors:	1
Program/types of spaces:	Circulation, Reference Desk, Reference Librarians/Staff, Stacks, Folios, Journals/Periodicals, Computer Workstations, Exhibit Cases, Study Table

Using the Environmental Design Library as an example, it is located within Wurster Hall, which houses and supports the research, teaching and facilities of the departments, programs and of the College of Environmental Design. Originally 3 levels, the library was renovated in 2002 to address newer technologies, spatial and code needs. Technology updates included placement of Ethernet and wireless connectivity, as well as additional electrical outlets, both floor and table, alongside reorganization of the space to create better work flow and flexibility. Updates to building codes, particularly ADA (American Disabilities Act) accessibility were also made, however decreased stack capacity. Additionally, a green/sustainable feature was applied through providing more natural light.¹¹³



[Figures 18 & 19: Environmental Design Library, computer area and study lounge/exhibit.]

¹¹³ Elizabeth Byrne, e-mail message to author, December 2, 2009.



[Figure 20: Environmental Design Library floor plan and spatial layout.]

Yale University

Location:	New Haven, Connecticut
Year founded:	1701
Student population:	11,250
Total libraries:	22
Collection/holdings:	12.5 million volumes

Background

As one of the eleven institutions established during America's colonial period, the library at Yale University was formed by "ten ministers [who] came to the house of the Reverend Samuel Russell in Branford in 1701, each bringing books for the founding of a college."¹¹⁴ Witnessing and experiencing the transformation of the colonies into the now United States, "many of the books came to the struggling college through the efforts of a Connecticut agent in London, as gifts from such people as Isaac Newton, Elihu Yale, and Isaac Watts. Bishop Berkeley, in 1733, sent about seven hundred volumes from England."¹¹⁵

By 1846, Yale's first library was erected, and actually "began as four separate libraries accommodated in a single interconnected structural complex. As was common on American campuses at the time, there was not only a College-owned book collection at Yale but also three other libraries owned by student societies."¹¹⁶ Like many universities and colleges between the nineteenth and twentieth centuries, Yale began its transformation from a primarily undergraduate college into a research university, which resulted in the growth, expansion and specialization and decentralization of its library system and staff.¹¹⁷

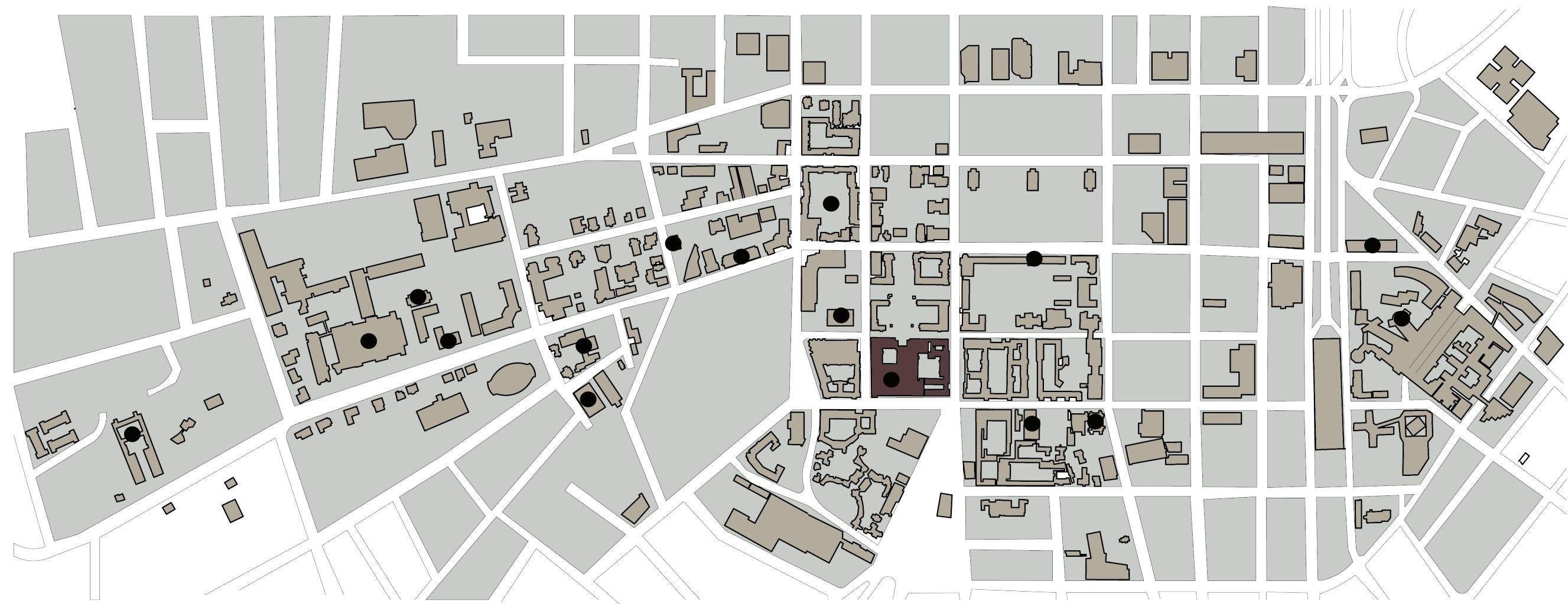
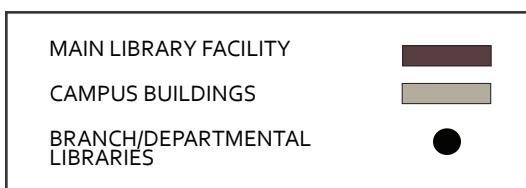
¹¹⁴ James T. Babb, "The Yale University Library: Its Early American Collections." *The William and Mary Quarterly, Third Series* 2, no. 4 (October 1945): 397.

¹¹⁵ Ibid, 397.

¹¹⁶ Kaser 1997, 16.

¹¹⁷ Thomas Frederick O'Connor, "The Yale University Library, 1865-1931" (DLS diss., Columbia University, 1984) <http://app.cul.columbia.edu:8080/ac/handle/10022/AC:P:1265>.

YALE UNIVERSITY LIBRARIES



Part II: Chapter IV

From this beginning the Yale University Library system has now grown to a total of twenty-two libraries, with a collection totaling 12.5 million volumes. These libraries are:

- | | |
|--------------------------------------|-----------------------------|
| - Arts | - Geology |
| - Astronomy | - Law |
| - Bass Library | - Lewis Walpole Library |
| - Beinecke Rare Book and Manuscript | - Mathematics |
| - Chemistry | - Medical |
| - Classics | - Mudd Library |
| - Divinity School | - Music |
| - East Asia | - Social Science |
| - Engineering and Applied Science | - Sterling Memorial Library |
| - Forestry and Environmental Studies | |

Of these listed, twenty are branch libraries, with the Sterling Memorial Library serving as the center and largest library of its system, housing four million volumes.

Services and Facilities

Sterling Memorial Library, the central library of the Yale University Library system holds a regular library staff and librarians that provide research and resource assistance through individual meetings, by appointment, phone, e-mail, text and instant messaging, as well as through various workshops high-quality instruction sessions, such as:

- *English Major Library Research*
- *Library Instruction for Historians*
- *Architecture Research Methodologies*
- *History of Art Graduate Workshops*
- *Learning in the Science Libraries*
- *Medical Library Classes*
- *Refworks, Endnote and Zotero*
- *GIS Workshops¹¹⁸*

and course integrated instruction, where the library works closely with faculty to design library research classes tailored to their specific courses.

¹¹⁸ Yale University Library, "Library Workshop Calendar," Yale University Library, <http://www.library.yale.edu/instruction/>.



[Figure 22: Sterling Memorial Library, Starr Reading Room.]

In further promotion of university library and research services, the central library has established the Personal Librarian Program for new students entering the university as an introduction to the library's collections and services. Within the program, students are "matched with a Librarian when [they] matriculate, a relationship that will continue through [their] freshman and sophomore years, or until [they] declare a major, whichever comes first."¹¹⁹ During this period, personal librarians (PL) would serve as the single point of contact for the library, as the main resource for students' research needs, providing personal notifications of research tools, databases, research methods, etc. After a major has been declared or after sophomore year, "the students' PL will introduce [them] to [their] subject specialist, a librarian with an advanced degree in the student's discipline, who will help [them] with the research [they] do for [their] major."¹²⁰

¹¹⁹ Yale University Library, "Personal Librarian Program," Yale University Library, <http://www.library.yale.edu/pl/>.

¹²⁰ Yale University Library, "Personal Librarian Program," Yale University Library, <http://www.library.yale.edu/pl/.4> (October 1945): 397.

Part II: Chapter IV

Branch library services encompass similar services as the central library's general services, however are focused on specific fields of study, catered to the particular needs of the program/department, its students and faculty, e.g. the Robert B. Haas Family Arts Library, housed within the Yale Arts Complex, which serves all the schools, colleges, and programs related to the arts including architecture, art, drama, and music. Services provided by the Haas Family Arts Reference staff aid students in:

- *Discovering the rich collections in the library and in related departments*
- *Developing research strategies*
- *Identifying research materials beyond Yale*
- *Assisting with class projects or research papers*¹²¹

through individual meetings, at the reference desk, phone, e-communication (email, chat, text), and through means of outreach, with librarians/staff staying in touch with faculty members and creating opportunities for dialogue with Arts Complex students. Additionally, research and reference aid is also conducted through its instruction program. This program includes mandatory instruction programs required by the various schools and colleges within the Yale Arts Complex, e.g. the School of Architecture:

- *Master of Architecture (MArch) I & II Summer Orientation and Fall Instruction Program: Required orientation to architecture collections at Yale, basic and advanced research methods.*
- *Undergraduate Architecture Research Methods Program: Required research methods session taught in conjunction with selected course. Covers basic and advanced research methods based on selected topic.*
- *Master of Environmental Design (M.E.D.): Group orientation.*
- *Doctor of Philosophy, Architecture (Ph.D.): Individual orientation.*¹²²

In discussing library facilities, Yale's central library facility is composed of Sterling Memorial (SML), Bass Library (originally Cross Campus Library) and the Irving S. Gilmore Music Library. Constructed in 1931, like the Doe Memorial Library, the SML is also tied to historic preservation guidelines as well as a lack of electrical/technological capabilities to support student/patron/tech needs. Both of which have lead to "a number of Sterling's interior spaces require[ing] restoration

¹²¹ Yale University Library, "Robert B. Haas Family Arts Library: Reference and Instruction," Yale University Library, <http://www.library.yale.edu/arts/refandinstruction.html#>.

¹²² Ibid.

and modernization to accommodate six decades of changes in user needs, publication patterns, acquisition practices, and technology.”¹²³

In response to these changes, alongside the construction of the new music library, major renovations of the structures, reading and service areas of the Sterling Memorial and Bass (CCL) Libraries were conducted, giving “opportunity to incorporate major mechanical, electrical, environmental, and telecommunications upgrades to meet current building codes, technological advancements, and standards for library collection maintenance...to fulfill Yale University students’ expectations for places conducive to learning.”¹²⁴

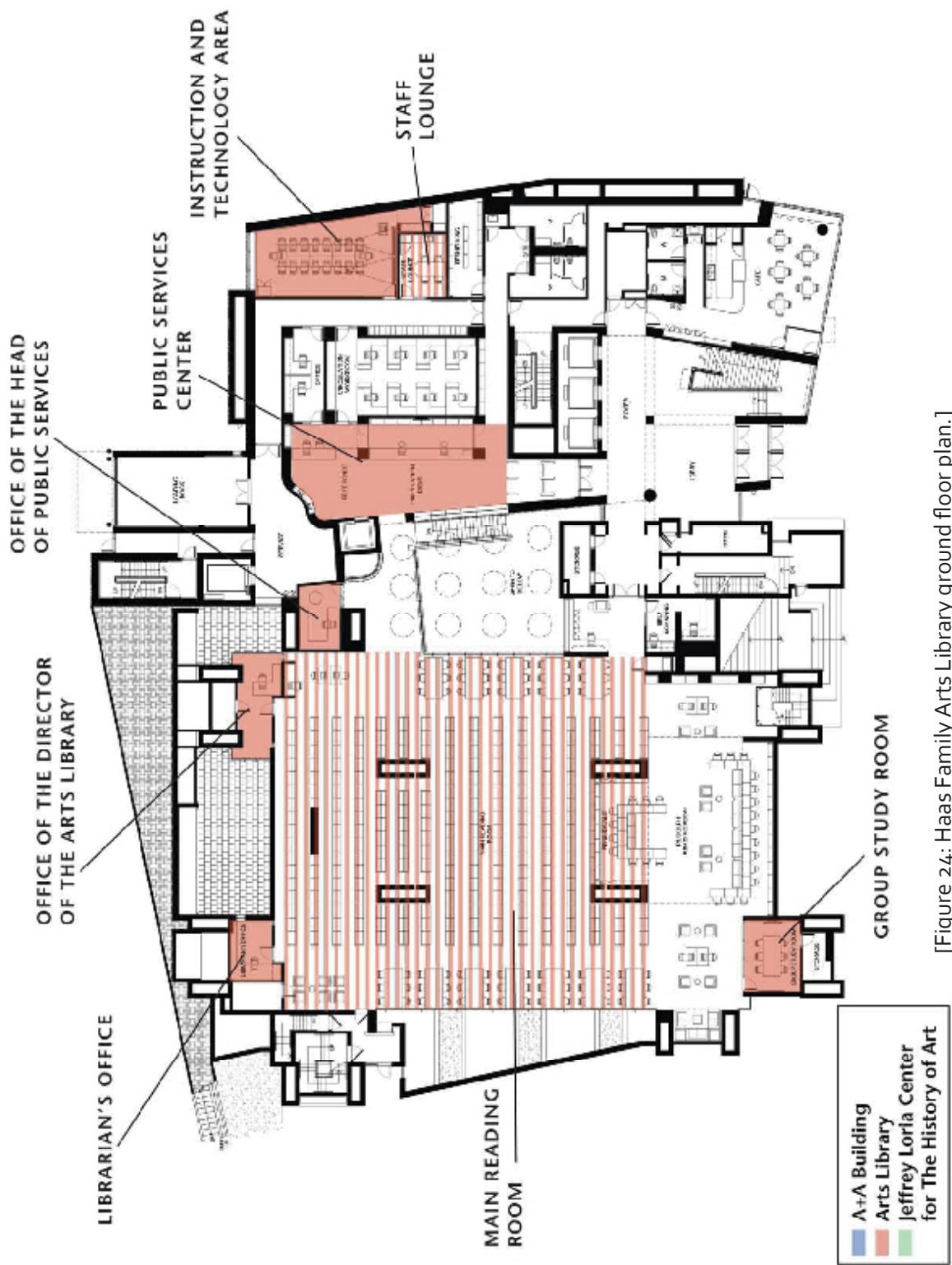
Branch Library:	Robert B. Haas Family Arts Library
Date established:	2008
Year building/space constructed:	1963/2008 Renovation
Branch Collection size:	125,000 volumes
Square footage:	20,434 SF
No. of floors:	2
Program/types of spaces:	Group Study Rooms/Open reading areas/Electronic classroom facilities.



[Figure 23: Haas Family Arts Library study lounge/reading area.]

¹²³ Yale University Library, “Scope and Rationale of the Phase I Renovation,” Yale University Library, <http://www.library.yale.edu/news/renovationscope.html>.

¹²⁴ Yale University Library, “Phase 2a Renovations: Project Overview and Key Milestones,” Yale University Library, <http://www.library.yale.edu/renovaxn/phase2a/overview.html>.





[Figure 25: Haas Family Arts Library basement floor plan.]

Part II: Chapter IV

Using the Haas Family Arts Library as an example, it is located within Paul Rudolph Hall, which houses the Arts Complex programs, classrooms and facilities. Included in the program of the original 1963 design, what was then known as the Art and Architecture Library underwent numerous "haphazard patch-ups and re-designs that continued long after the 1969 fire that destroyed the upper floors"¹²⁵ and required the gutting of the building. Renovation and restoration to the interior of Rudolph Hall to something like its original state¹²⁶ was completed in 2008, with updates made to the spatial program, technological features, and HVAC as the original structure had tremendous issues with climate control.

In support of new user needs for technological advances, e-classrooms for library instruction and teaching, offering seating for 20 students maximum, each with their own screens and state of the art presentation consoles, and group study rooms with provisions for small presentations via plasma screens were the most important additions in the renovation, allowing for better networking, user interaction and group connectivity.

¹²⁵ Yale University Library, "Brief History of the Robert B. Haas Family Library," Yale University Library, <http://www.library.yale.edu/arts/history.html>.

¹²⁶ James Gardner, "Revivifying Yale's Brutalist Pile," The New York Sun, 19 June, 2008, <http://www.nysun.com/arts/revivifying-yales-brutalist-pile/80261/>.

University of Minnesota, Twin Cities

Location:	Minneapolis, Minnesota
Year founded:	1851
Student population:	44,000
Total libraries:	14
Collection/holdings:	6.8 million volumes, 77,446 serial subscriptions

Background

Founded in 1851 during the states territorial period, the University of Minnesota Library system was officially established in 1869, after its designation as a depository for Minnesota government documents and 1200 volume purchase which formed the nucleus of the collection. Within 8 years, the university campus had expanded, and the collection had increased tenfold. By 1888 library decentralization had begun with the establishment of the Law School and assimilation of the personal collection of the Dean as the Law Library, and the geographical distance between the Twin Cities campuses.¹²⁷ Expansion of the branch libraries had increased tremendously by 1905, as the collection had grown to 73000 and the number of departmental libraries to 20.

Since then, the University Library System at the University of Minnesota, Twin Cities Campus, has remained a decentralized system, now consisting of 35 libraries (major and branch) spread over 3 campuses in 2 cities¹²⁸ that include:

- | | | | |
|---|-------------------------------|---|-------------------------------|
| - | Library of South Asia | - | Law Library |
| - | Architecture and Landscape | - | Forest Products |
| | Architecture Library | - | Graduate Theological Union |
| - | Bio-Medical Library | - | Mathematics Statistics |
| - | Charles Babbage Institute | - | Music |
| - | Childrens Literature Research | - | Optometry and Health Sciences |
| | Collection | - | Pacific Film Archive |
| - | East Asian Library | - | Public Health |
| - | Elmer L. Andersen Library | - | Science |
| - | Entomology, Fisheries and | - | Social Welfare |
| | Wildlife | - | South/Southeast Asia |
| - | Forestry Library | - | Teaching |
| - | Journalism Library | | |

¹²⁷ Regents of the University of Minnesota, "Historical Timeline of the University Libraries," University of Minnesota Libraries, <http://www.lib.umn.edu/about/timeline>.

¹²⁸ George D'Elia et al., Evaluation of the Document Delivery Service Provided by University Libraries, Twin Cities Campus, University of Minnesota. Final Report of a Research Project (Washington D.C.: Council of Library Resources, 1984), 1.

UNIVERSITY OF MINNESOTA, TWIN CITIES LIBRARIES
EAST & WEST BANK



Of these, 5 are major anchor libraries that provide space, information, collection and services to support research and instruction for the separated campus, in both Minneapolis and St. Paul: Wilson Library (humanities and social sciences), Walter Library (physical sciences and engineering) and Elmer L. Anderson Library (archives and special collections) located in West Bank, Minneapolis campus, Bio-Medical Library and Walter Library (physical sciences and engineering) located in East Bank, Minneapolis campus, and Magrath Library (natural, agricultural, environmental, and biological sciences) located in St. Paul campus.¹²⁹

Services and Facilities

Through the anchor libraries mentioned above, services that the University of Minnesota Library system provides is based on their mission to "inspire learning and discovery through information resources, collaboration, and expertise"¹³⁰ focusing primarily on student/user engagement. In addition to standard library services (e.g. accessible librarians and staff, borrowing, interlibrary loan, document delivery, reserves, workshops, orientation and instruction) user specialized services have been developed, in support of the mission statement, user needs and research, with programs/services such as the Undergraduate Virtual Library, providing an "integrated suite



[Figure 27: Wilson Library, Smart Learning Commons.]

¹²⁹ University of Minnesota Libraries, <http://www.ala.org/ala/mgrps/divs/acrl/awards/excellenceaward/UofMinnesotaLibrarie.pdf>, 2.

¹³⁰ Ibid.



[Figure 28: Smart Learning Commons, one-on-one assistance.]

of collections, services and tools for the millennial generation" of undergraduate students; the SMART Learning Commons, described as "one-stop study/research/learning spots"¹³¹; peer-assisted learning/research consultation, providing weekly learning sessions (on a group and/or individual basis) to improve academic performance and one-on-one assistance to develop research strategies¹³²; and the Digital Conservancy providing research support and open access to graduate students and faculty.

Other branch library services within the system encompass similar services as general services provided by the anchor libraries, however are catered to the specific needs of the college or department. For example, the Architecture and Landscape Architecture Library serves and supports the research and curriculum of the College of Design, providing general services such as "circulation, reference services, interlibrary loans, course reserves, document delivery" as well as user education and library orientation/instruction which are scheduled both informally and incorporated into the departments' studio classes.¹³³

¹³¹ University of Minnesota Libraries, <http://www.ala.org/ala/mgrps/divs/acrl/awards/excellenceaward/UofMinnesotaLibrerie.pdf>, 2.

¹³² The Regents of the University of Minnesota, "Smart Learning Commons - About PAL," University of Minnesota, <http://smart.umn.edu/aboutpal.html>.

¹³³ The Regents of the University of Minnesota, "Library Services," University of Minnesota Libraries: Architecture & Landscape Architecture Library, <http://arch.lib.umn.edu/services.phtml/>.

Part II: Chapter IV

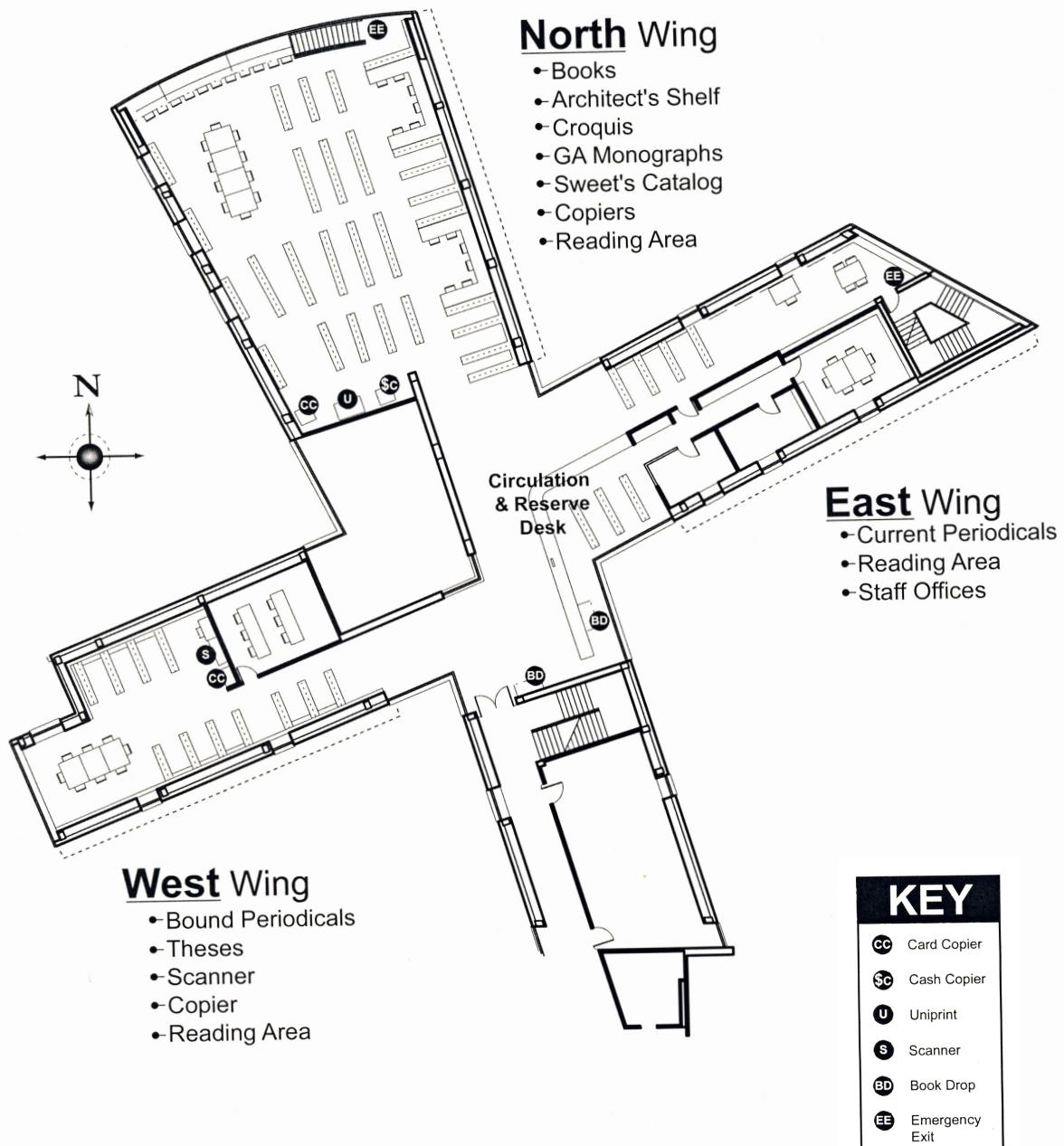
Taking a look at the library buildings, the systems 5 anchors, consist of 4 built between 1920s and 1980s, (e.g. Wilson Library completed in 1968) and its most recent building, the Andersen Library, completed in 2000. To cope with newer pedagogical, technological and spatial needs, and the adaptation of high-tech demanding spaces such as SMART learning commons, older anchor buildings were renovated, incorporating electrical and connectivity support (etherjacks, wireless/internet connectivity, etc.).

Branch Library:	Architecture and Landscape Architecture Library
Date established:	1985
Year building/space constructed:	1960/2002 Renovation and addition
Branch Collection size:	41,500 monographs (plus journals and multimedia)
Square footage:	6,470 SF
No. of floors:	1
Program/types of spaces:	Study areas, conference room, computer areas (internet access only)

Using the Architecture and Landscape Architecture Library as an example, it is located on the second floor of Ralph Rapson Hall, which houses the College of Design. Completing its renovation



[Figure 29: Architecture and Landscape Architecture Library.]



[Figure 30: Architecture and Landscape Architecture Library floor plan.]

Part II: Chapter IV

and expansion in 2002, the building and the library facility has been updated to handle the technological and pedagogical needs of its users, spaces and equipment. This has also been accomplished by sustainable means as the original Rapson Hall has utilized solar photovoltaic panels for 20 years, which has aided in the provision of "electricity through solar generated hydrogen when solar array is not producing power."¹³⁴

¹³⁴ Michael Fraase, "Rapson generates hydrogen from rooftop solar array," College of Design Memo, posted November 3, 2008, http://blog.lib.umn.edu/cdescomm/cdes_memo/2008/12/rapson_generates_hydrogen_from.html (accessed March 2, 2010).

Analysis

In investigating the aforementioned university library systems and their branch facilities, all were developed and continue to be collection based, as decentralization was the response to the spatial needs and future growths of their collections, and as each is university and library system is glorified by their size and amount of holdings. Additionally, the basis of collection size is also reflected in the facilities as at the heart of their systems is usually a large (or several), architecturally significant, permanent and monumental library building(s), holding majority of the physical texts, followed by numerous branch/departmental specific libraries.

Physically separated, branch/departmental library facilities are often thought of as inefficient and costly as they are thought to hold duplicates of the collections held within the main/central library building and services, however is not always the case. In the case of the systems discussed, very few are duplicate materials and services are, as opposed to general services, department/college/school specific.

Since the arrival of newer technologies and “accelerated development of sophisticated information systems, multiple possibilities for access, communications networks, broad distribution of the Internet, miniaturization technologies and paper-free ways of storing information,”¹³⁵ newer purposes for the library as a physical entity and newer needs of users have created change in the definition of the academic library, an ongoing transition/repurposing that has been realized and exemplified in each of the case studies, and will also be discussed further in the following chapters.

In addressing the needs of users, the transition has occurred in the role of the library and librarian, from focusing primarily on providing access to materials, to a focus on providing services based on research and instruction. Reviewing each of the university systems, all exemplify this transition in their main/central libraries and branch/departmental libraries through various types of programmed services such as the Research Advisory service at Berkeley, the Personal Librarian at Yale, and the SMART Learning Commons at Minnesota, which all focus on the aid and instruction of researching methods for undergraduate students, an issue brought forth by changes in technology, teaching methods and the ways research can now be conducted, e.g. internet searches, making it difficult to discern reliable sources of information. For graduate

¹³⁵ Snunit Shoham and Israela Yablonka, “Monumental Library Buildings in the Internet Era: The future of public libraries.” IFLA Journal, Vol. 34, No. 3 (2008): 267.

students and faculty, the library staff in these systems extends aid through individual research consultation/advising as well as incorporating library and research instruction within their courses.

On a smaller scale, the branch libraries of these systems display similar services, however on a more specific level, based on department/college/school focus, e.g. architecture/environmental design, and other related fields. In focusing on a particular group of users, librarians and staff specialize in that particular field and engage in creating better relationships with students and faculty as they are physically embedded within school/college facility. Being located closer to where their users are (within the same building), "getting into the flow of users", students and faculty have a closer connection to the library, as the facility is utilized much more and identified by users as 'their library'¹³⁶ like that at the Environmental Design Library at UC Berkeley.

As physical entities, main libraries continue to be the larger, monumental facilities within their campuses, however their branch libraries are shrinking as service focus is shifting from collection to instruction/research aid and tech/information system access. Illustrating this shift physically are the Environmental Design Library at UC Berkeley and the Architecture and Landscape Architecture Library at the University of Minnesota, where collection stacks were downsized at UC Berkeley during its 2002 renovation. In comparison to both Yale and UC Berkeley, the Architecture and Landscape Architecture Library at Minnesota is significantly smaller in size (sq.ft), holding a relatively smaller physical collection and utilizes on 2 primary staff – the head librarian and librarian assistant.

In addition to size, another physical characteristic of these systems and facilities is that most of them were designed as static and permanent architectural/building/spatial solutions. In permanence, when developing and designing building expansions, updates and/or additions, most are treated as 'afterthought' solutions, as static existing buildings are more difficult to physically adjust and adapt to needs brought forth by evolving technologies, pedagogies and new generation of students, faculty and users. This inflexibility also proves to be a costly ordeal, especially when dealing with existing structures, historic or not.

Looking again at each of these case studies, we see similar changes in function of spaces, technological/electrical capability upgrades, and the move towards providing more service rather than collection. Each has catered to the current needs and expectations of their users

¹³⁶ Elizabeth Byrne, e-mail message to author, December 2, 2009.

Part II: Chapter IV

(undergraduate, graduate, faculty, etc.) through renovations, expansions, etc. but what about further in the future, beyond what is just needed now? When dealing with facets of change (e.g. physical, pedagogy, etc.) it is often difficult to see and accommodate for what is needed beyond what is present.

For the academic library, technologies, pedagogies and user needs, are the major grounds for change, however are also difficult to accommodate for, when they are not in the mainstream as they may not necessarily occur as predicted or forecasted. In these case studies, although they continue to maintain physical collection space in their branch libraries, their approaches to providing for the needs of the future has primarily been through the notion of flexibility and ease; utilizing open floor plans that can be rearranged and reprogrammed for future uses, and incorporating more electrical/power support for current technology needs as well as allowing for easier access and modification for electrical/power needs to come in the future.

Chapter V

The University of Hawai'i Library System

So how does the University of Hawai'i compare to library systems of other higher education institutions such as the ones examined and discussed in the previous chapter?

Location:	Honolulu, Hawai'i
Year founded:	1908
Student population:	20,005
Total libraries:	3
Collection/holdings:	3.2 million books and journals

Taking a look into the University of Hawaii's current library facilities, the University of Hawai'i at Mānoa Library system is composed of Hamilton and Sinclair Libraries, as well as 11 smaller affiliate collections and reading rooms dispersed throughout campus:

- Law Library – William S. Richardson School of Law
- Sunset Reference Center – School of Travel Industry Management
- Anthropology Graduate Reading Library – College of Social Sciences, Anthropology Department
- The Curriculum Resource Center (CRC) – Wist Hall
- Institute for Astronomy Library
- NASA Pacific Regional Planetary Data Center – School of Ocean and Earth Science and Technology
- Transportation Library – Department of Civil Engineering, Holmes Hall
- Second Language Studies/Linguistics Reading Room – Department of Second Language Studies, Moore Hall

and currently utilizes a centralized system, with Hamilton Library acting as the main library, holding majority of the physical collection and services.

According to its mission statement, the University of Hawaii at Mānoa Library "supports the learning, research and information needs of students, faculty, staff and our community... [and] provides access to the world of knowledge. It preserves our local cultural heritage for future generations."¹³⁷

¹³⁷ University of Hawaii at Mānoa Libraries, "Development: Mission," University of Hawaii at Mānoa <http://library.manoa.hawaii.edu/about/gifts/development/index.php>.

UNIVERSITY OF HAWAII, MĀNOA LIBRARIES



Hamilton and Sinclair Libraries

Collections and Services

As mentioned in previous chapters and sections, the two main physical facilities dedicated to library purposes/functions on the UHM campus are Hamilton and Sinclair Library, located at opposite ends of upper campus. Although originally purposed to serve the separate needs and house the collections of undergraduates (Sinclair) and graduates (Hamilton), Hamilton Library serves as the main library facility on campus, in regards to holding most of the physical collection, as well as library services and service providers (librarians/library staff).

Whilst Hamilton contains the main collection, Sinclair Library contains the audiovisual/music collection, government documents collection, reserves and bound periodicals, which take up much of the floor space within the building, and sum up the remainder of library affiliated services and spaces within the building. Aside from the collection, it also houses non-library departments/campus collaborations such as the Student Success Center, Honors Program, Career Center, CLIC (Computerized Learning and Information Center) Lab etc.

Problems and Issues

Majority of the problems that both Hamilton and Sinclair Libraries revolve around many aforementioned issues discussed in Chapter 3, primarily physical matters due to changes in technology, higher education, finance, collections and space. These matters include maintenance and repair issues due to weather damage as well as physical alterations due to newer demands of the times such as student, instructor, pedagogical, and technical needs, and the space required to provide for such needs.

Examples of such issues include flooding and water damage of Hamilton Library in October of 2004, water leakage of the 2nd and 3rd floors of Hamilton Library in 2007, both of which caused tremendous damage to the school's physical collections. Another example of damage caused by weather/climate has occurred in Sinclair Library due to its open-air nature, which has allowed mold to develop within the building and on the physical collections.

Other issues that have been brought up regard patron and institutional needs, and how to support and provide for them spatially/physically, the most outstanding being technological and pedagogical demands. Additionally, the physical collection has also become an issue, in its own

demands for square footage as it is currently outgrowing its provided space, and is competing for additional space with tech and learning/study areas. Examples of these issues include a focus on adding more tech (computer/internet access/servers) and learning areas, which has compromised shelf space for physical collections (which are therefore temporarily placed/shelved in old individual task desks or removed).

Although most of the significant and noticeable problems entail physical demands, library service infrastructure and digital collections also have their own issues, especially with recent budget cuts, and issues regarding copyright and publication. Library funding and budget cuts, in particular, have had the greatest influence on infrastructure changes and services as they continue to regulate when and how the buildings, collections and services are utilized throughout the academic year as exemplified with Hamilton Library's closure this past Winter interim period (2009).¹³⁸

Repurposing and Spatial Changes

In response to the problems and issues mentioned above, more recently, several spaces within each of these libraries have been repurposed, in response to changes in user needs and newer functions.



[Figure 32: Newly renovated Sinclair Library study lounge.]

¹³⁸Junghee Lee, "Hamilton library to open a week early," *Kā Leo O Hawaii*, December 10, 2009, Front page.



[Figure 33: CLIC Lab (Computer access lab) in Sinclair Library.]



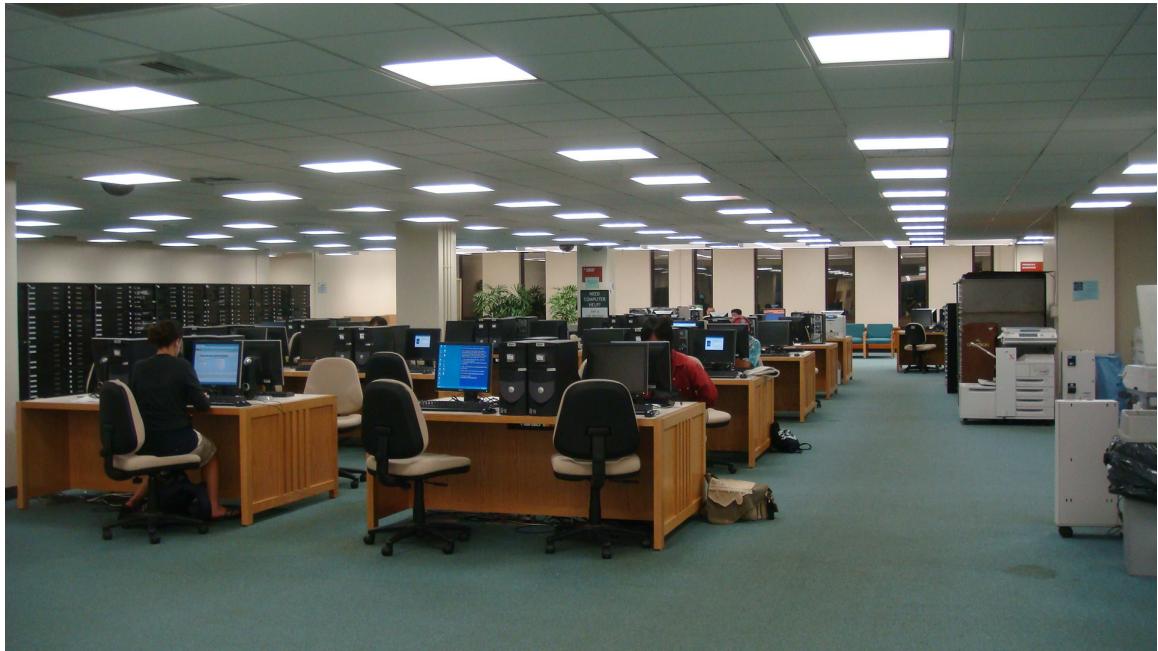
[Figure 34: Student Success Center at Sinclair Library.]



[Figure 35: Group study room within the Student Success Center.]



[Figure 36: Group study rooms in the Student Success Center.]



[Figure 37: Hamilton Library main floor, CLIC Lab.]



[Figure 38: Hamilton Library main floor, CLIC Lab and study areas.]



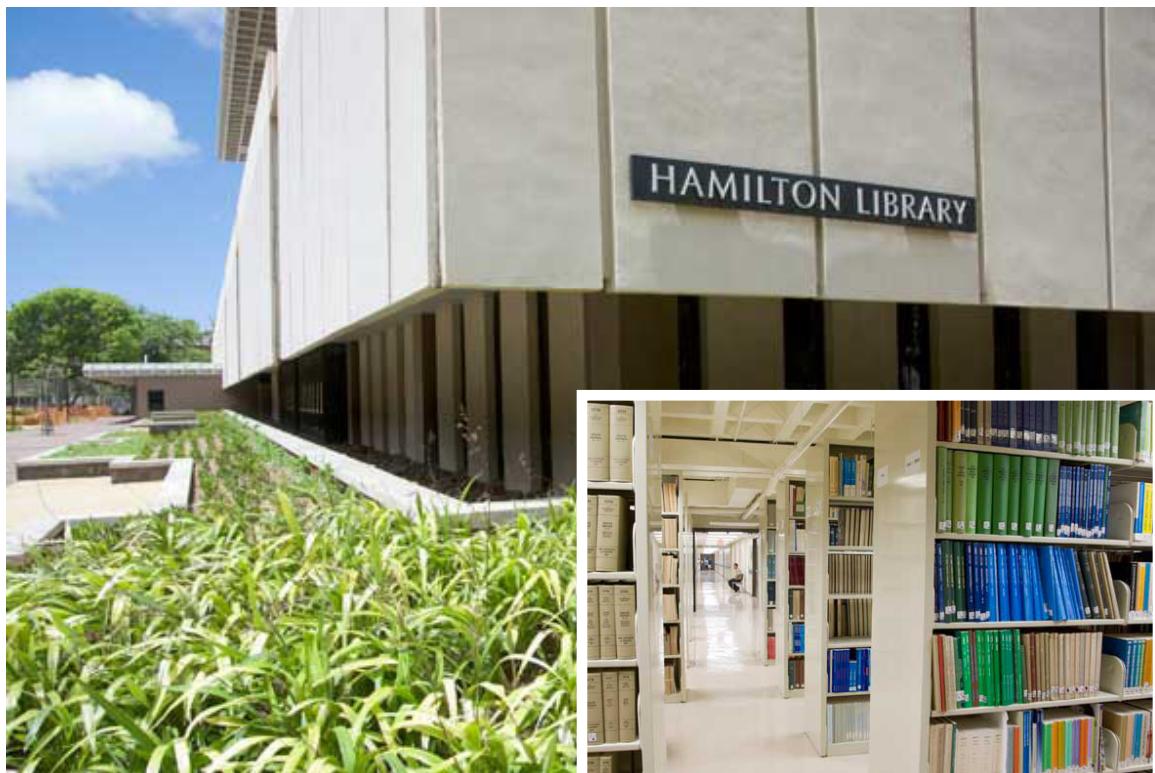
[Figure 39: Group study rooms in Hamilton Library, 2nd Floor.]



[Figure 40 & 41: Hamilton Library Addition presentation rooms, exterior and interior.]



[Figure 42: Hamilton Library Addition SciTech Commons.]



[Figure 43 & 44: Hamilton Library newly renovated exterior and interior basement level.]

Part II: Chapter V

Particularly focusing on the technological and pedagogical shift and the physical responses to these changes, we can see how they are physically impacting both Sinclair and Hamilton Libraries. Within Sinclair, several rooms have been designated ‘learning arenas’ equipped with flat-screens to be utilized for group work or classes/courses. Additionally, with the recent displacement of the Psychology Department from Gartley Hall (due to structural integrity and water damage issues),¹³⁹ space was cleared to house the Outreach College within Sinclair.

Similarly, within Hamilton, presentation rooms have been added to the SciTech Commons area, equipped with projectors, giving students the opportunity to rehearse presentations in front of small peer audiences.¹⁴⁰ Although many of these technological updates have had a positive influence on patrons, some of the physical collection has been impacted and displaced with the invasion of the necessary spaces and servers to provide such technological services.

Regarding other physical spatial alterations, in response to issues brought forth by weather/climate conditions, in Sinclair Library, majority of the physical collections (textual) have been moved to Hamilton Library for mold removal and preservation. Although there are still stacked shelves within the building, most are older science journals which are available digitally. The remaining major collection housed within Sinclair is the Audio/Visual collection, contained on the air-conditioned 4th floor. Looking at Hamilton, repairs have been made to the damaged ceilings and roof due to rain infiltration, and the impacted books have been dried, repaired and re-shelved in their respective areas. With the damage caused by the 2004 flood, the ground floor of Hamilton is currently undergoing re-construction, repair and restoration, however unfortunately many of the documents, such as original maps, etc., are permanently lost.

¹³⁹ Craig Gima, “Water problems keep Gartley Hall unusable,” Honolulu Star Bulletin January 4, 2010. http://www.starbulletin.com/news/hawaiinews/20100104_water_problems_keep_gartley_hall_unusable.html.

¹⁴⁰ Teri L. Skillman-Kashyap, “Changing spaces at Hamilton Library,” University of Hawai‘i at Mānoa Newsroom, posted March 19, 2010, <http://hawaii.edu/news/article.php?ald=3476>.

Summary

In the discussion of decentralization and centralization, it's important to note that views presented on the subject in the past were all in the generation of physical collection development, prior to the dawn of the higher technologies, internet and the methods and types of communication we are now familiar with. In turn, the physical representation of the library was developed in the 'bigger is better' and 'knowledge is power' mentality, producing library buildings of monumental scale and ornate styles, containing massive collections which would eventually be dispersed through multiple (and often smaller) libraries throughout campus because of space deficiencies.

Presently and unfortunately most library systems are still based on this scenario and are only now, within the last century shifting, technologically and pedagogically, suggesting/inducing shrinkage in collection, physical space, and placing more emphasis on services/learning/social aspect. Shifts in function/role are occurring from collection development to service development, as more and more academic library systems are now focusing on services provided than collection size. This is primarily due to an "accelerated development of sophisticated information systems, multiple possibilities for access, communications networks, broad distribution of the Internet, miniaturization technologies and paper-free ways of storing information"¹⁴¹ which have revolutionized society in all facets, especially the ways in which we communicate and obtain information. Likewise, a shift is occurring in the library as a physical entity, from static to flexible, from collection to technological, and from large to small, in regards to physical space, due to both technological advances and the recent economic downturn and continuing budget cuts.

At the libraries of UH, although subtle, these shifts are occurring, as spaces are being repurposed for service-based purposes and brought to handle state-of-the-art technologies. Looking at Hamilton and Sinclair Libraries, although Sinclair contains non-library departments such as the Student Success Center and acts more so as a large study hall than a traditional library, with its large reading and study areas, these spaces as well as repurposed spaces such as the learning arenas culminate the basic services and spaces necessary in the 'library' of the future. In a sense, these small transitions are somewhat of an initial phase in the physical response to the move towards a focus on research, service and user needs.

¹⁴¹Shoham and Yablonka 2008, 267.

Part III: The Future Change

““Transition and change, change which is rapid, shifting, and unpredictable” – an apt description of academic libraries. “No consensus as to what the future holds” – a depiction not only of research libraries, but of libraries of all types. “And people are required to manage [change]” – an obvious but often overlooked truth as the possibilities and potentials of technology beckon and bedazzle. In a time when all aspects of higher education are undergoing intense scrutiny, libraries may be under the greatest pressures of all to carry out traditional missions while simultaneously reinventing themselves.”¹⁴²

Although today's problems and solutions directly affect the future, academic libraries are not limited to them, as there are many other factors, such as visions and forecasts, that can potentially and significantly impact what academic libraries will be tomorrow. Continuing into the 21st century and beyond, academic libraries are in question in regards to their physical necessity in an age of advancing technology and “instant electronic information.”¹⁴³

However, as libraries “react to the[ir] institutions mission and, as an extension of its reaction, defines the college or university,”¹⁴⁴ we are witnessing a tremendous transformation in higher education with the aid of technology and economic trends, which in that regard, have developed dire predictions of the existence of libraries, with prevailing obsolete and irrelevant perceptions of books as a technology and the library buildings that house them – bringing about the very same question, will libraries continue to remain in the future? If so, “What is the role of a library when it no longer needs to be a warehouse of books and when users can obtain information without setting foot in its doors?”¹⁴⁵

¹⁴² McCabe and Person 1995, 167.

¹⁴³ Guy Lasnier, “McHenry Library pioneers tour new construction,” University of California, Santa Cruz News/Events, July 30, 2007, http://www.ucsc.edu/news_events/text.asp?pid=1469.

¹⁴⁴ Budd 1998, 3.

¹⁴⁵ Freeman 2005,vii.

Chapter VI

The Changing Role of the Academic Library

*"The stereotypical library is dying – and it's taking its shushing ladies, dank smell and endless shelves of books with it."*¹⁴⁶

The academic world is in a great transition into the future, as it has "transitioned from a time where information was scarce and precious to today where information is vast and readily available, and in many cases, free...as people who in the past visited libraries to find specific pieces of information are now able to find that information online"¹⁴⁷; from a time where instruction was solely based within the classroom and conducted through lecture and seminar to today where learning is becoming more interactive by means of technology; and from a time where the amount of knowledge and information measured power and greatness within the intellectual and educational community to the amount and type of services and learning provided as the basis of intellectual and institutional dominance - which has contributed to the changing role of the academic library.

In these transitions, however, as previously discussed, numerous problems emerge in role, function, necessity and usage, questioning "whether the library as a place has become a dinosaur"¹⁴⁸ and if tomorrow even needs the presence of the academic library.

So Many Problems, Why Do We Need Libraries?

*"Though skeptics may pronounce the irrelevance of libraries in the age of instant electronic information, "libraries are here to stay,""*¹⁴⁹

To answer such a question, we must review the problems of today's libraries and take a closer look into the significant impacts brought forth by them not only on the futures of academic

¹⁴⁶ John D. Sutter "The future of libraries, with or without books." CNN.com/technology, September 4, 2009. <http://edition.cnn.com/2009/TECH/09/04/future.library.technology/>.

¹⁴⁷ Thomas Frey, "The Future of Libraries," FuturistSpeaker.com, posted November 2, 2006, <http://www.futuristspeaker.com/2006/11/the-future-of-libraries/>.

¹⁴⁸ Simmonds and Andaleeb 2001, 627.

¹⁴⁹ Lasnier, "McHenry Library pioneers tour new construction," University of California, Santa Cruz News/Events, July 30, 2007, http://www.ucsc.edu/news_events/text.asp?pid=1469.

libraries, but with each other as well, in order to justify the necessity of academic libraries in the future, regardless of societal, technological, pedagogical and economical fluctuations and transformations. Reviewing today's problems of, technology, higher education, service, finance, collections and space, the methods being taken currently to solve them, and research conducted by other professionals and experts within higher education and library information science, several key justifying factors, in support of academic libraries in the future have emerged.

Information

The first factor supporting the necessity of libraries is that information is constant and will continue to increase in the future. "Change [is] taking place in all areas of human knowledge, is increasing at a tremendous rate and is exponential in character, i.e., where change occurs new information is generated, which in turn creates change, ad infinitum."¹⁵⁰ As new technology contributes significantly to this change in terms of creation, quantity and access of new information, through the developments of the computer and the internet, it is also changing the methods in which we learn and comprehend information.

One of the more significant methodical changes is reading and comprehension. "While reading was until very recently identified with its natural medium of the book, we now must learn to identify it with the screen: "The book has now ceased to be the root-metaphor of the age; the screen has taken its place."¹⁵¹ While this may be true as technology is changing all aspects of how today's society functions and obtains information, books/physical collections will still remain present in the future for two reasons: nostalgia and the inability to digitize all books and print material.

Demographically, the age gap of today's and tomorrow's higher education students and library patrons is widening, changing the relationship between book and reader, as today's generations were brought up in using physical texts, while tomorrow's students are being raised and educated in the digital age, accessing, reading and understanding information digitally. Although students of tomorrow may no longer use books as they were originally intended or as frequently as they are used now, "books will still accompany us for many years, as they are beautiful objects that people will want to keep in their environment, less for reading than as talismans or fetishes invested with

¹⁵⁰ Bruno 1971, 311.

¹⁵¹ Christian Vandendorpe, From Papyrus to Hypertext, Toward the Universal Digital Library (Chicago: University of Illinois Press, 2009), 163.

sentimental or symbolic value."¹⁵² Today's generations will still have the connection between reading and the sensual/nostalgic value of books; the tactile, scent, and the mere presence of books, as they often connote libraries.

In additional support of the presence of books in the future, is the continued creation of them in the years to come. Although computers, the internet, digitization and concepts of 'digital libraries' have questioned the relevance and decreased the production of books, "new media generally don't replace old media, as Marshall McLuhan point[s] out. After TV we still have radio. After telephones we had telegrams for a good long while. So what about books? After we have networked digital books, we'll still have and produce physical books."¹⁵³ With an influx of information and the presence of books in the future, the library as a physical entity is still required.

Research and Services: The Role of the Librarian

The second factor in justifying the need and survival of academic libraries in the future is the continuous need for library services in support of research, missions and pedagogies of higher education institutions. Stemming from information abundance, as the production of information continues, profusely and often times overwhelmingly, the need for a means to contain, control and monitor is still predominant. Although new technology (e.g. the internet, search engines such as Google, etc.) has often been sought to as the solution to make this information easier to search and access for its users, it has rather, further complicated the way in which students are conducting research, as according to research presented by Project Information Literacy,

*"So far, we have found that no matter where students are enrolled, no matter what information resources they may have at their disposal, and no matter how much time they have, the abundance of information technology and the proliferation of digital information resources make conducting research uniquely paradoxical; Research seems to be far more difficult to conduct in the digital age than it did in previous times."*¹⁵⁴

¹⁵² Vandendorpe 2009, 163.

¹⁵³ David Weinberger, "Will books survive? A scorecard..." Journal of the Hyperlinked Organization Joho the Blog, posted November 21, 2009, <http://www.hyperorg.com/blogger/2009/11/21/will-books-survive-a-scorecard/> (accessed November 30, 2009).

¹⁵⁴ Alison J. Head and Michael B. Eisenberg. "Finding Context: What Today's College Students Say about Conducting Research in the Digital Age." Project Information Literacy Report (February 4, 2009) http://projectinfolit.org/pdfs/PIL_ProgressReport_2_2009.pdf.

With the challenges of researching in the digital age, the necessity of student guidance comes to the forefront, implying the rise of newer services and changes in the role of the librarian.

As discussed repeatedly throughout this document, technology has been one of the main driving forces for change and is now changing the way today's and tomorrow's students learn, comprehend, and are taught, influencing the products of their researching endeavors. With the influx of information and technological resources, the importance of having the academic library as a resource is supported as their services specifically cater to their patrons, as "the librarian will continue to provide personalized service to patrons. Personal service is what will differentiate the library from other providers."¹⁵⁵ Along with providing personalized services, the role of the librarian, to a certain extent, is now changing as "library and information technology (IT) services coming together and aligning efforts. After all, library professionals and IT professionals have a great deal in common: At heart, they are all information professionals."¹⁵⁶

Support and Space

The third factor advocating the need for academic libraries in the future is the continued housing of the support, remaining print material/physical collections, library services (e.g. librarians), and gathering spaces for patrons, as physical spaces for these services will still be needed in the future, despite notions of technology completely eradicating the academic library building.

As many library services are being converted into online services, ideas of online services and digitizing the library have led many to believe that the library building and books (often seen as a financial black hole) are no longer needed, resulting in financial savings. Little do most know, "making library services available online is expensive"¹⁵⁷ and is conducted by tens and even hundreds of individuals, working in computer stations, connected to servers, etc. the list goes on, which require physical space.

Aside from the 'behind the scenes' spatial needs of online services, access to remaining collections, and upfront and personal services for patrons are also advocating the necessity of the library. As determined previously, physical collections, although reduced, will still be present in the future, and still require space to protect, preserve and provide access to, as they are assets of their institutions. Regarding in-person services, the purpose of library spaces is changing from

¹⁵⁵ Breivik and Gee 2006, 179.

¹⁵⁶ Ibid, 170.

¹⁵⁷ Ibid, 180.

repository to relationship facilitator, promoting the creation of relationships between librarians and their patrons, as well as the relationships amongst patrons: students, faculty and those within the greater surround community.

"Though information may be at one's fingertips from a dorm room or office, today's students and faculty require a place to gather to collaborate,"¹⁵⁸ further substantiating the need for the academic library.

¹⁵⁸ Lasnier, "McHenry Library pioneers tour new construction," University of California, Santa Cruz News/Events, July 30, 2007, http://www.ucsc.edu/news_events/text.asp?pid=1469.

Chapter VII

Impacting Changes and Trends

*"In considering the future of academic libraries, one must take into account economic factors, historical influence, digital developments, and the changing nature of how a library is perceived."*¹⁵⁹

The academic library is part of a larger, multifaceted culture, which makes predicting and designing its future difficult. Although a profound feat in itself, the changes and trends that are occurring now assist in how tomorrow is forecasted, giving a more insightful, logical and useful idea of what the future of libraries could look like. Amongst the many influential facets that impact the academic library, higher education, government, society, economy and technology have emerged as major drivers of change in the future.

Education, Government, Economy and Society

In order to prepare for the future, we must recognize the trends within today's educational, governmental, societal and economical environments that are impacting the directions academic libraries are taking now for the future.

As examined earlier in this document, education, government, society, economy and technology all affect each other. Recently, the Association of College & Research Libraries (ACRL) developed ten assumptions identifying the current conditions of academic libraries with the potential for significantly impacting future academic library planning. According to the ACRL Research Committee:

- 1) *There will be an increased emphasis on digitizing collections, preserving digital archives and improving methods of data storage and retrieval.*
- 2) *The skill set for libraries will continue to evolve in response to the needs and expectations of the changing populations (students and faculty) that they serve.*
- 3) *Students and faculty will increasingly demand faster and greater access to services.*

¹⁵⁹ McCabe and Person 1995, 167.

- 4) *Debates about intellectual property will become increasingly common in higher education.*
- 5) *The demand for technology-related services will grow and require additional funding.*
- 6) *Higher education will increasingly view the institution as a business.*
- 7) *Students will increasingly view themselves as customers and consumers.*
- 8) *Distance learning will be an increasingly more common option in higher education and will consist but not threaten the traditional bricks-and-mortar model.*
- 9) *Free public access to information stemming from publicly funded research and continue to grow.*
- 10) *Privacy will continue to be an important issue in librarianship.¹⁶⁰*

Each of these ten issues/assumptions of the future of academic libraries relates to each type of environment in which libraries are heavily influenced. However, of these influences, higher education is the direct link that connects them to the academic library.

An unfortunate, but common and ongoing trend is the issue of funding, which has long influenced the eradication, dwindling collections and provided services, and shrinking buildings and spaces. In today's economy, funding has been diminishing for the support of education, especially academic libraries. As Western Washington University associate professor Johann Neem describes,

"On its face, the challenge facing libraries is simple: declining funding. At a time when universities and colleges are pressed for funds, developing archival, book, journal, and electronic collections costs money. Libraries thus face the same challenge faced by other academic units -- the humanities, the social sciences, the classroom in general -- that rely upon rather than generate revenue."¹⁶¹

As technology plays a major role in these transformations, we cannot dwell and continue into the future with what we know now. We must look towards technologies that are not mainstream, nor are out in the market, that are currently being thought of and tested in the lab; also known as new and emerging technologies.

¹⁶⁰ Mullins et al., "Top ten assumptions for the future of academic libraries and librarians: A report from the ACRL research committee," *College and Research Libraries News* 68, no. 4 (April 2007)

¹⁶¹ Johann Neem, "Reviving the Academic Library," *Inside Higher Ed*, November 19, 2009 <http://www.insidehighered.com/views/2009/11/19/neem>.

New and Emerging Technologies

*"The computer in my cell phone today is a million times cheaper and a thousand times more powerful than the computer that we used at MIT when I was an undergraduate...That's a billion-fold increase. And we'll do that again in the next 25 years."*¹⁶²

Since the arrival of the computer and even more so the internet, technology has been the main factor that has catapulted societal transformation in the last 30 years. Keeping in mind the lives of existing academic library buildings, many, were designed utilizing technologies of their times. However, by the time of their completion and usage, aside from the building materials aging, its technologies and spatial programs aged even quicker; what is considered the newest, 'top-of-the-line' technology now, will be considered old within the next few years.

Thinking about and imagining the future of academic library buildings and spaces, in order to develop them as useful, lasting, and multigenerational, current technologies as well as emerging technologies must be acknowledged, as they will affect the way people will live in the future and impact spaces in which we use them, just as the development of the personal computers, laptops, the internet, wireless capabilities, and other technological advances of today's world have, transforming how we as a society function, and how the spaces in which we work serve our needs.

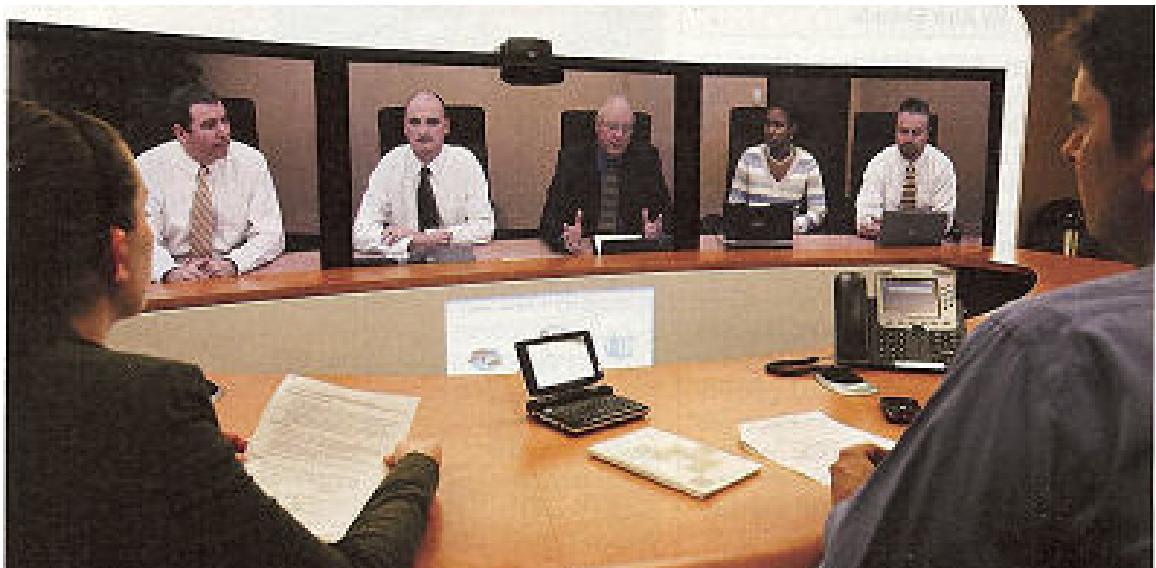
Discussed will be several technologies currently in the works that have emerged as major potential influences on the next generation 'library' both in terms of its role and its building and/or spaces.

New Technologies

The Next Level of Teleconferencing

Today, teleconferencing has brought individuals from different parts of the world together by means of a combination of web camera and voice chat. Although a huge development in comparison to communication methods often years ago, tomorrow's communication capabilities, however, are envisioned to feature immersive, lifelike and live conferencing technologies.

¹⁶² Daniel Lyons, "I, Robot," Newsweek, May 16, 2009 <http://www.newsweek.com/id/197812/page/3>.



[Figure 45: Telepresence conference.]



[Figure 46: Teleportec conference.]

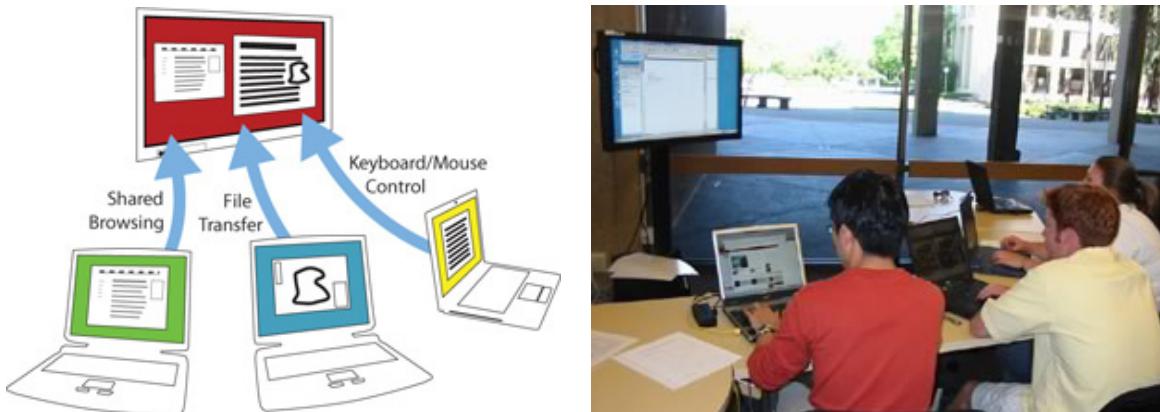
Currently, there are several products regarding this type of technology are in the lab and barely breaking into the consumer market, including Teleportec and Telepresence.

All similar in their natures, each of these emerging technologies allows an enhanced version of what we know as teleconferencing, allowing individuals to be in two locations at once. Differentiating them is the method in which it accomplishes this task. Using Teleportec, individuals from anywhere in the world can appear in the room, life size, live and with a three dimensional environment – almost as if the person was actually there, however the only thing they cannot do is shake hands.¹⁶³ Using Telepresence, users experience a more immersive meeting, through the use of life size screen projections combined with a touch screen interface.

Tidebreak: Interactive Technologies

Looking into bettering both usage of today's current technologies as well as pedagogy and workplace performance, Tidebreak encompasses "interactive workplace and learning space technologies that accelerate team performance and fuel innovation,"¹⁶⁴ further promoting and supporting the pedagogical shift from teaching to collaborative learning.

Both of Tidebreak's main products: TeamSpot and ClassSpot, "enable dynamic physical collaboration zones for enhanced group interaction"¹⁶⁵ through connecting personal laptop



[Figures 47 & 48: TeamSpot diagram and in-use.]

¹⁶³ Teleportec, <http://www.teleportec.com/>

¹⁶⁴ Tidebreak Inc., "About Tidebreak," <http://tidebreak.com/company>.

¹⁶⁵ Ibid.

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workspaces on one main workspace or screen, instead of "huddling around one laptop screen"¹⁶⁶ allowing for easier sharing of digital content, e.g. websites, files, etc., and increased group and classroom learning productivity.

Although a present technology, Tidebreak TeamSpot and ClassSpot, like Teleportec and Telepresence, is just breaking into the consumer market, however is currently being utilized a few higher education institutions such as Stanford University, Massachusetts Institute of Technology, and the University of Washington, giving insight into the "next wave" of teaching/learning technology¹⁶⁷ and methodology.

E-books, Wireless Reading Devices and Vooks

Now booming in today's consumer market are a variety of physical book alternatives, which are shaping the future in which we create and read text. These technologies include e-books, wireless reading devices, and Vooks, each transforming the various methods in which society makes use of text in education, commercial and personal realms.

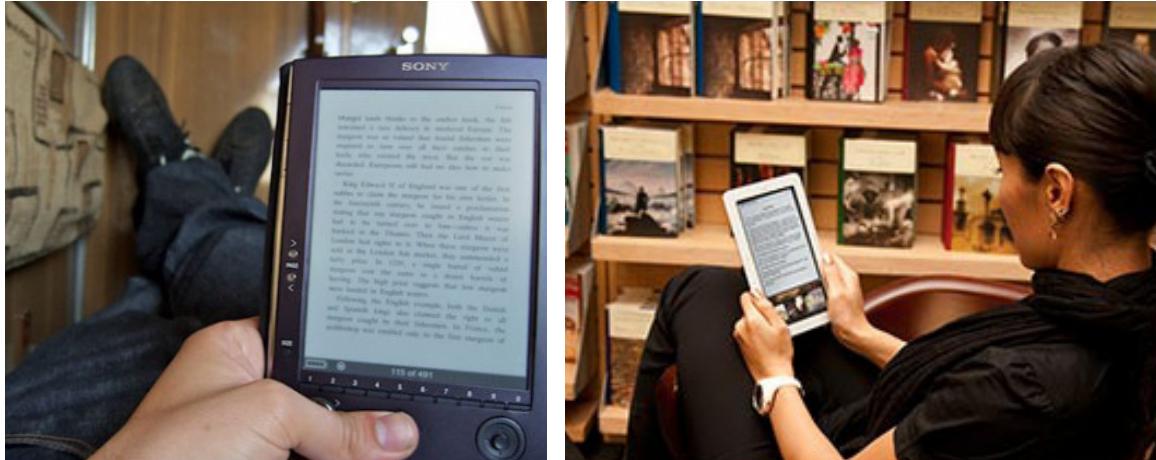
One of the first steps in the digitization movement, e-books, short for electronic books, are digital



[Figure 49: Amazon Kindle with physical (paper) books.]

¹⁶⁶ 166 Tidebreak Inc., "TeamSpot," <http://tidebreak.com/products/teamsport>.

¹⁶⁷ 167 Tidebreak Inc., "About Tidebreak," <http://tidebreak.com/company>.



[Figures 50 & 51: Sony Reader and the Barnes and Noble Nook in use.]

books rather than physical books, that are available in either digital text and/or audio forms. Taking a step further in textual digitization, the recent development in wireless reading devices such as the Amazon Kindle, Barnes and Noble Nook and Sony Reader has lead to increased portability, easier access, customization (e.g. text size, etc.) and better reading experience (e.g. internet access, etc.) to digital books, also providing a solution to the spatial problem that physical texts/books incur.

With different types of textual formats, both physical (paper) and digital vastly available, along with society's visual/on screen dependency¹⁶⁸, and the pedagogical shift from teaching to learning, newer technologies have taken the development of the book to the next level, making it no longer just about reading and writing. This in itself has further implications for the future of not just books and libraries, but of educational learning assignments, potentially leading to reports, research papers, presentations, etc., incorporating various types of media, a step taken by the development of the Vook, which is a combination of a "well written book, high-quality video, and the internet into a complete story."¹⁶⁹

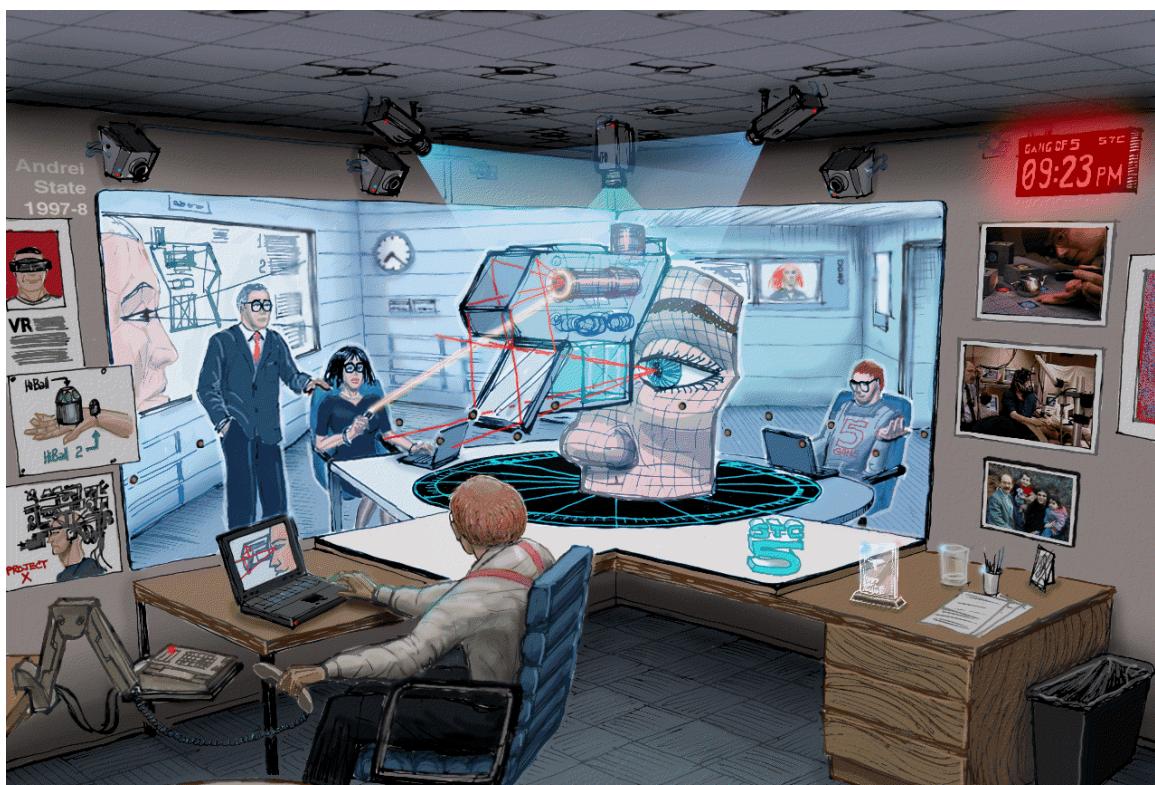
¹⁶⁸ Visual/on-screen dependency meaning individuals watching television, web and mobile video, based on statistics measuring television watching statistics as seen in Appendix C.

¹⁶⁹ Vook LLC., "What is a Vook?", <http://vook.com/vook.php>.

Emerging Technologies

Telecubicle

The next step above Teleportec and Telepresence, currently in the works, the Telecubicle creates a workspace that "merges virtual reality and video conferencing immersing users in multiple connections"¹⁷⁰ which is also known as tele-immersion¹⁷¹, one of the first concepts envisioning a future containing an internet/means of communication involving multiple senses also known as a multi-sensory internet, or experience. As futurist Cynthia Wagner depicts it, "imagine that the walls of your cubical not only hold pictures of your cat, but also become display screens that appear as windows into another office on the other side of the world, where a partner is working on a project with you."¹⁷²



[Figure 52: Rendering of a potential Telecubicle setup.]

¹⁷⁰ Wagner, Cynthia G. "The Promise of Internet2." *Futurist* 35, no. 4 (July/August 2001): 12.

¹⁷¹ Celia Garcia, Claire Matthews & Emma Ross, "Tele-immersion: the future of Internet tele-communication," *SocBytes Journal* February 2002, http://www.dcs.napier.ac.uk/~mm/socbytes/feb2002_i5.html.

¹⁷² Wagner 2001, 12.

VIVO (Voice-In/Voice-Out)

*"In the digital culture that is being established in front of our eyes, a new form of reading is emerging: gleaning, clicking, zapping, skimming, it is both visual and tabular and does not involve a meditative attitude..."*¹⁷³

Further expanding the idea of a multi-sensory internet/digital experience, VIVO technology entails computers equipped with a voice-in/voice-out interface, or rather computers with talking capabilities, "incorporating multisensory, multimodal technology,"¹⁷⁴ based on the notion of the recreation of oral culture, due to the "abandonment of reading and writing, of written language/text itself"¹⁷⁵ as "most people would rather talk to someone on the telephone than write to them; most people would rather watch TV than read a book; [and] most schools are experiencing a decline in student literacy skills – a true literacy crisis – with little hope for a breakthrough."¹⁷⁶

According to futurist and VIVO advocate William Crossman, "VIVO technology offers three great potential opportunities: VIVOs will allow functionally non-literate people to access all information via the Internet and Web without having to learn to read and write; its instantaneous language-translation function will allow everyone to speak with everyone else; and it will allow disabled people to access all information by speaking, listening, looking, or signing."¹⁷⁷

Multi-Sensory Internet

*"We're putting eyes, ears and sensory organs on our computers and our inter-networks in absolutely unprecedented ways. We are now asking them to observe and manipulate the physical world on our behalf. The internet is bringing about such devices needed to come in multiple flavours depending on the application required. In essence, these interfaces stimulate one of our 5 senses; usually sight, hearing, taste, touch, and smell."*¹⁷⁸

More and more, we are seeing various types of technologies dealing with the senses, with the potential of leading to a multi-sensory internet, appealing to the five senses, allowing users

¹⁷³ Vandendorpe 2009, 165.

¹⁷⁴ William Crossman, "Voice-In/Voice-Out Computers and the Postliterate Era," *Futurist* (March 2007), Britannica Online Encyclopedia <http://www.britannica.com/bps/additionalcontent/18/23934688/VoiceInVoiceOut-Computers-and-the-Postliterate-Era#>.

¹⁷⁵ William Crossman, *VIVO [Voice-In/Voice-Out]: The Coming Age of Talking Computers* (Oakland: Regent Press, 2004), 16.

¹⁷⁶ Ibid, 15.

¹⁷⁷ Crossman, "Voice-In/Voice-Out Computers and the Postliterate Era," *Futurist* (March 2007), Britannica Online Encyclopedia <http://www.britannica.com/bps/additionalcontent/18/23934688/VoiceInVoiceOut-Computers-and-the-Postliterate-Era#>.

¹⁷⁸ Arthur Hissey, "How the net has become multi-sensory," *Computer Research & Technology ETopics* <http://www.crt.net.au/About/ETopics/Archives/sens.html>.



[Figures 53 & 54: The five senses and DigiScent iSmell computer peripheral device.]

to sensorially experience websites through sensory immersion right from their desktops. The internet which we are currently using employs the senses of sight and sound, by means of binary code and digital synthesis.

Recently, developments in tactile and scent application have emerged, forecasting the possibility of an invention applying to the sense of taste (although a probable cause for a variety of issues including hygiene) via computer screens. Demonstrating these possibilities are innovations such as the DigiScent iSmell, digitizing scent through a combination of binary codes and a collection of chemicals or odors within a peripheral device.

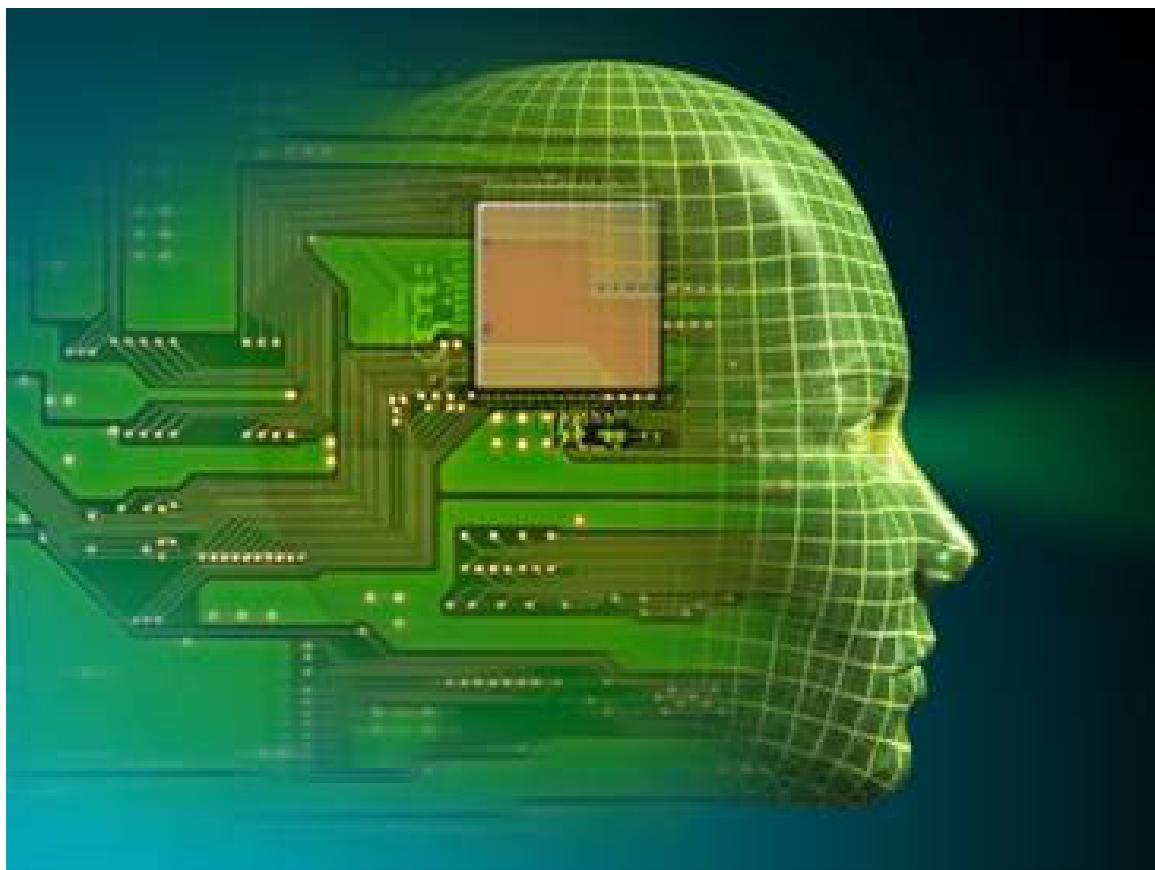
Other innovations such as mice and body-suits with "feel-able feedback with tactile vibrations"¹⁷⁹ further promote tactile internet capabilities, opening opportunities for the digitization of textures/physical items, giving users the ability to physically/virtually feel items (e.g. fabrics, materials, etc.) seen on a website, at their desks.

¹⁷⁹ Ibid.

Brain/Mind-Machine

The most extreme emerging technology with the potential to impact the future of libraries is brain/mind-machines, which involves the linking of the human brain with computers and ideas of having thought-controlled capabilities. Although thought of as 'out of this world', outlandish and "little more than fantasy, their emergence seems like just a matter of time,"¹⁸⁰ as support and funding for the research of this emerging technology has been provided by the government, through the U.S. Defense Advanced Research Projects Agency (DARPA).

Means of connecting brains and computers have primarily been through the implanting of electrodes inside both human and animal brains, researching possibilities of neuro-technology, mapping out the circuitry behind one of the brain's most complex functions, memory to further



[Figure 55: Mind and machine merger.]

¹⁸⁰ Carl Zimmer, "The Ultimate Remote Control: One day, our brains might be able to beam our very thoughts wirelessly to the machines around us," Newsweek International (June 7, 2004), <http://msnbc.msn.com/id/5093199/site/newsweek/>.

expand and advance developments such as brain-machine interfaces (BMI), brain-computer interfaces (BCI), which are devices that link the biological circuits of a brain to the silicon circuits of a computer – that will change how the mind thinks.”¹⁸¹

“Once they close the loop of brain-machine interaction...researchers can begin to think realistically about designing systems whose physical capabilities surpass those of normal people,”¹⁸² leading to one of the more interesting initiatives recently aided by DARPA, which has been research in “manipulating the brain’s inner workings – specifically those that send, receive and process sights and sounds.”¹⁸³ Through this research in determining “whether such information can be transmitted between brains and computers to enhance perception and communication,” brain-to-brain (B2B) wireless communication has the potential to become a reality.¹⁸⁴

Spatial Impacts

Each of these emerging technologies have spatial implications that have the capabilities of influencing how tomorrow’s libraries will be designed and how they will look and feel, ranging from small spatial alterations to dramatic structural/building modifications. So what kind of spatial impacts do these technologies entail in the future of libraries? What sorts of problems do they bring to the table? What are their solutions?

Spatially, a multi-sensory internet and telecommunicative technologies pose minimal changes to exterior, major changes to interiors, as they are able to be placed within spaces, much like that of today’s computers. As higher and presumably more power demanding technologies, spaces in which they are placed must have the electronic and broadband capabilities in which they can function.

Although simpler structurally, technologies involving the senses and telecommunications also create other issues regarding privacy, scent and even taste. As a multi-sensory internet would convey scents and even tastes through the screen and/or through peripheral devices, controlling scents becomes a major problem as they are difficult to control within a large space. Along with

¹⁸¹ Gregory T. Huang, “Mind-Machine Merger.” Technology Review Volume 106, Issue 4 (May 2003): 39-45.

¹⁸² Ibid.

¹⁸³ Ibid.

¹⁸⁴ Chris Jablonski, “A brain-computer interface that communicates thoughts between people,” ZD Net Emerging Tech Blog, posted October 6, 2009, <http://blogs.zdnet.com/emergingtech/?p=1819&tag=content;col1> (accessed October 30, 2009).

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control issues, scent has 'staying power' in the sense that it can cling on to materials, fabrics, hair, etc. and be present for longer than intended. The issue of tastes takes on a series of other issues, more importantly the issue of hygiene.

Spatial solutions for these issues would come by means of wall treatments, types of furniture and flooring placed within the space where computers with multi-sensory capabilities would be placed. Additionally, spaces in which these computers are located may have to be housed within individual rooms to provide privacy and control scents from overpowering others being omitted from other computers. Air ventilation and conditioning would need to be considered as scents would need to be removed quickly to experience other scents from different web sites.

With Voice-In/Voice-Out (VIVO) and Brain/Mind Machine Interface technologies, dramatic spatial changes are implied as both pose the idea of completely eliminating the necessity for books and physical print materials. As VIVO technology utilizes voice recognition, and Brain/Mind Machine interfaces utilize brain to computer and even brain to brain communications, the impact on the design of library spaces and buildings is immense as it omits spaces once dedicated to stacks and shelves for physical books, therefore shrinking the amount of spaces necessary to serve as a 'library' or information center.

Summary

Although many of these technologies are barely breaching the commercial world or are still ‘in the works’ being tested and prototyped, and though there are numerous problems and issues that libraries are currently facing, clearly change is in store for tomorrow’s library, both academic and public—a change that is rapid as evident in those that have occurred in recent times in comparison to that of only a decade ago as presented in Table 1.

Function	1992 Library (Yesterday)	2002 Library (Today)
Integrated Library System	Provided MARC, patron and circulation records	Web-based: meta-data; resource links; cross data-base searching
Information available	The print collection; Inter-Library Loan for anything else; CD Abstracts & Indexes	Print collection plus online data-bases; Document Delivery; extensive E-resources
Access to information	Walk-in to OPAC, PC's, stacks	Remote, wireless
Study space	Quiet areas	Group study areas
Information Instruction	Bibliographic Instruction by instructor request	Information Literacy; hands-on learning
Information printouts	Dot matrix printer	Laser printer
Organizational	Bureaucratic; functional; hierachial	Services oriented; Teams
Orientation	Local	Regional, consortial
Computer access	OPAC; Online access to DBs	Information Commons
Financial	“Parent” dependent	Participate in fundraising
Consortia	Test and buy databases	Negotiate special DB's

[Table 1: ‘Looking Forward by Looking Back’¹⁸⁵ Library Comparison]

In just a mere decade, the methods in which we obtain information, and how they have transformed today’s libraries has been immense. Of course, only time will tell if libraries will continue to thrive in the future and if these upcoming technologies will dominate markets or flop, however these changing user needs and potential impacts should be considered in the designing for library spaces in the future.

¹⁸⁵ James W. Marcum, “Visions: The Academic Library in 2012,” *D-Lib Magazine* 9, no. 5 (May 2003), <http://www.dlib.org/dlib/mayo3/marcum/05marcum.html>.

Part IV: Design

Designing for the Future

*"The product of skilled scenario work is not a plan but a strategy. Where a plan is based on prediction, a strategy is designed to encompass unforeseeably changing conditions. A good strategy ensures that, no matter what happens, you always have maneuvering room."*¹⁸⁶

Considering all that has been discussed so far in this document, by now we have discovered and reiterated that there are many outlying, external factors that have influenced libraries of the past and present. Keeping in mind the goal of this particular project, 'designing for now with tomorrow in mind' is the premise this design project will be abiding by, to develop a reasonably feasible design solution for the future of academic library systems, specifically that of the University of Hawai'i at Mānoa accommodating for change/transformation within the next 15 years.

However, before planning, developing and designing solutions for the University of Hawai'i at Mānoa Library System for the future, assumptions based on today's current trends must be made as the future is multifaceted, and academic libraries are impacted and influenced by how the plethora of environments are changing for the future.

In regards to the physical spatial impacts brought forth by the future, the futures of education, demography, economy, environment and technology are the major factors that have the potential to heavily influence the design of the "library" building/space. As there is no one correct physical solution due to the unpredictability of the future, these factors will primarily be addressed in the assumptions and will aid in the development and design of spatial solutions for this project.

¹⁸⁶ Cheryl LaGuardia, ed., *Recreating the Academic Library* (New York: Neal-Schuman Publishers, Inc., 1998), 81.

Design Considerations for the University of Hawai'i at Mānoa

The Future: A New Direction

"Dator's Second Law of Futures" – 'any useful idea about the futures should appear to be ridiculous,' which itself derives from the fact that more and more of the futures are novel and less and less a continuation from the present and the past. "¹⁸⁷

In 2008, a study and investigation of the history, present and futures of campus design and higher education resulted in the development of four alternative/preferred futures and campus scenarios/models for Hawai'i and the University of Hawai'i, Mānoa campus. These futures/scenarios are Growth, Begin, Sustain and Transform where:

Growth – assumes Hawai'i as a thriving, growing community within a prosperous and growing world, thriving on a high growth and high tech, extensively dynamic and entrepreneurial economy.

Begin – assumes Hawai'i as a thriving, self-sufficient, post-collapse community of new beginnings, where a global economic and environmental collapse has resulted in a self-sufficient culture focused on survival based on agriculture and aquaculture based on manual labor and recycled and renewable old technologies.

Sustain – assumes Hawai'i struggling towards environmental, energy and food sustainability, where climate changes have resulted in sea-level rise and a severely degraded environment, creating a shift in culture, governance and economy from consumerism to conservation, sustainability and modest expansion through efficiency.

Transform – assumes Hawai'i as a dynamic part of a changing, diverse inner solar system, where technological developments have continued to accelerate at an ever-increasing pace, resulting in a population and environment dominated by artificial intelligence.¹⁸⁸

¹⁸⁷ Carl Zimmer, "The Ultimate Remote Control: One day, our brains might be able to beam our very thoughts wirelessly to the machines around us," Newsweek International (June 7, 2004), <http://msnbc.msn.com/id/5093199/site/newsweek/>.

¹⁸⁸ Jim Dator, "Campuses 2060: An International Workshop on Futures of Campuses for Higher Education," (pamphlet presented at the International Workshop on Futures of Campuses for Higher Education, Honolulu, Hawaii, November 14-15, 2009).

Part IV: Design Considerations

Based upon these general assumptions for each futures model, as well as current environmental, governmental, and economical trends, today's society is moving towards a more sustainable future which assumes:

"...based on economic principles of system analytics applied to social science and environmental science, a new, scientifically-based, global sustainability doctrine evolved around which the world eventually coalesced. Long-term complex problems like climate change, sea level rise, and the rest were too urgent... Recognizing that there was a huge need for accurate, comprehensive and integrated scientific information about environmental and energy issues..."¹⁸⁹

This particular scenario may or may not actually occur exactly as described as it can be altered or dismissed by other factors dominant in the new beginnings/collapse, transformational and continued growth scenarios/future models. However, for the sake of this design project, and providing a design solution for today with tomorrow in mind, the main assumption is that today's society is headed in the direction of this future and:

- There is a huge need for accurate, comprehensive and integrated scientific information about environmental and energy issues.
- Students/faculty and other members of the University still need to do the research and development needed in order to solve the transnational energy, environmental, and food problems.

¹⁸⁹ Jim Dator, "The Global Green University of the Pacific (UHM 2060 Sustain)," (paper presented at the International Workshop on Futures of Campuses for Higher Education, Honolulu, Hawaii, November 14-15, 2009).

Part IV: Design Considerations

Although the general assumption for this project is a more sustainable alternative future, after feedback and comments about points of overlapping between the presented alternative futures from members of an international and Hawai'i expert panel from the *Campuses 2060: Futures of Higher Education Workshop* held on November 14, 2009, society is also moving towards a future composed of different elements/assumptions present in other alternative futures which include:

- Learners, trainers, researchers, business partners, and supervisors participate remotely from around the world through numerous channels of three dimensional/multisensory virtual presence, indicating the presence of high technology.
- Researchers, learners and clients come together to produce information useful for new technology development and exploitation/consumerism, however departments and disciplines will still remain.

Constants and Variables

As there are a variety of influencing aspects on the university as an institution, politically, demographically, educationally and physically, their futures and assumptions are likewise important and influential on the future 'library' building or space. Amongst the many impacting factors, the futures of technology, education, environment, demography and economy have significant and direct impacts on the physical design of a 'library' building or space of the future, and for this project, assumptions will be delineated in regards to each in terms of constants and variables which will help guide in design. So what remains a constant and what is changing in the next 15 years?

Constants

Education

- The hierarchical political and organizational structure of the institution will remain the same (e.g. Board of Regents, etc.).
- Instructors, professors and students will continue to be physically present on campus and in classrooms/facilities.

Demography

- The University of Hawaii will continue to educate and serve a multiracial/ethnic, student population along with a growing white student population.
- Although technology will continue at the rate of its current advancement, artificial intelligence will not surpass human intelligence.

Economy

- Despite the recent recession, the economy will continue to steadily grow and fluctuate at its current low growth rate.

Environment/Climate

- Global warming will continue to be a major global threat.
- Despite threats of global warming, Hawaii's climate will remain "almost unchanged."¹⁹⁰

¹⁹⁰ Chip Fletcher, "Global Sea Level Rise (2009) PowerPoint Presentation," Coastal Geology Group Sea Level Rise Website, <http://www.soest.hawaii.edu/coasts/sealevel/> (accessed January 17, 2010).

Part IV: Design Considerations

As the “ocean exerts a strong influence in the climate of islands,”¹⁹¹ sea surface temperature (SST) is closely related to climate. According to climate researchers, “...global surface temperature may not increase over the next decade, as natural climate variations in the North Atlantic (MOC) and tropical Pacific (PDO) temporarily offset the projected anthropogenic warming.”¹⁹² Therefore, “tropical Pacific SST sea surface temp will remain almost unchanged in the next decade.”¹⁹³

Technology

- Technology will continue to increase, improve and advance significantly slower than its current rate (exponential), however multisensory technologies and other emerging technologies are within reach.

¹⁹¹ R.T. Watson, M.C. Zinyowera and R.H. Moss (Intergovernmental Panel on Climate Change), “Ch. 9.2 Regional Climate,” The Regional Impacts of Climate Change: An Assessment of Vulnerability, (Cambridge: Cambridge University Press, 1997) <http://www.ipcc.ch/ipccreports/sres/regional/244.htm#trends>

¹⁹² Fletcher, “Global Sea Level Rise (2009) PowerPoint Presentation,” Coastal Geology Group Sea Level Rise Website, <http://www.soest.hawaii.edu/coasts/sealevel/> (accessed January 17, 2010).

¹⁹³ Ibid.

Changes

Education

- Higher education will increasingly view the institution as a business.
- Distance learning will be an increasingly more common option in higher education and will consist but not threaten the traditional bricks-and-mortar model.¹⁹⁴
- The tradition of education will transition from a heavy emphasis on teaching, to more emphasis on learning, where “teachers will transition from topic experts to a role in which they act more as guides and coaches.”¹⁹⁵

Demography

- The traditional college-age population of students will expand increasingly as more adults will participate in postsecondary education.¹⁹⁶
- Students will increasingly view themselves as customers and consumers.¹⁹⁷

Economy

- The economy is headed towards a more sustainable/disciplined future, by means of “modest expansion through efficiency”¹⁹⁸ and sustainability.

Environment/Climate

- Although the tropical Pacific SST will relatively remain unchanged in the next few years, global warming will inevitably create warmer/rising and cooler decreasing temperatures.
- Global warming will create increases in precipitation as polar ice caps continue to melt and result in rising sea levels.

¹⁹⁴ Mullins et al., “Top ten assumptions for the future of academic libraries and librarians: A report from the ACRL research committee,” *College and Research Libraries News* 68, no. 4 (April 2007) <http://www.ala.org/ala/mgrps/divs/acrl/publications/crl-news/2007/apr/tenassumptions.cfm>

¹⁹⁵ Thomas Frey, “The Future of Libraries: Beginning the Great Transformation.” The DaVinci Institute. <http://www.davincinistitute.com/page.php?ID=120> (accessed January 30, 2009).

¹⁹⁶ Anderson 2003, 3.

¹⁹⁷ Mullins et al., “Top ten assumptions for the future of academic libraries and librarians: A report from the ACRL research committee,” *College and Research Libraries News* 68, no. 4 (April 2007) <http://www.ala.org/ala/mgrps/divs/acrl/publications/crl-news/2007/apr/tenassumptions.cfm>

¹⁹⁸ Dator, “Campuses 2060: An International Workshop on Futures of Campuses for Higher Education,” (pamphlet presented at the International Workshop on Futures of Campuses for Higher Education, Honolulu, Hawaii, November 14–15, 2009).

Assumptions for the Academic 'Library' of the Future

Before delving into assumptions for the future of academic libraries, it is important to note that although the future is uncertain, what is certain is that there will be continuity. Some aspects of our current knowing, buildings and aspects of higher education and academic libraries will remain unchanged in the future.

Making assumptions for the future, these assumptions include those aforementioned earlier in this portion of the document as they pose general statements about the future of academic libraries and have been further researched and observed by professionals and experts within the American Library Association.

- *There will be an increased emphasis on digitizing collections, preserving digital archives and improving methods of data storage and retrieval.*
- *The skill set for libraries will continue to evolve in response to the needs and expectations of the changing populations (students and faculty) that they serve.*
- *Students and faculty will increasingly demand faster and greater access to services.*
- *Debates about intellectual property will become increasingly common in higher education.*
- *The demand for technology-related services will grow and require additional funding.*
- *Free public access to information stemming from publicly funded research and continue to grow.*
- *Privacy will continue to be an important issue in librarianship.*¹⁹⁹

On top of these ten delineated by the ACRL, are additional assumptions in support of the continuity of the academic library 15+ years from now:

- The traditional responsibility to gather useful materials, to provide access to them and to other off-campus resources will still be present, however to a lesser extent than what is currently is.

¹⁹⁹ Mullins et al., "Top ten assumptions for the future of academic libraries and librarians: A report from the ACRL research committee," *College and Research Libraries News* 68, no. 4 (April 2007) <http://www.ala.org/ala/mgrps/divs/acrl/publications/crl-news/2007/apr/tenassumptions.cfm>

Part IV: Design Considerations

- Our society will still be producing/developing information, and people will continue their desire/quest for more information.
- Physical text/books and materials will still be present, with less focus (more so for decorative purposes) unless considered significantly historical.
- Users of the library of the future will remain human, despite rapid advancements in the quest for artificial intelligence.
- Rather than the centralized information system currently being enforced, the 'library' will become decentralized in regards to library services, with its main or larger building remaining as storage for remaining physical text/books, with areas converted for other uses such as an information commons.

Decentralization

"Accumulated knowledge and stored information are admittedly at the center of the academic enterprise, and in a world where the word virtual is becoming an available modifier for practically any noun, the library's increasing decentralization is paradoxically making it more "the heart" even as its physical centrality changes."²⁰⁰

Why should UH decentralize its library? As higher education is shifting from teaching to learning, and the role of the library and the librarian is shifting from traditional roles of "assembling, organizing, [preserving] and distributing the products of intellectual endeavor"²⁰¹ to roles of user centered services, decentralization becomes a more appropriate solution for university campuses, and in this case, the University of Hawai'i.

Decentralized libraries focus on the user experience and service "by concentrating on service, a departmental library becomes more valuable to the patron than the service provided at a general reference desk"²⁰² promoting the need for service, scholarship, instruction, relationship and research. In further support of the move towards a decentralized system are the advances and future technologies, which have solved several issues once a part of the debate in selecting centralized or decentralized systems, including storage issues as well as cataloguing issues.

As investigated and analyzed in case studies earlier in the previous chapter, decentralization was becoming an increasingly rising trend for academic libraries across the nation, even in some of the nation's highest ranked research libraries. However, with the current economic crisis, funding for all facets of higher education has continued to decrease, forcing many universities utilizing this type of library system to re-centralize, such as Stanford University²⁰³. Although this may seem like an unsuitable solution, the decentralized systems of such universities were collection based – dispersion of the physical collection throughout the campus.

200 McCabe and Person 1995, 4.

201 Ibid, xi.

202 Shkolnik 1991, 346.

203 Lynn Blumenstein, "Stanford University Libraries Cut 15%, Lose Staff, Hours, Materials Budget," Library Journal June 18, 2009, <http://www.libraryjournal.com/article/CA6666009.html>.

This project is by no means implying the implementation of decentralizing collections, but rather a decentralization of services throughout campus, “moving from a collection-centered model to an engagement-centered one,”²⁰⁴ in efforts to get “into the flow of users” to further position and promote the necessity and presence of the ‘library’ in the future.

“Where attention is scarce, the library needs to provide services which save time, which are built around user workflow, and which are targeted and engaging...”²⁰⁵ therefore, this project is an insight into how UH may adapt a engagement-based decentralized library system through the design of a prototypical solution, examining and determining the necessary spaces for a future library within this type of system.

Concerns

Exploring other services provided on campus grounds, Information Technology Services (ITS) utilizes a decentralized/dispersed/embedded service provider model, which in a way can provide insight into how a decentralized library/embedded librarian model could potentially function on the UH campus.

The major concern of ITS that forecasts upon a decentralized/embedded librarian system would be the quality and utilization of services and spaces provided. Currently, ITS service providers are located in various locations such as Computerized Learning and Information Center (CLIC) Labs located within Hamilton and Sinclair Libraries and other buildings, and within departments, e.g. College of Social Sciences located in Saunders Hall; CLIC Labs providing computer/workstation access and ITS staff providing computer and tech support. Although services are executed, it has been observed that some (I am, by no means, stating that all ITS staff behave in this manner) service providers have the tendency to be unsociable, demonstrating anti-social behavior.

For a decentralized library system, this too is a possibility, however can also occur within a centralized system (monolithic building/virtual setting) and proves to be more so an internal psychological problem and management problem as opposed to a consequence of working in a particular building, virtual setting, place or time. Posing a solution based on the notion of this concern as psychological, this issue would best be remedied by the selection process of these dispersed/embedded librarians/staff.

²⁰⁴ University of Minnesota Libraries, “ACRL 2009 Excellence in Academic Library Award Application - The University of Minnesota Libraries: Changing the Paradigm,” American Library Association, <http://www.ala.org/ala/mgrps/divs/acrl/awards/excellenceaward/UofMinnesotaLibrarie.pdf>, 2.

²⁰⁵ Ibid, 1.

Campus Analysis

University of Hawai'i at Mānoa

Currently, the University of Hawai'i at Mānoa is composed of 19 colleges and schools offering over 200 degree programs.

Schools:

Architecture
Law
Medicine
Hawaiian Knowledge
Nursing & Dental Hygiene
Ocean & Environmental Science & Technology
Pacific & Asian Studies
Social Work
Travel Industry Management

Colleges:

Business
Tropical Agriculture & Human Resources
Engineering
Education
Arts & Sciences
Arts & Humanities
Language, Linguistics & Literature
Natural Sciences
Social Sciences

Of these schools and colleges, and their departments, only 11 are housed within their own building or located within a particular area with buildings predominantly utilized by departments within that school or college.

Servicing these departments and disciplines are two main buildings housing library services, Sinclair Library, housing the Audiovisual, Music, Government Document and pre-1980 bound journal collections, and Hamilton Library housing majority of the university's collections, services, and librarians. There are also several affiliated libraries, located within different buildings/disciplines however are not controlled or maintained by the university library system.

Because the campus itself is scattered, in terms of its placement and organization of the various disciplines, proximity and service are issues that have emerged, where services are housed only within Hamilton Library and are often underutilized due to either proximity and/or lack of knowledge of available services.

UH MĀNOA CAMPUS: SCHOOLS & COLLEGES



The UH Mānoa Campus, in regards to its master planning, is a very diverse and outspread departmental system, with several schools and colleges kept close to their dedicated buildings as well as those spread far apart from each other. Most schools are kept within the same facility or facilities such as that of the Schools of Architecture, Travel Industry Management (TIM), Social Work and Ocean and Earth Science and Technology (SOEST), and several colleges including the College of Business, Engineering and Education. The remainder of schools and colleges are housed within facilities that are intermingled with other departments. For example, Moore Hall is shared by several colleges within the College of Arts and Sciences as well as the School of Pacific & Asian Studies.

This mixing of departments, schools and colleges, although seemingly disorganized, indicates changes that have occurred with the growth of the institution since its inception, as well as its continuing evolution, with the movement and repurposing of various facilities throughout the campus.

UH MĀNOA CAMPUS: COLLEGE OF ARTS & SCIENCES

Part IV: Campus Analysis



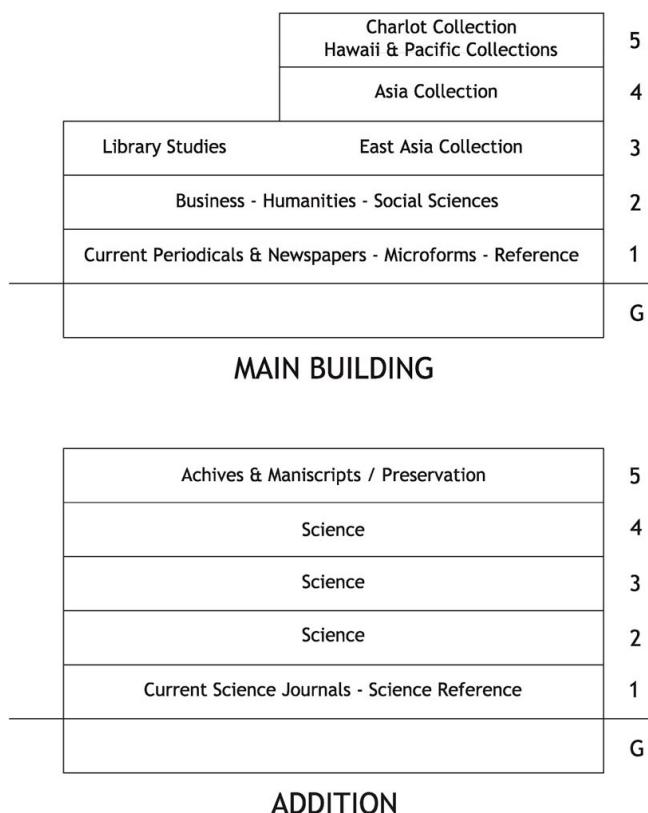
UH MĀNOA CAMPUS: LIBRARIES



Hamilton Library

As mentioned in previous chapters, Hamilton Library acts primarily as the hub or center of the UH Mānoa library system, dedicated to holding majority of the physical collection, services, librarians and supporting staff. Although it holds this title and responsibility, spatial changes have been occurring in lieu of a shift from teaching to learning spaces as discussed and shown in Chapter 5.

Sprinkled with study spaces/areas throughout the building, newer and more featured study and computer access spaces are located primarily on the 1st and 2nd floor of the building (main and addition combined), with the physical collection stored from the 1nd through 5th floors. Here, we see a combination of collection, administrative and learning spaces, but because of the size and the original purposing of the building, the collection is emphasized, with new learning, study and computer access spaces squeezed in.



[Figure 59: Hamilton Library building cross section diagram.]



[Figure 6o: Hamilton Library first floor plan.]



[Figure 61: Hamilton Library second floor plan.]

Sinclair Library

[Figure 62: Sinclair Library building cross section diagram.]

As Sinclair Library currently acts more so like a study hall than a traditional library, it serves as a model in support of “breaking away from spaces where service providers call the shots” by providing a combination of spaces “where students take responsibility for their own educations” as well as spaces “that integrate services delivered by librarians, information technologies and even student tutoring.”²⁰⁶ Somewhat similar to changes occurring in Hamilton, here, the shift from teaching to learning spaces is demonstrated through a “de-emphasis of services, and more weight on flexibility and student control”²⁰⁷ which can be seen in the amount/ratio of spaces allocated to each type of major space/function in its program:

Gross SF:	59,752	
Net SF:	56,702	
Classrooms:	3,994	8%
Departmental:	8,104	15%
Office:	6,491	12%
Public:	35,688	63%
Service:	852	2% ²⁰⁸

²⁰⁶ John K. Waters, “The Library Morphs,” Campus Technology, April 1, 2008, <http://campustechnology.com/Articles/2008/04/The-Library-Morphs.aspx>, 5.

²⁰⁷ Ibid, 2.

²⁰⁸ Approximate values, rounded to the nearest whole number. Based upon the ratio of space and net square feet.



[Figure 63: Sinclair Library first floor plan.]

Sinclair's first floor is where these services and spaces are located, while upper floors currently dedicated to physical collection storage, bound journals and music/audio visual. As we can see majority of space has been allocated to open/public type spaces (as collections once on the first floor have been removed), with the remainder maintaining supporting roles.

Campus System and Spatial Prototype

For this project, a prototypical approach will be undertaken in the implementation of a decentralized library system and satellite “library”/information center/node. As a prototype, these spaces can virtually be placed in any available areas within existing buildings, and provide the basic ‘building blocks’, or spaces, in developing a ‘library’ of the future.

Building Parameters

Building parameters, much like that of design principles, present the guidelines, characteristics and elements that govern the translation of conceptual ideas to a physical/tangible solution. These parameters consist of:

Flexibility/Changeability

Flexibility is the ability to adapt and be modified accordingly to changing circumstances and needs. This applies spatially, including changes brought forth by other impacting factors such as technology and teaching/educational methods.

Functionality

Functionality implies the best possible design solution for its purpose/intended use, as required by its users/occupants.

Recyclability

Recyclability refers to that of materials, selecting and applying materials that are not necessarily the longest lasting, which would ideally imply and enforce change. Projected longevity of such materials would be between 2-5 years, and would ideally be cheaper in the long run as materials would cost relatively less. Additionally, maintenance would be a constant, as materials would have shorter life spans, forcing constant change and possibly less cost in additional maintenance and repairs, like many of the other facilities on the UH Mānoa campus are currently experiencing, e.g. Hamilton Library.

Sustainability/Reusability

Environmental sustainability has been defined as "meeting the needs of the present without compromising the ability of future generations to meet their needs."²⁰⁹ Therefore sustainability refers to the utilization and application of sustainable/energy efficient methods and environmental friendly/renewable materials. Reusability refers to the ability to recycle and/or reuse materials used to construct the physical design solution.

Spatial Types

Using spaces present within the case studies discussed earlier as well as Sinclair Library's general spatial program as a base model, in addition to spatial changes implied by newer and emerging technologies, pedagogies, environmental concerns, etc., the general types of spaces that will be explored are:

- Classrooms
- Office
- Public
- Service
- Technological

But why are we maintaining these types of spaces if we are dealing with the future? Although these are spaces that have been utilized in existing (old and new) library programs, they still remain even in the current transition from teaching to learning spaces, learning by means of service provider (e.g. librarian, tutor, instructor, etc.) or peer. Their presence within the library of the future still proves to be of essence, however potentially at a smaller scale and in support of different functions and roles.

²⁰⁹ Tim Petersen, "Sustainable design: 'a new way of doing business,' Entrepreneur September 2006, http://www.entrepreneur.com/tradejournals/article/151702693_2.html.

How To...

In determining the building parameters and space types of the prototype for the library of the future within the UH Mānoa library system, how can the parameters be achieved in the design within these specified spaces? Re-examining the building parameters and spaces established for this prototype, each will answer the question through potential design solutions.

Looking back at the four established parameters for this particular design exploration, flexibility/changeability, functionality, recyclability and sustainability/reusability essentially are achievable by means of spatial arrangements and treatments, selected materials as well as furnishings and equipments, differentiating primarily by method and purpose.

One common denominator shared between each of these building parameters is the notion of flexibility. Although a category in itself, it is a characteristic that is essential for each in that all have ability to change, e.g. sustainable means have the ability to be reused for the same or different purposes, likewise recyclable means and materials, and functions/purposes of things such as building spaces.

With the idea of the future of libraries “breaking away from spaces where service providers call the shots” by providing a combination of spaces “where students take responsibility for their own educations” as well as spaces “that integrate services delivered by librarians, information technologies and even student tutoring,”²¹⁰ and a “de-emphasis of services, [with] more weight on flexibility and student control,”²¹¹ and with the general notion that the future is unpredictable, it is safe to say that tomorrow’s library facilities “will not be static computer lab[s]”²¹² but rather dynamic centers of information, further supporting the common denominator of flexibility.

So with flexibility how can each parameter be physically represented through building design? For the most part, each can be accomplished through spatial treatments, materials and furnishings, as associate university librarian and the University of North Carolina at Asheville discusses about their current library renovation,

*“Nothing will be nailed down. The computers will be wireless and the furniture will be movable. We won’t be dropping any cable, either. This is a space that will evolve and change.”*²¹³

²¹⁰ Waters, 5.

²¹¹ Ibid, 2.

²¹² Ibid, 6

²¹³ Ibid.

Part IV: Campus System and Spatial Prototype

Referring to furnishings and technology within the library building, the types of materials used to enclose spaces within as well as the types of furnishings utilized in those spaces, these materials and furnishings can be made of recyclable materials, or can be recycled and reused for other purposes. Examples that are currently being used today, as well as Sinclair Library are Herman Miller's systems furniture, which are made of recyclable materials, and can be utilized in any accommodating space, as seen in Figures 33-36 in Chapter 5. In regards to building materials, renewable and eco-friendly materials can also be utilized to accomplish recyclability and sustainability.

Other means of implementing flexibility/changeability and functionality within the building is through providing an open floor plan. Similar to that of Sinclair's comment of 'nothing will be nailed down', of which he refers to furnishings, computer stations, etc., this takes it to the next level by basically avoiding permanent spatial dividers or anything non-structural. In a way this can also regard how technology is treated in flexible spaces, where tech journalist John Waters notes:

*"Best advice from the pundits: Don't fall in love with any particular technology. A good thing about a "learning commons" project is that it takes so long to complete, you'll see technology trends come and go. The technological capabilities of these spaces are no longer key defining characteristics."*²¹⁴

Likewise, the use of shorter lasting, less durable building materials is yet another representation of how flexibility/changeability, functionality, sustainability and recyclability can be incorporated into a design of a future library building—where not only is it a potential cost-saving, cost-efficient solution, but also up keeps the building up to par with maintenance and is adjustable to the constant and fast paced changing needs and physical demands of technologies, pedagogies and patrons.

Regarding sustainability, aside from sustainable materials, other 'green' building methods can entail energy efficiency where energy demands can be lessened through building design, e.g reducing air conditioning utilizing natural ventilation by means of fenestrations (as exemplified by Sinclair Library), or even self-sustainability, where the building can produce its own sources of power, such as electricity by means of photovoltaics, etc. Even reusing or repurposing an existing building, also known as 'adaptive reuse' is a green building solution.

²¹⁴ Ibid.

Prototype at the School of Architecture

As this project is taking a prototypical approach to the design of a future library space, it can virtually be placed within any existing space. However, because this project encompasses a physical design, for this design exercise, the School of Architecture will be utilized to exemplify how the prototype and its spaces can fit into an existing condition, as it contains ample space for exploring the amount and types of spaces for a 'library' of the future.

Under the assumption that Sinclair Library's library affiliated services (Sinclair A/V, Music & Government Document collections) will be moved to Hamilton for a re-centralized collection, where Hamilton will act as the 'mothership' for the library system with nodes/satellites at various facilities around campus housing librarians to work "in the flow" of users, and Sinclair (no longer library) will be taken over by the University for use by other departments and services not affiliated with the library system.

In proximity, the School of Architecture can service up to 8 various disciplines, with its physical closeness to the College of Business, School of Travel Industry Management, College of Social Sciences, etc. Additionally, the School of Architecture is currently hovered above what would be considered 'prime real estate' in terms of space, as it is presently a covered parking lot, allowing for easier implementation of accessible, usable and energy focused spaces to suffice potential/newer technological needs.

Site Analysis

Location & Zoning Information

Building Address:

2410 Campus Road
Honolulu, Hawaii USA 96822

TMK:	28023003
Address:	2444/2530/2540/2560 Dole Street
State Land Use District:	Urban
Zoning:	R-5 Residential District
Land Classification:	Improved Residential
Height Limit:	25 Feet

Views:

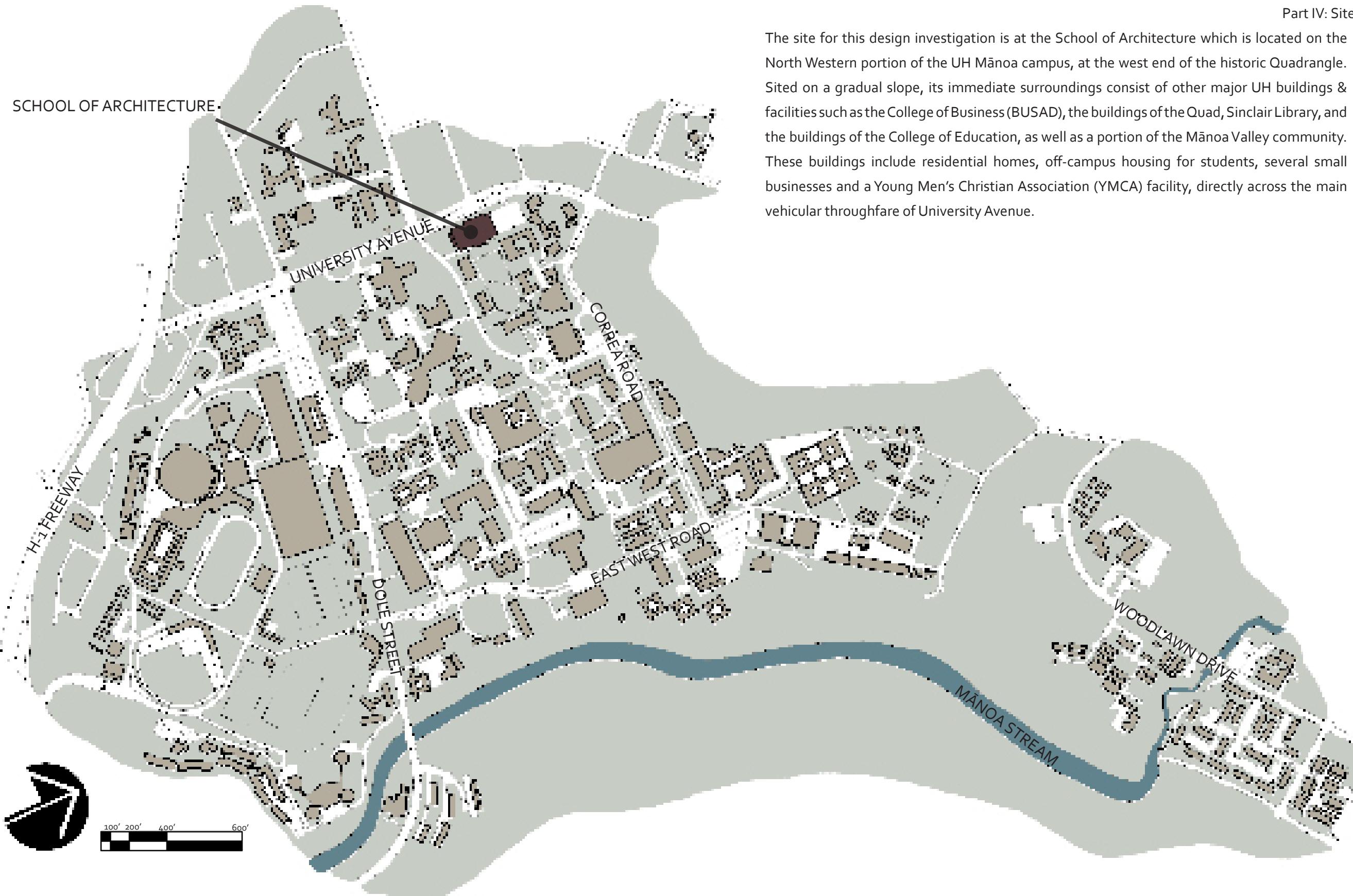


[Figure 64: North façade from parking lot.]



[Figure 65: South façade from Sinclair Library.]

UH MĀNOA CAMPUS: SITE LOCATION



The site for this design investigation is at the School of Architecture which is located on the North Western portion of the UH Mānoa campus, at the west end of the historic Quadrangle. Sited on a gradual slope, its immediate surroundings consist of other major UH buildings & facilities such as the College of Business (BUSAD), the buildings of the Quad, Sinclair Library, and the buildings of the College of Education, as well as a portion of the Mānoa Valley community. These buildings include residential homes, off-campus housing for students, several small businesses and a Young Men's Christian Association (YMCA) facility, directly across the main vehicular throughfare of University Avenue.



[Figure 66: East façade from the Quad.]



[Figure 67: West façade from Seaview Avenue/University Avenue.]

Building Code

As the School of Architecture Building was constructed and completed in 1994, it is compliant with the 1997 Uniform Building Code (UBC).

Code: Uniform Building Code 1997
Use: Group B Occupancy

Chapter 3 Use or Occupancy – Section 304 Requirements

Group B Occupancies shall include buildings, structures, or portions thereof, for office, professional or service-type transactions, which are not classified as Group H Occupancies. Such occupancies for the storage of records and accounts, and eating and drinking establishments with an occupant load of less than 50. Business occupancies shall include, but not limited to, the following: 10. Education occupancies above the 12th grade.

Chapter 34 Existing Structures – Section 3403 – Additions, Alterations or Repairs

3403.1 General

Buildings and structures to which additions, alterations or repairs are made shall comply with all the requirements of this code for new facilities except as specifically provided in this section.

3403.2 When Allowed

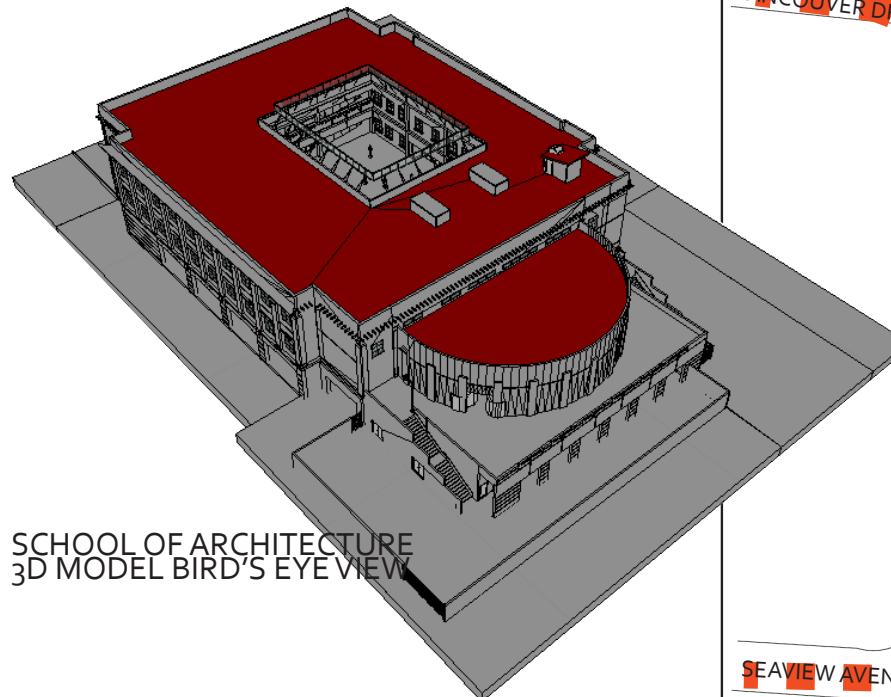
Additions, alterations or repairs may be made to any building or structure without requiring the existing building or structure to comply with all the requirements of this code, provided the addition, alteration or repair conforms to that required for a new building or structure.

3403.3 Nonstructural

Alterations or repairs to an existing building or structure that are nonstructural and do not adversely affect any structural member of any part of the building or structure having required fire resistance may be made with the same materials of which the building or structure is constructed.²¹⁵

²¹⁵ International Conference of Building Officials, 1997 Uniform Building Code, Vol. 1, Whittier: International Conference of Building Officials, 1997.

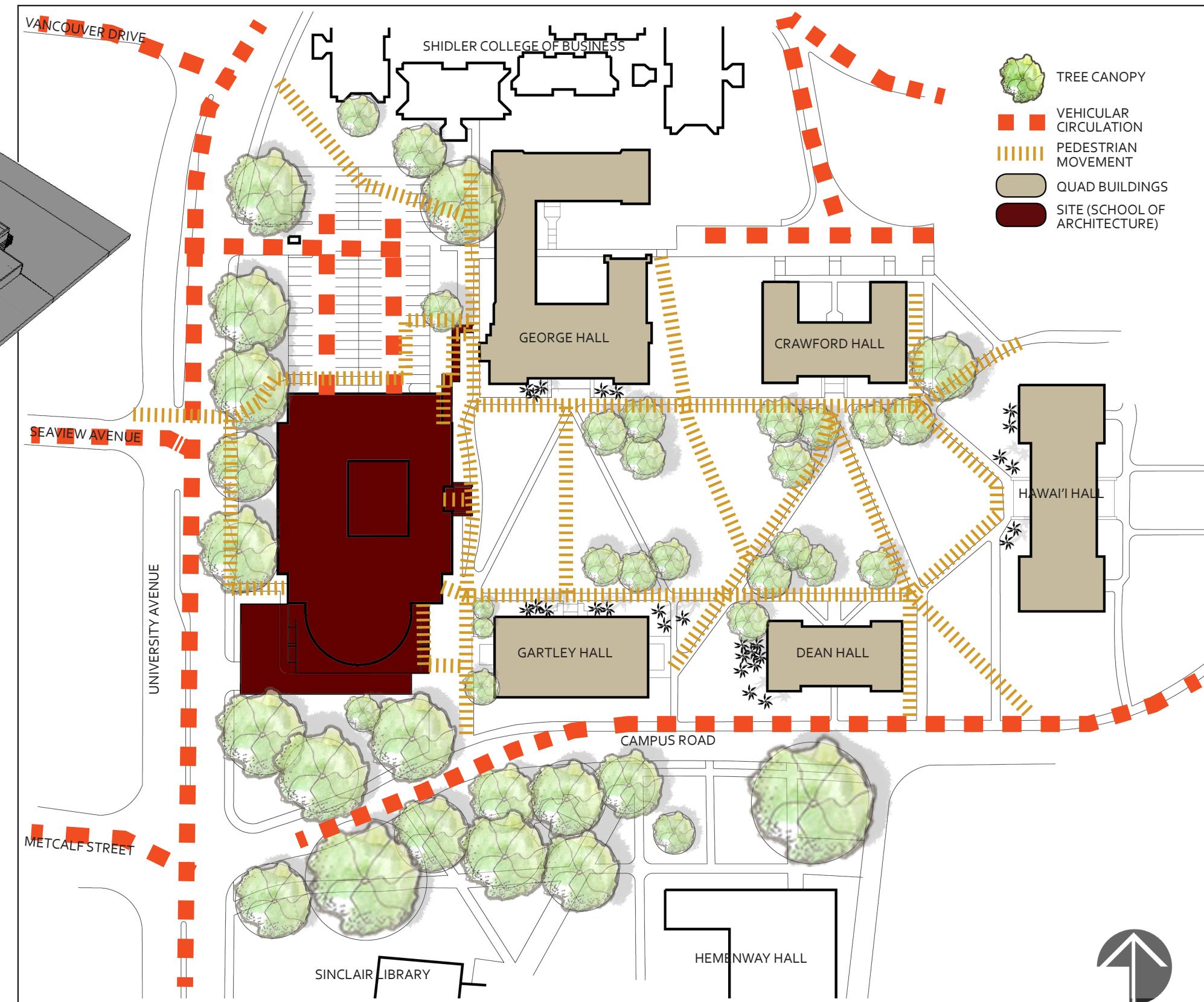
SITE ANALYSIS: PEDESTRIAN & VEHICULAR CIRCULATION



The circulation in and around the Quadrangle is quite busy, as it is practically surrounded by vehicular movement and filled with pedestrian movement in between and through the buildings of which it is comprised of. Which implies its easy accessibility by means of vehicle, bike or foot.

Pedestrian movement is regulated with the placement and usage of sidewalks, however in certain areas of the Quad (between George Hall and Crawford Hall) and coming from University Avenue and the College of Business, are unpaved walking paths, or shortcuts.

Although vehicular movement basically surrounds the Quad, majority occurs on University Avenue to the School of Architecture/College of Business parking lot. Other roads, such as Campus Road and Maile Way are used for on campus access, however are not heavily impacted by traffic.



SITE ANALYSIS: ACCESSIBILITY



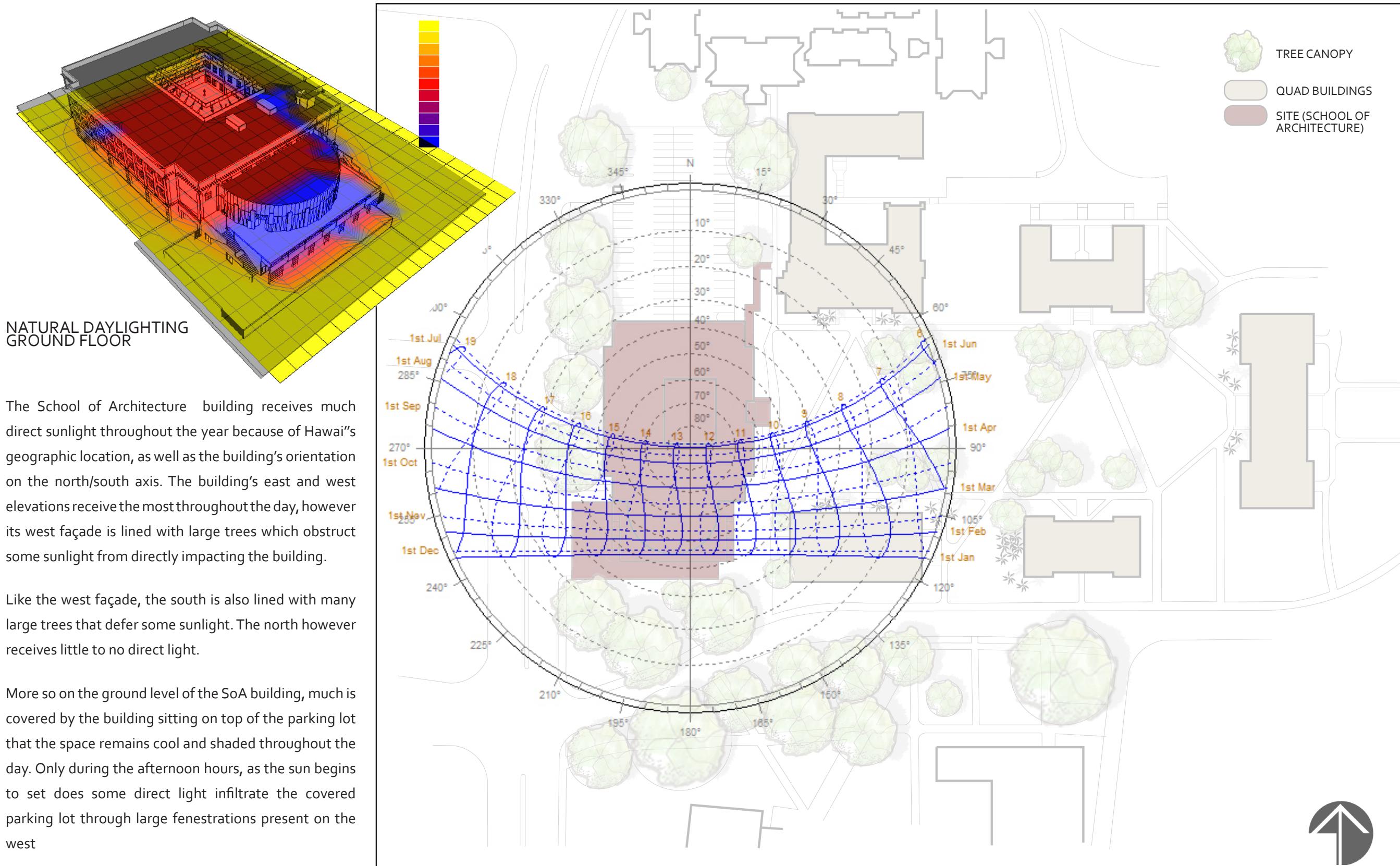
The site is easily accessible on wheels and on foot, as it is located directly off of University Avenue. By foot, there are 3 main points of entry, one on the north face of the building, the second on the east side, and the last from the south.

ADA accessibility is either from the ramp on the north side of the building, or by elevator located on the south end of the parking lot.

The main/formal entryway is from the east, facing the Quad, while the other major points of access are from the exterior side stairs to the 2nd floor, or the fire exit stairs located beside the elevator on the south end of the building.



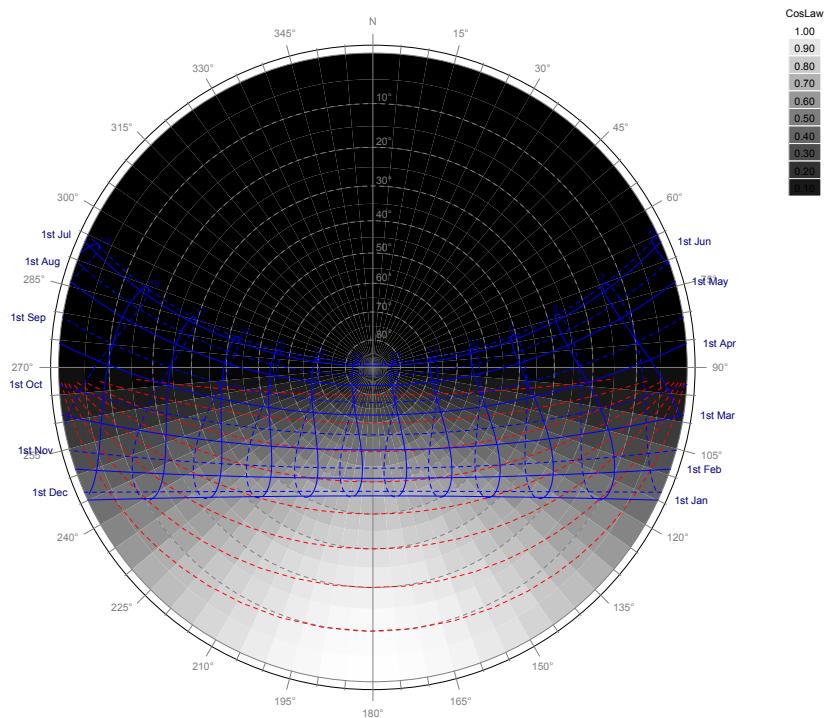
SITE ANALYSIS: SUN PATH & NATURAL DAYLIGHTING

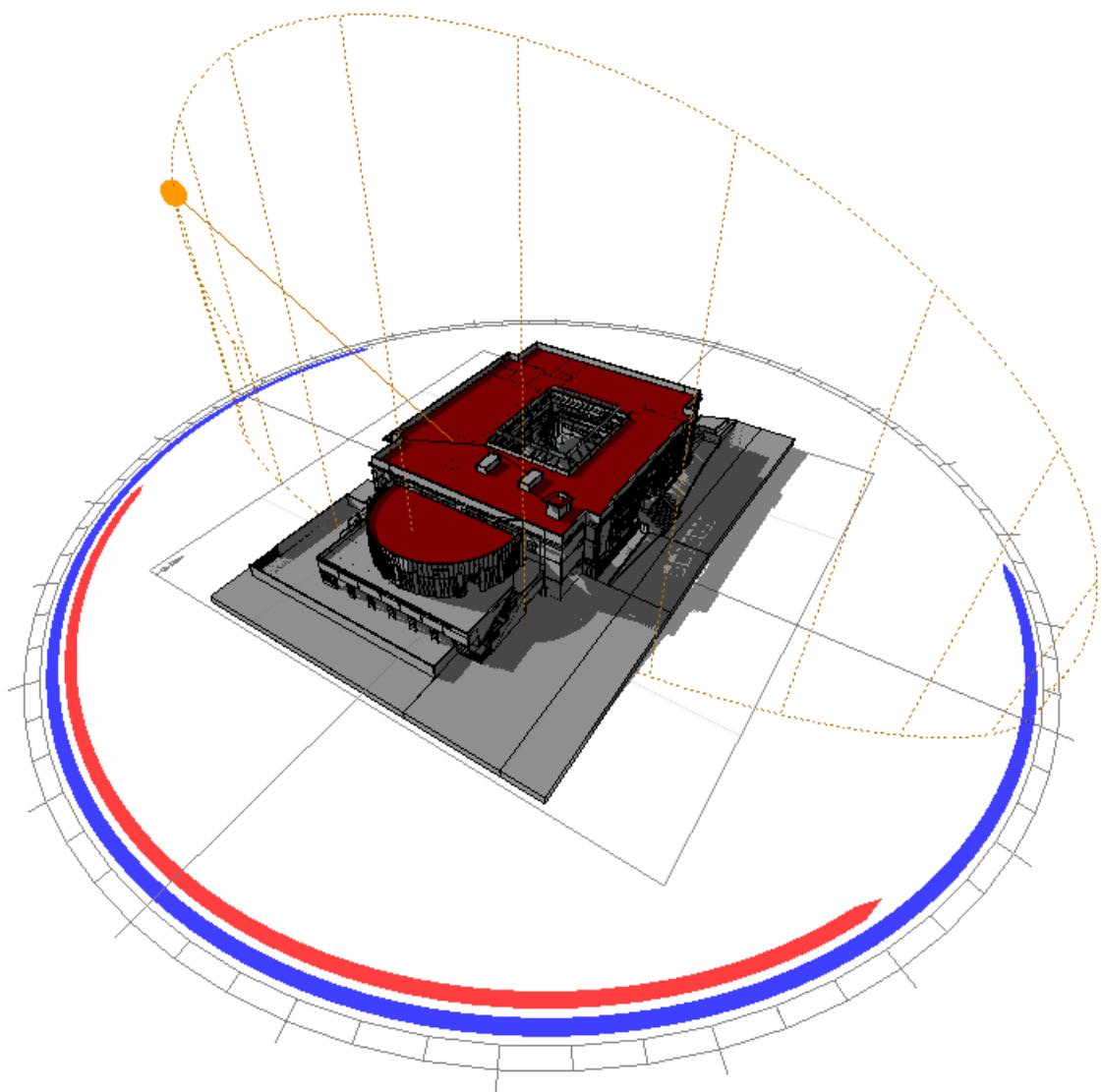


Shadows & Shading

With the School of Architecture building's North-South orientation, the buildings East, South and West façades are impacted by direct sunlight, therefore creating shadows on the West, North and East façades.

Analyzing the ground floor of the School of Architecture, shading is predominant throughout the entire day, with minimal direct sunlight penetration due to the only fenestrations being located on the North and West façades of the building, solid walls on its South and East sides, and its primary function as a covered parking lot. Because of the constant shade provided, it is generally cooler, with the exception of heat generated by parked vehicles.





[Figure 68: 4PM shadow (April 1st).]

SITE ANALYSIS: PREVAILING WINDS



School of Architecture Building

As the SoA building was completed in 1994, it is constructed of reinforced poured-in-place concrete as well as concrete masonry units. Capping the Quad and classical core of campus and to tie in with the buildings surrounding the Quad, classical architectural elements were added to the façades, such as pilasters.

Historical Constraints/Considerations

Although there are no actual historical constraints for the School of Architecture building due to it being the youngest building of the Quad, one major design consideration exists. This consideration is to conform to the classical architectural style/nature of all the buildings that surround the Quad, which is also considered the classical core of the Mānoa campus.

Analysis

Aside from removing a little over half of the existing parking, which the School of Architecture sits on top of, utilization of the ground floor would be an optimal/ideal location with minimal intrusion to the building's site while providing ample space to provide for a potential/future information commons suited for campus, which will be further discussed in the proposals for the library system master plan for UH and future library prototype.

Design Proposal

In addition to producing a 'strategic scenario'²¹⁶ for the academic library/information commons of the future, more specifically for the UH system, proposed for this project are two prototypical design interventions based upon the research and design parameters provided in this document—the first on a large scale, with the master planning of the UH Mānoa library system, and the second focusing on one of the proposed library/information commons facilities, providing a conceptual design for the required spaces.

University of Hawai'i at Mānoa Library System Master Plan

*"For more than a century, planning for library space was driven by the need to put shelves under books, and to provide space for services. One of those things is probably history, as we move more and more information resources into ubiquitous virtual space...the other is going to become history as we get around to moving many library resources into that virtual space." - Yale University Librarian Emeritus Scott Bennett*²¹⁷

As current library conditions are indicating potential shrinkage in physical collection spaces and a shift to digital collections, new technology and focus on librarian services getting into the flow of users and providing spaces useful for users (study, information access, etc.), proposed is a progressive library system for the UH Mānoa campus developed in 3 phases.

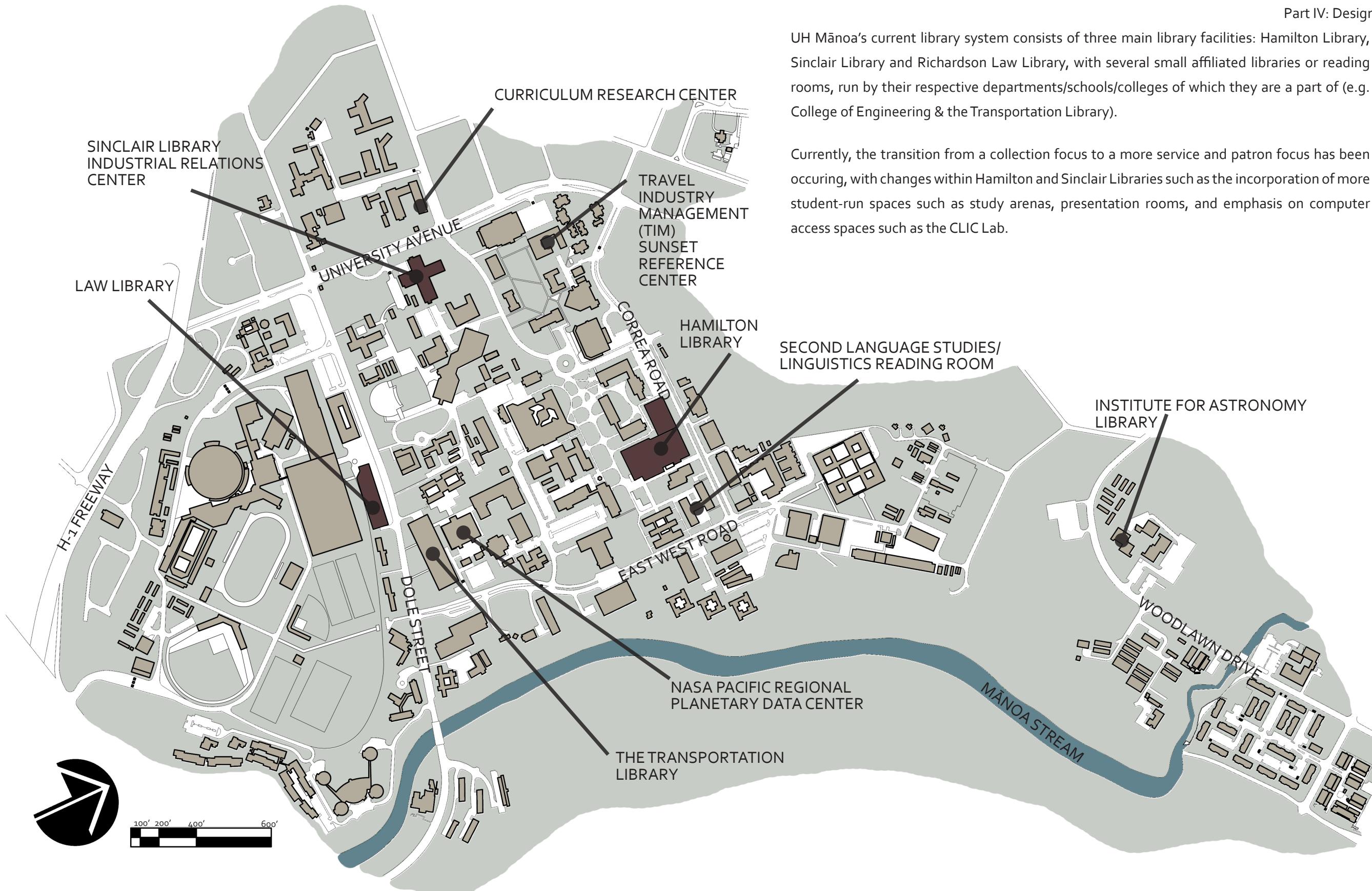
Why phases? Although there are indicators of shrinkage and nothing is for certain, change can be a lengthy process, especially with educational, state funded institutions such as the University of Hawai'i. Therefore, this master plan proposal estimates between 10 to 15 years or more down the line for each phase to occur, beginning with its existing state.

²¹⁶ LaGuardia, ed., 81.

²¹⁷ Waters, 5.

UH MĀNOA EXISTING LIBRARY SYSTEM CONDITIONS/PHASE I

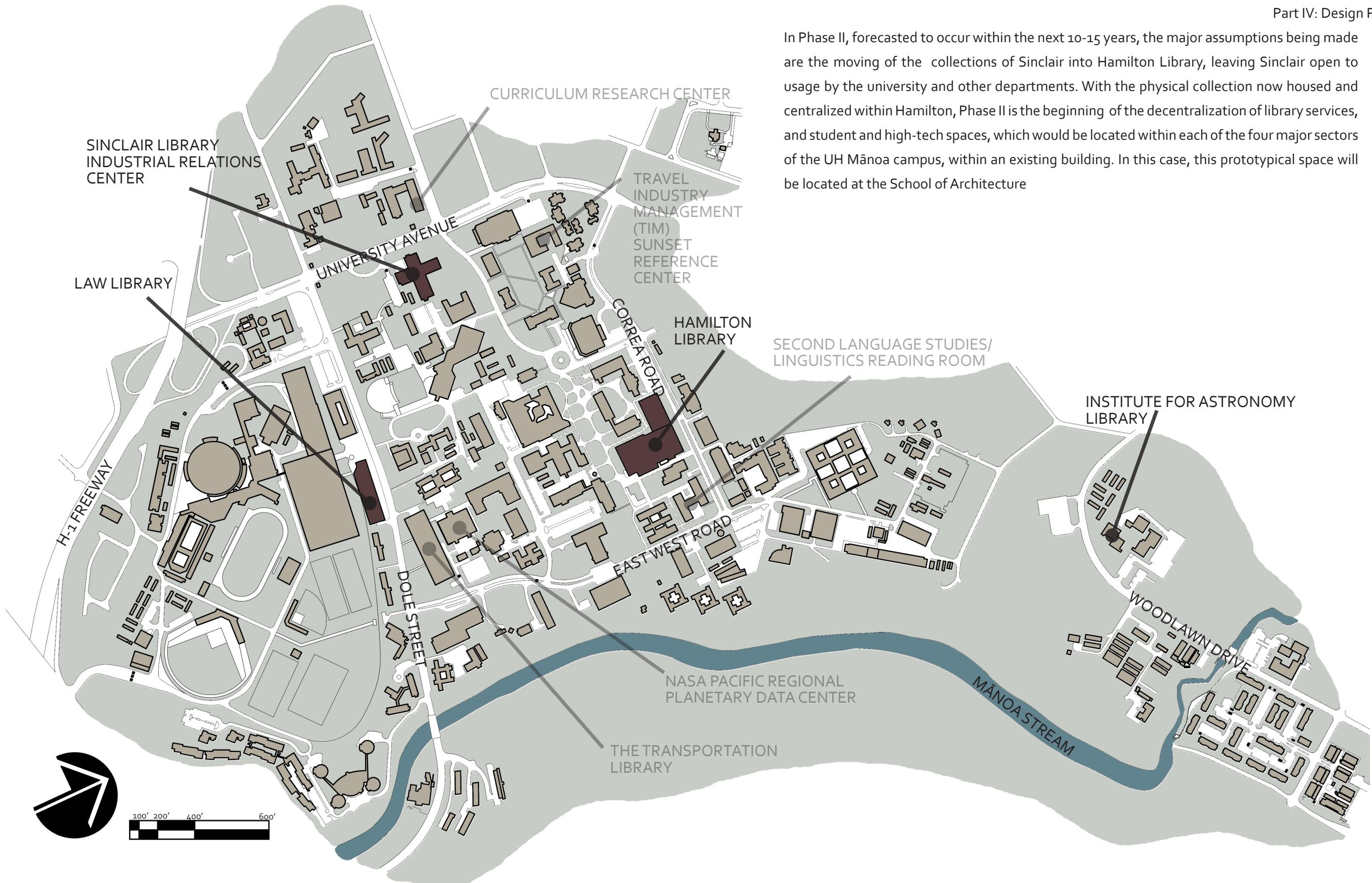
Part IV: Design Proposal



UH Mānoa's current library system consists of three main library facilities: Hamilton Library, Sinclair Library and Richardson Law Library, with several small affiliated libraries or reading rooms, run by their respective departments/schools/colleges of which they are a part of (e.g. College of Engineering & the Transportation Library).

Currently, the transition from a collection focus to a more service and patron focus has been occurring, with changes within Hamilton and Sinclair Libraries such as the incorporation of more student-run spaces such as study arenas, presentation rooms, and emphasis on computer access spaces such as the CLIC Lab.

LIBRARY MASTER PLAN PROPOSAL: PHASE II



In Phase II, forecasted to occur within the next 10-15 years, the major assumptions being made are the moving of the collections of Sinclair into Hamilton Library, leaving Sinclair open to usage by the university and other departments. With the physical collection now housed and centralized within Hamilton, Phase II is the beginning of the decentralization of library services, and student and high-tech spaces, which would be located within each of the four major sectors of the UH Mānoa campus, within an existing building. In this case, this prototypical space will be located at the School of Architecture.

LIBRARY MASTER PLAN PROPOSAL: PHASE II DIAGRAM



Phase II library locations were determined by proximity to preferred or central facility locations on campus. In this case, the Mānoa campus was divided in to 4 major sectors. Within these 4 areas are library spaces or information commons which would serve the respective schools, colleges and departments within a 5 minute walking radius.

Users, therefore are a mixed group of students and faculty from various fields of study, e.g. the information commons located at Hamilton Library in this phase would be dedicated/catered to students and faculty of a good portion of the departments of the College of Arts & Sciences such as the Math, Chemistry, Physics, Languages, etc. departments, as well as CTAHR, the School of Nursing & Hygiene and the School of Hawaiian Knowledge.

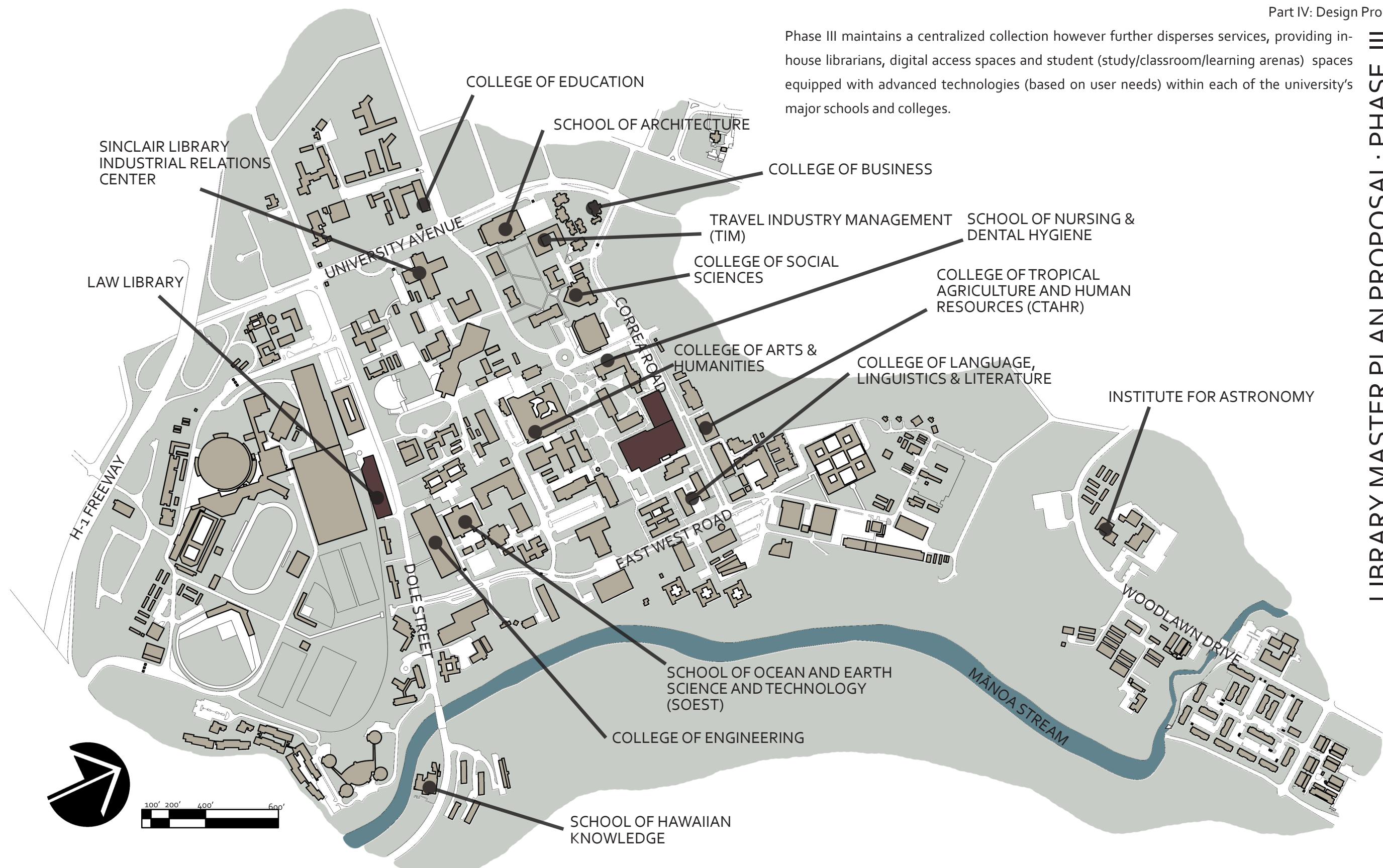
Phase II

Forecasted to occur between 10 to 15+ years, the major assumption in this phase is to centralize the collection, decentralize services and student/high-tech spaces as well as librarians, which would make tomorrow's library/information commons more engaging, and initializing the idea of 'getting into the workflow of its users'.

As the initial phase utilizing this notion, spaces are to be relatively smaller than existing library buildings and spaces on the UH campus, and are (as indicated in the provided maps) located to serve 4 major quarters of campus.

Although seemingly confusing in regards how information will be organized based on such mixed user groups, the access to newer information and learning technologies would be specified towards the needs of these groups, and access to physical and digital collections/information remain a standard in each of these locations. This would provide as a transition point to furthering the dispersion of library services and learning/information commons throughout campus.

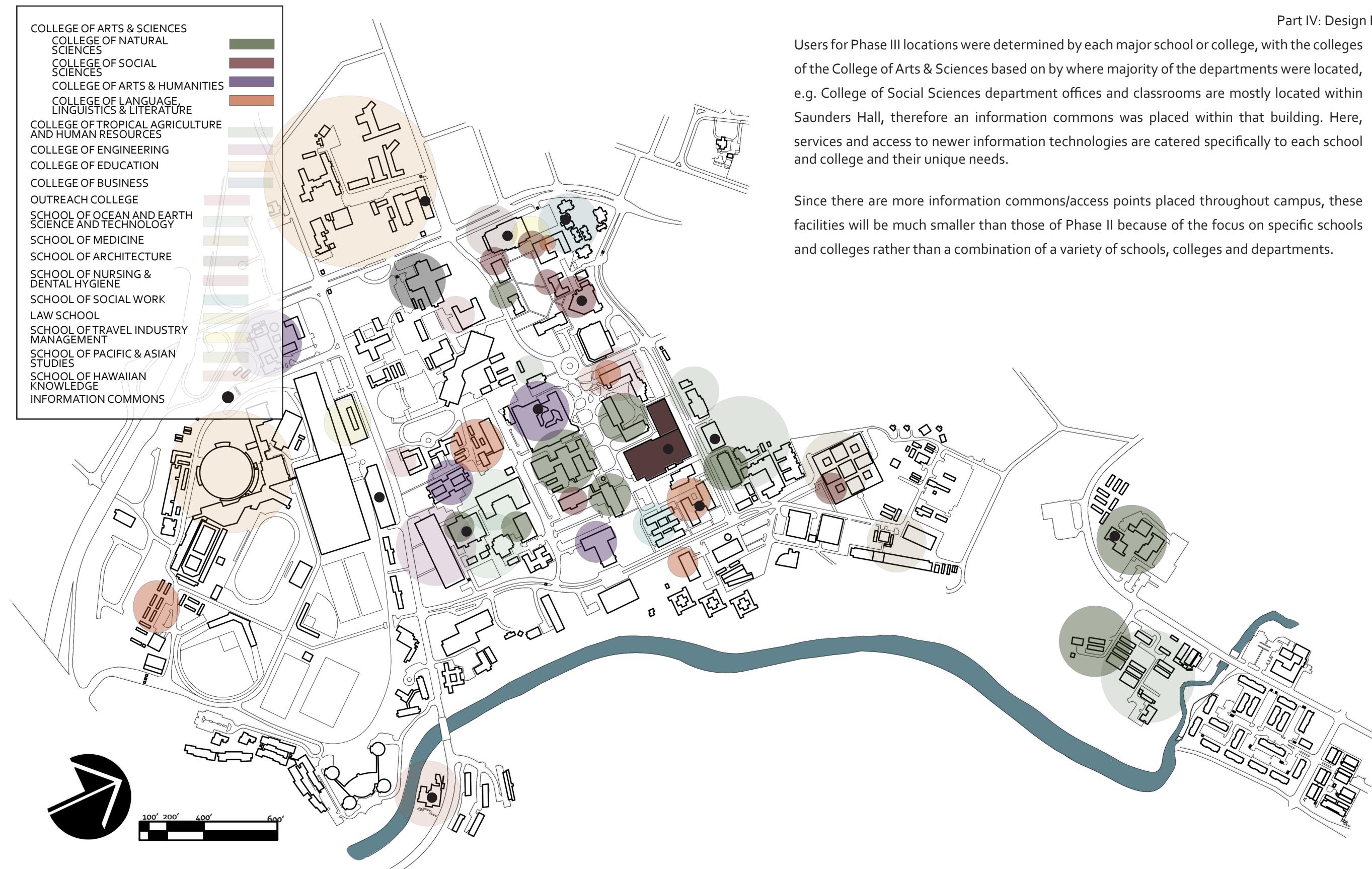
LIBRARY MASTER PLAN PROPOSAL: PHASE III



Phase III maintains a centralized collection however further disperses services, providing in-house librarians, digital access spaces and student (study/classroom/learning arenas) spaces equipped with advanced technologies (based on user needs) within each of the university's major schools and colleges.

LIBRARY MASTER PLAN PROPOSAL: PHASE III DIAGRAM

Part IV: Design Proposal



Users for Phase III locations were determined by each major school or college, with the colleges of the College of Arts & Sciences based on where majority of the departments were located, e.g. College of Social Sciences department offices and classrooms are mostly located within Saunders Hall, therefore an information commons was placed within that building. Here, services and access to newer information technologies are catered specifically to each school and college and their unique needs.

Since there are more information commons/access points placed throughout campus, these facilities will be much smaller than those of Phase II because of the focus on specific schools and colleges rather than a combination of a variety of schools, colleges and departments.

Phase III

Further dispersing of services and librarians, taking on a more 'embedded librarian' organization, each of these information commons/satellite libraries are located within each school or college. Because the College of Arts & Sciences is scattered throughout campus, their information commons/libraries would be located in areas with the highest concentration of departments within each of the sub-colleges of the College of Arts & Sciences, such as the College of Social Sciences.

University of Hawai'i at Mānoa Library System Prototype

As indicated in the library system master plan, a prototypical approach will be undertaken in the application of of a satellite "library"/information center/commons to be implemented within Phase II of the library system master plan.

Prototype at the School of Architecture

The academic library is part of a larger, multifaceted culture, which makes predicting and designing its future difficult. Although a profound feat in itself, the changes and trends that are occurring now assist in how tomorrow is forecasted, giving a more insightful, logical and useful idea of what the future of libraries could look like. Amongst the many influential facets that impact the academic library, higher education, government, society, economy and technology have emerged as major drivers of change in the future.

Investigating these factors, focusing on newer ideas currently being implemented in various academic libraries, and researching emerging technologies, spaces for a library of the near future were determined and applied to available space within the existing School of Architecture building on the UH campus, where the design intervention explores types of spaces/uses for students and faculty, not necessarily limited to a specific discipline, but can also be flexible to accommodate specific or related disciplines/departments.

This design intervention/solution utilizes the existing building and space of the School of Architecture building and potentially other campus buildings. But why keep it within the existing building and structure? As the major assumption for this project is that our world, and more specifically Hawai'i, is headed towards and more sustainable future scenario, this would imply that re-use of materials and existing buildings would more valued, economically and environmentally. In support of this, architect Carl Elefante's quote "The greenest building is the one already built." provides a clear and simple explanation in looking towards re-use and re-programming as an optimal design solution.

Although implemented at the SoA, these spaces can go into any existing building that has enough space, and does not necessarily have to be placed at the SoA as it is a spatial prototype, exploring types of spaces that could be present within a library of the future.

Spatial Program

As this is just a prototype defining and developing future library spaces, this information center/space can provide research and technological support to several departments and disciplines, either scattered or related, around the east portion of the UHM campus. Potential users can include Schools of Architecture, Travel Industry Management, Nursing & Dental Hygiene, Colleges of Education, Business, Social Sciences, and the Biology (College of Natural Sciences) and Speech (College of Arts & Humanities) departments, or can service the architecture program and other environmentally related programs. The spaces within the center will contain high tech classroom spaces, collaborative/group spaces for group work and access to librarians assigned to each discipline.

Summary of Spaces

There are five major spaces which will be included and focused on within the Phase II library/information commons: 1) learning, 2) study, 3) office, 4) multi-sensory and 5) computer access.

Technology

- Multi-sensory Classroom
- Info. Commons (Workstations)
- Teleportech/Classrooms
- Collaborative Learning Rooms
- Tech Service Space

Staff	Area/Staff	Area/Rm	Rm	Total
24	20 sf	480	1	480
78	50 sf	3900	1	3900
93	20 sf	Varies	3	1865
20	20 sf	400	3	1200
	Varies	Varies	3	1485

Offices

- Librarian's Offices
- Staff/Storage Room
- Information Desk/Area
- Lobbies

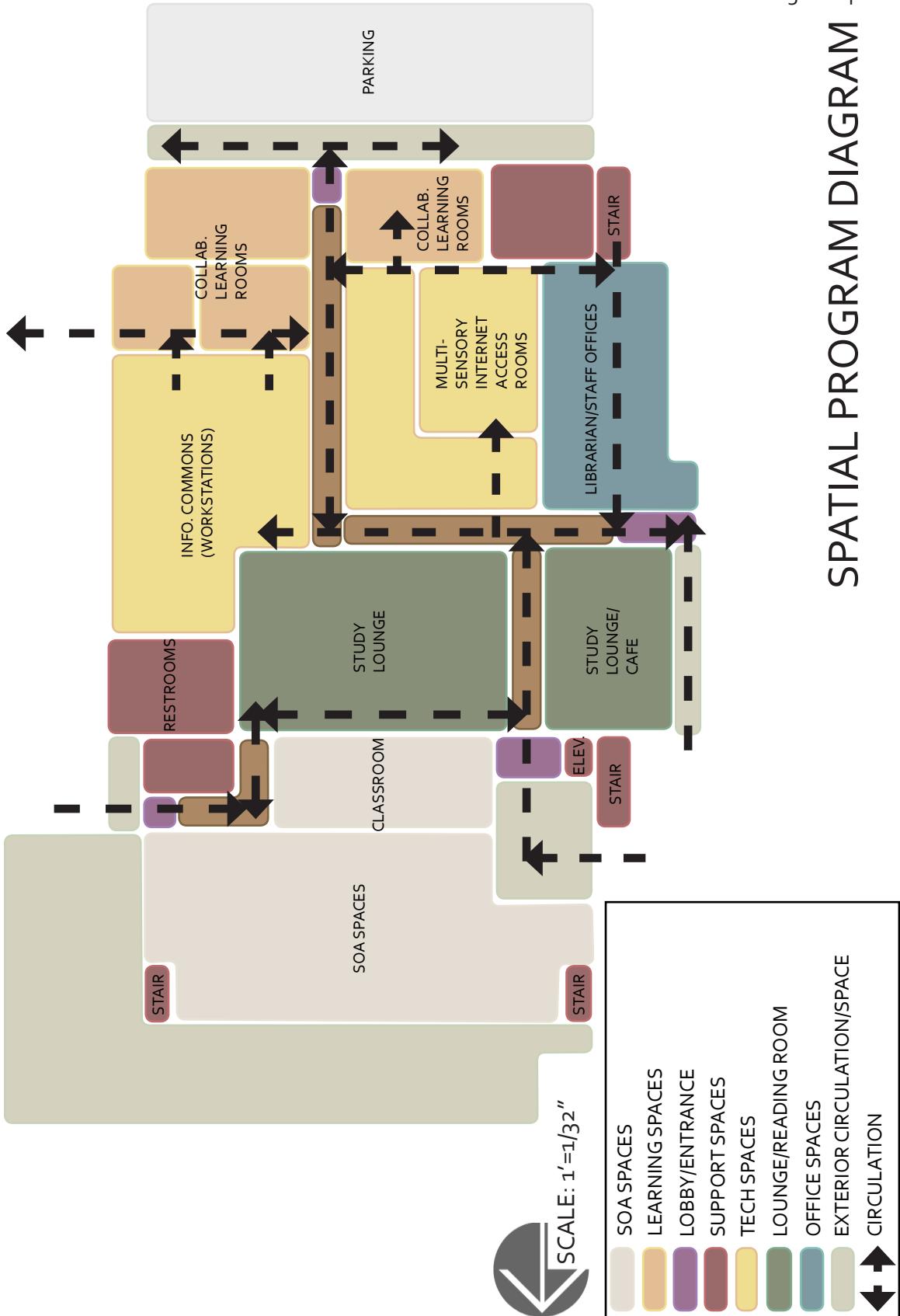
1	150 sf	600	4	600
2	Varies	Varies	2	1125
1	130 sf	130	1	130
	Varies	Varies	4	920

Public

- Lounge/Study
- Cafe/Study

140	20 sf	2800	1	2800
100	15 sf	1500	1	1500

SPATIAL PROGRAM DIAGRAM



Part IV: Design Proposal

Support
- Restrooms/Custodial

Staff	Area/Staff	Area/Rm	Rm	Total
	Varies	1080	3	1080

Total Program Area: 16,005 sf
Circulation: 7,370 sf
Total Area: 23,375 sf

Program

AREA: 'LIBRARY'/INFORMATION CENTER: Multi-sensory Classroom

Number of Stations: 24 **Area per Station:** 20
Total Floor Area: 480 sf
Activity/Use: Classroom that can convert into Individual rooms to provide use of multi-sensory internet and provide multi-sensory learning experiences. Requires partial privacy and ventilation/air conditioning treatment primarily for digital scents.
Adjacencies:
Mandatory: Staff/Storage, Information Commons

AREA: "LIBRARY"/INFORMATION CENTER: Information Commons, Computer Access

Number of Stations: 78 **Area per Station:** 50
Total Floor Area: 3900 sf
Activity/Use: Large open area with information/internet/digital collection access stations/computers.
Adjacencies:
Mandatory: Lobbies, Librarian Offices, Staff/Storage, Multi-sensory Classroom, Lounge, Teleportec/Classrooms, Restrooms

AREA: 'LIBRARY'/INFORMATION CENTER: Teleportech/Classrooms

Number of Stations: 3 **Area per Station:** Varies
Total Floor Area: 1865 sf
Activity/Use: High-tech teleconferencing (Teleportec) room for meetings, small lectures, classes, etc. Contains Teleportec equipment technology, as well as nanotechnology walls that could alter the space for various applications.
Adjacencies:
Mandatory: Information Commons, Librarian Offices, Staff/Storage

Part IV: Design Proposal

AREA: 'LIBRARY'/INFORMATION CENTER: Collaborative Learning Rooms

Number of Stations: 3 **Area per Station:** 400
Total Floor Area: 1200 sf
Activity/Use: High-tech room for larger group meetings for collaborative projects/group work. Can double as classroom/instructional space. Contains Tidebreak and Teleportech technology, as well as nanotechnology walls that could alter the space for various applications.

Adjacencies:
Mandatory: Information Commons, Staff

AREA: 'LIBRARY'/INFORMATION CENTER: Tech Service/Support Spaces

Number of Stations: 2 **Area per Station:** Varies
Total Floor Area: 1485 sf
Activity/Use: Spaces that support the technical/electrical demands of high-tech spaces such as the multi-sensory classroom and rooms utilizing Teleportec or Teamspot technologies.

Adjacencies:
Mandatory: Multi-sensory Classroom, Teleportec/Classrooms

AREA: 'LIBRARY'/INFORMATION CENTER: Librarian Offices

Number of Stations: 4 **Area per Station:** 150
Total Floor Area: 600 sf
Activity/Use: Assigned to 'specialized' librarians to service Architecture, Business, Social Science, Nursing & Dental Hygiene, Travel Industry Management, Biology and Speech students and faculty. Used for researching, assisting and advising students, providing students and faculty with information for research projects/assignments, etc. Contains computer equipment for digital access to student files, main library collection, digital communication with students and faculty, and for preparing instruction on information literacy to the above mentioned schools/colleges/departments.

Adjacencies:
Mandatory: Lobby, Information Commons, Staff/Storage, Teleportech/Classrooms

AREA: 'LIBRARY'/INFORMATION CENTER: Staff Office/Storage

Number of Stations: 2 **Area per Station:** Varies
Total Floor Area: 1125 sf
Activity/Use: Assigned to supporting in-house librarian staff member(s) and/or information technologist (IT) staff member to provide equipment/technological support. Contains important/archived print materials and computer equipment for assisting students and faculty, as well as other supporting equipment for the library/information commons.
Adjacencies:
 Mandatory: Librarian Offices, Information Commons, Multi-sensory Classroom, Teleportec/Classrooms, Collaborative Learning Spaces

AREA: 'LIBRARY'/INFORMATION CENTER: Lobbies

Number of Stations: 4 **Area per Station:** Varies
Total Floor Area: 920 sf
Activity/Use: Transition area from exterior (all four sides of the School of Architecture building) into library/information commons space, and waiting area for individual meetings with librarians.
Adjacencies:
 Mandatory: Entrances

AREA: 'LIBRARY'/INFORMATION CENTER: Information Desk Area

Number of Stations: 1 **Area per Station:** 130
Total Floor Area: 130 sf
Activity/Use: Located at main lobby entrance from the Quad, an area dedicated to providing direction and information to users.
Adjacencies:
 Mandatory: Lobby, Information Commons

AREA: 'LIBRARY'/INFORMATION CENTER: Lounge/Study

Number of Stations: 1 **Area per Station:** 2800
Total Floor Area: 2800 sf
Activity/Use: Houses remainder of architectural related print material moved/saved from main library (Hamilton Library). Allows access to print material, however is primarily for decoration, and houses these materials along the walls of the space. Space can also be utilized as a lounge/study, with outdoor/lanai access and can provide another access point into the library/information commons.
Adjacencies:
 Mandatory: Lobby, Information Commons, Café/Study Lounge

AREA: 'LIBRARY'/INFORMATION CENTER: Café/Study Lounge

Number of Stations: 1 **Area per Station:** 1500
Total Floor Area: 1500 sf
Activity/Use: Provides coffee and non-alcoholic beverages and snacks for students and faculty utilizing the information commons. Purpose for café is primarily to accommodate the current trend of library spaces allowing beverages and incorporating such spaces to bring in more patrons. Similar to that of larger bookstores such as Borders and Barnes & Noble, of which both utilize café spaces within store along with browsing through texts, which make them luring locations of study/leisurely reading and information browsing for all ages, more so students.

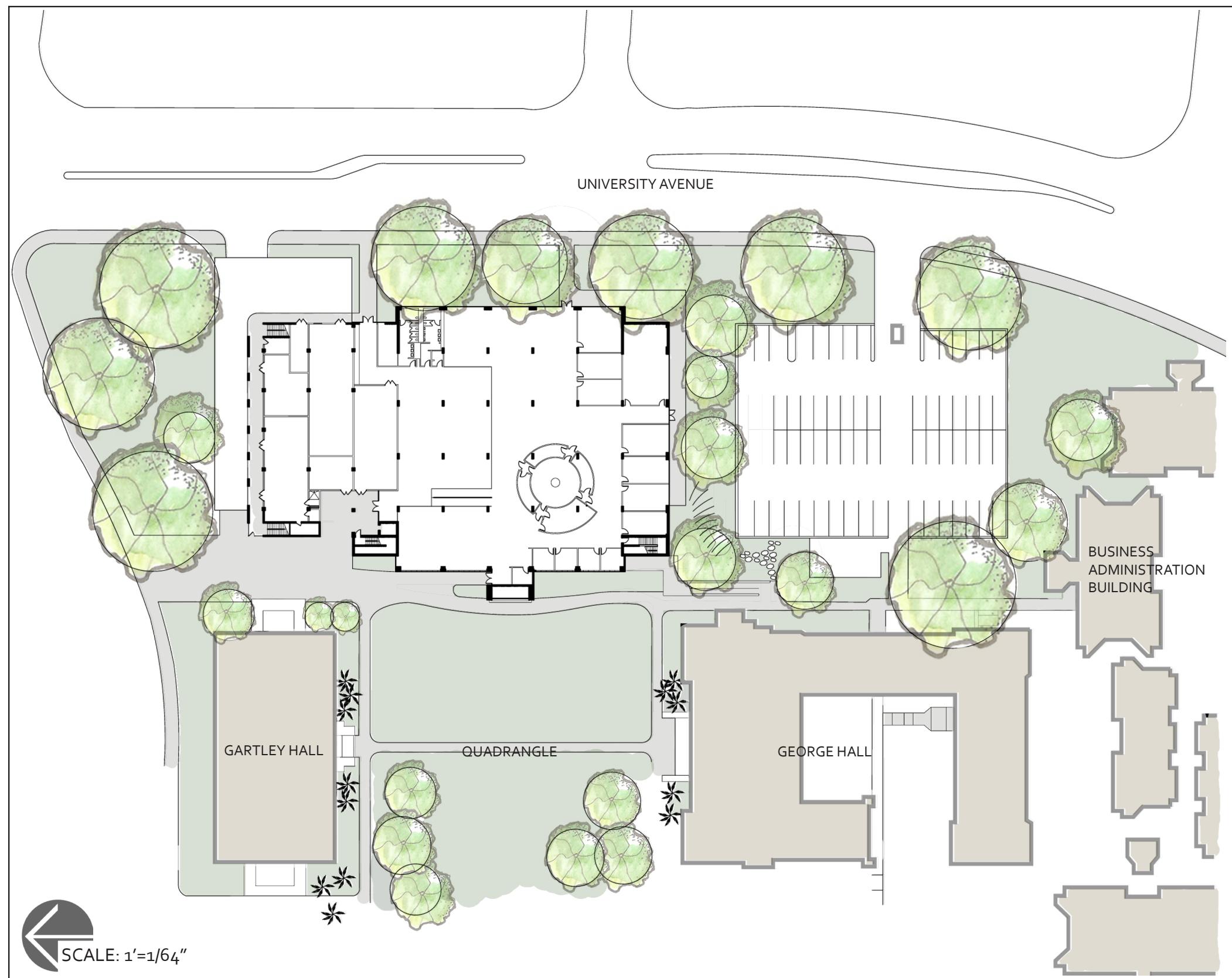
Adjacencies:

Mandatory: Lobby, Information Commons, Lounge

AREA: 'LIBRARY'/INFORMATION CENTER: Restrooms/Custodial

Number of Stations: 3 **Area per Station:** Varies
Total Floor Area: 1080 sf
Activity/Use: Standard lavatory facilities and supporting janitorial closet for maintenance.
Adjacencies:
Mandatory: Lounge/Study, Information Commons

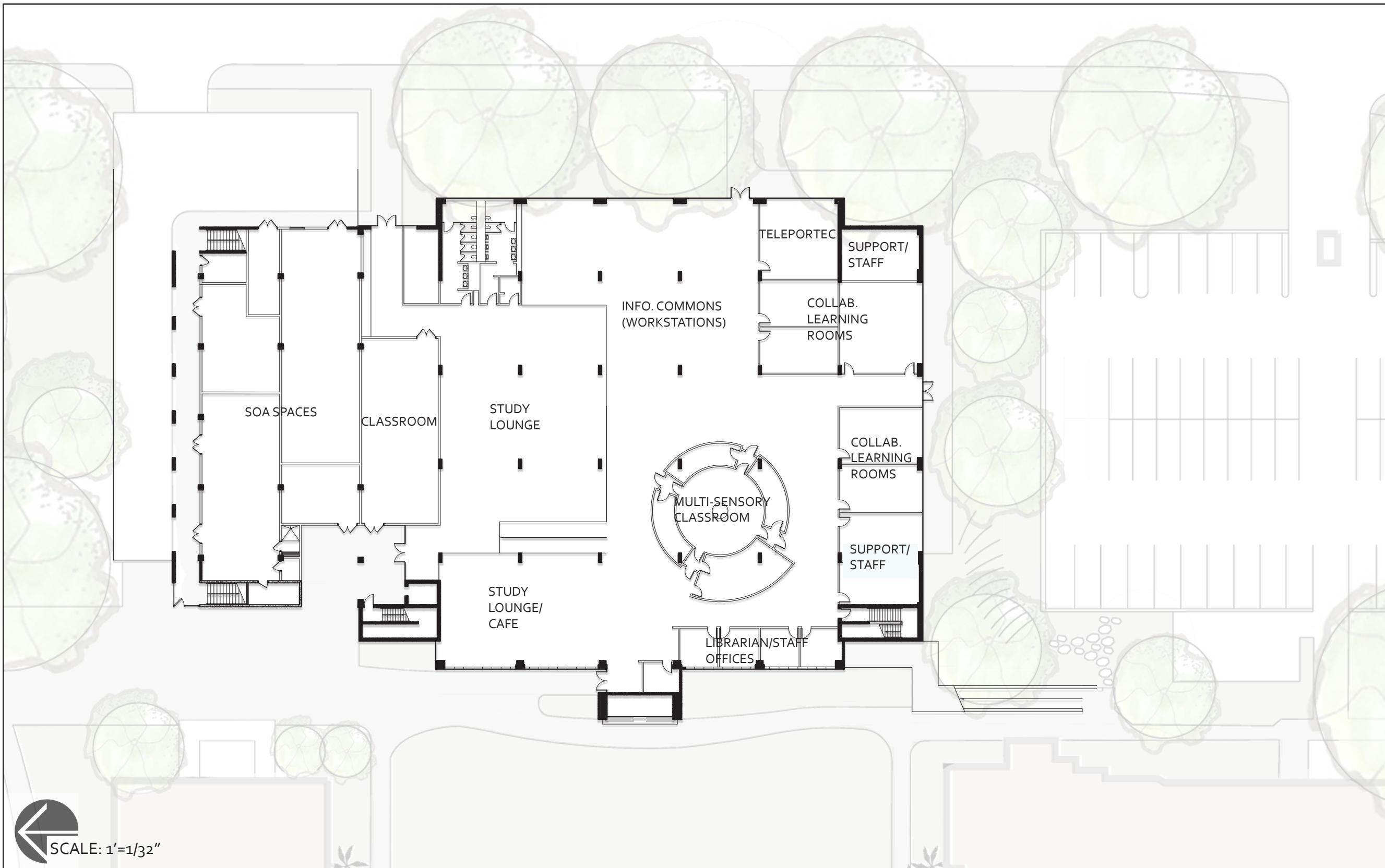
SITE PLAN



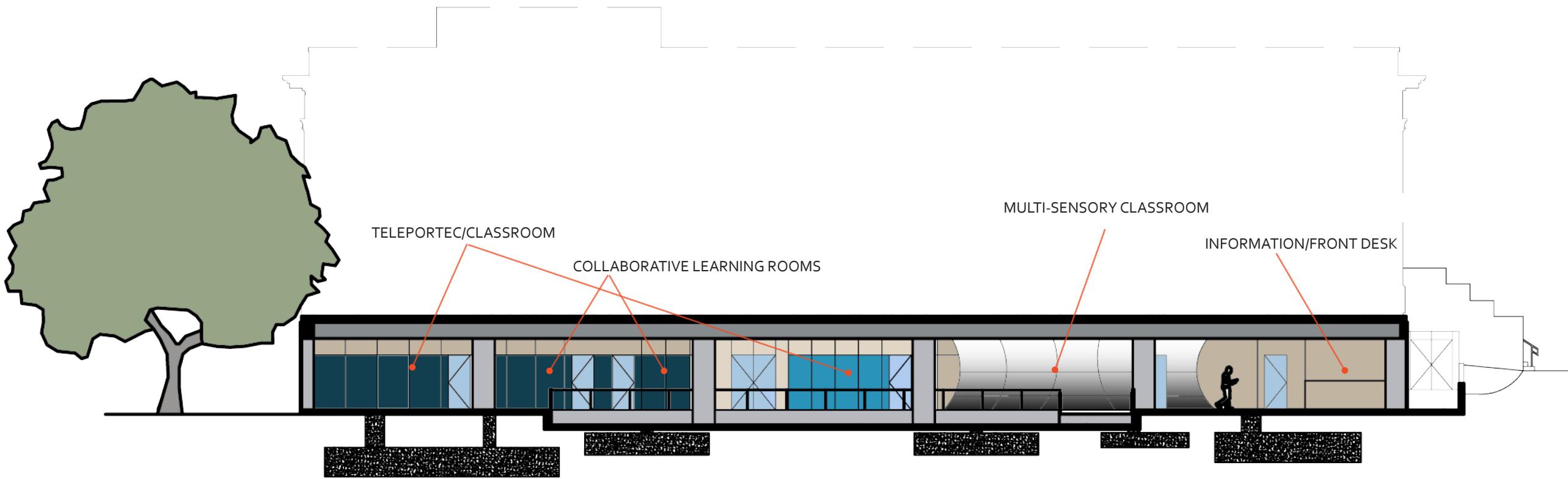
In addition to the existing ground floor entrances, two more entry points have been added to provide access to the new library/information center/commons space from all sides of the building.

From University Avenue, one has been placed directly in front of the University Avenue and Seaview Avenue intersection, where a cross walk is present. The other entrance has been placed on the North face of the building, to provide access from the now shrunken parking lot and the College of Business. Because this new entry way is below grade of the parking lot, due to the sloped nature of the site, a natural pathway is provided from the existing stone pathway from the parking lot to the ADA accessible ramo of the SoA, much like that created at the entrance to the College of Business (BUSAD) building.

GROUND FLOOR PLAN

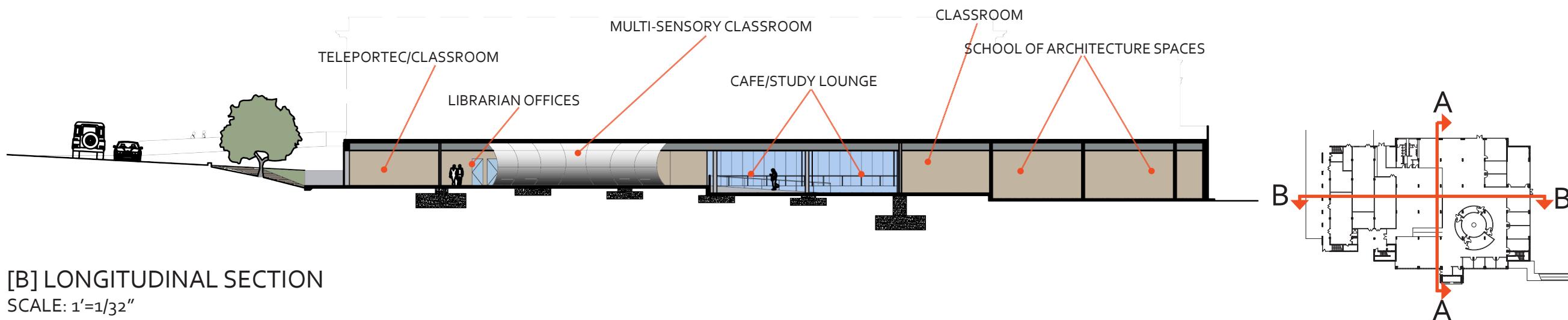


SECTIONS



[A] CROSS SECTION

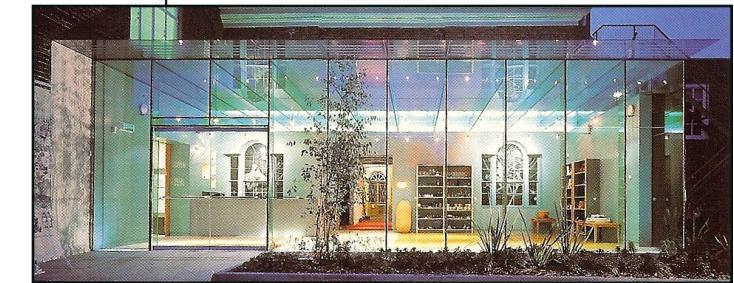
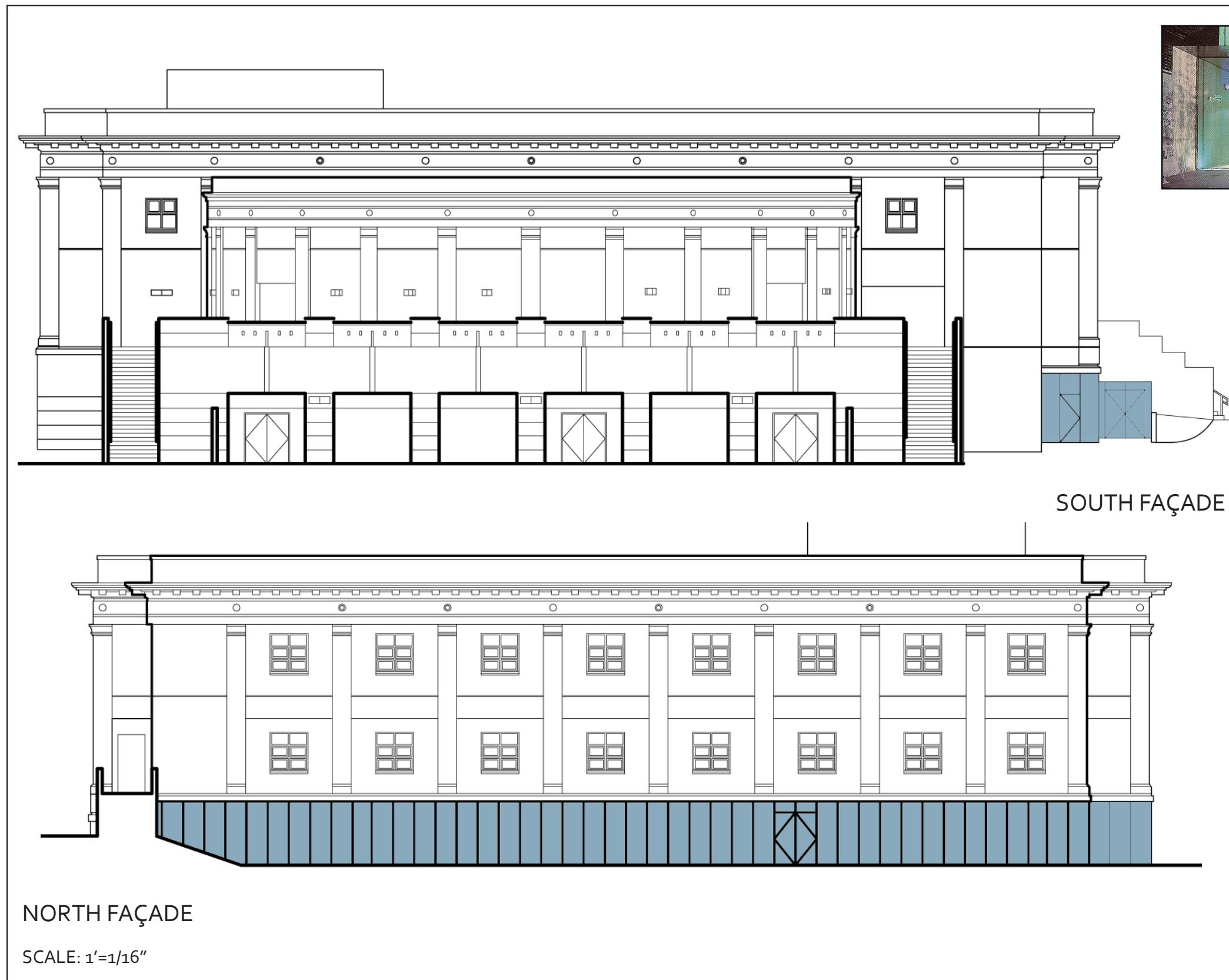
SCALE: 1'=1/16"



ELEVATIONS



ELEVATIONS



[Fig. 86 & 87: Exterior glass curtain wall treatment example and solar powered glass curtain wall system.]

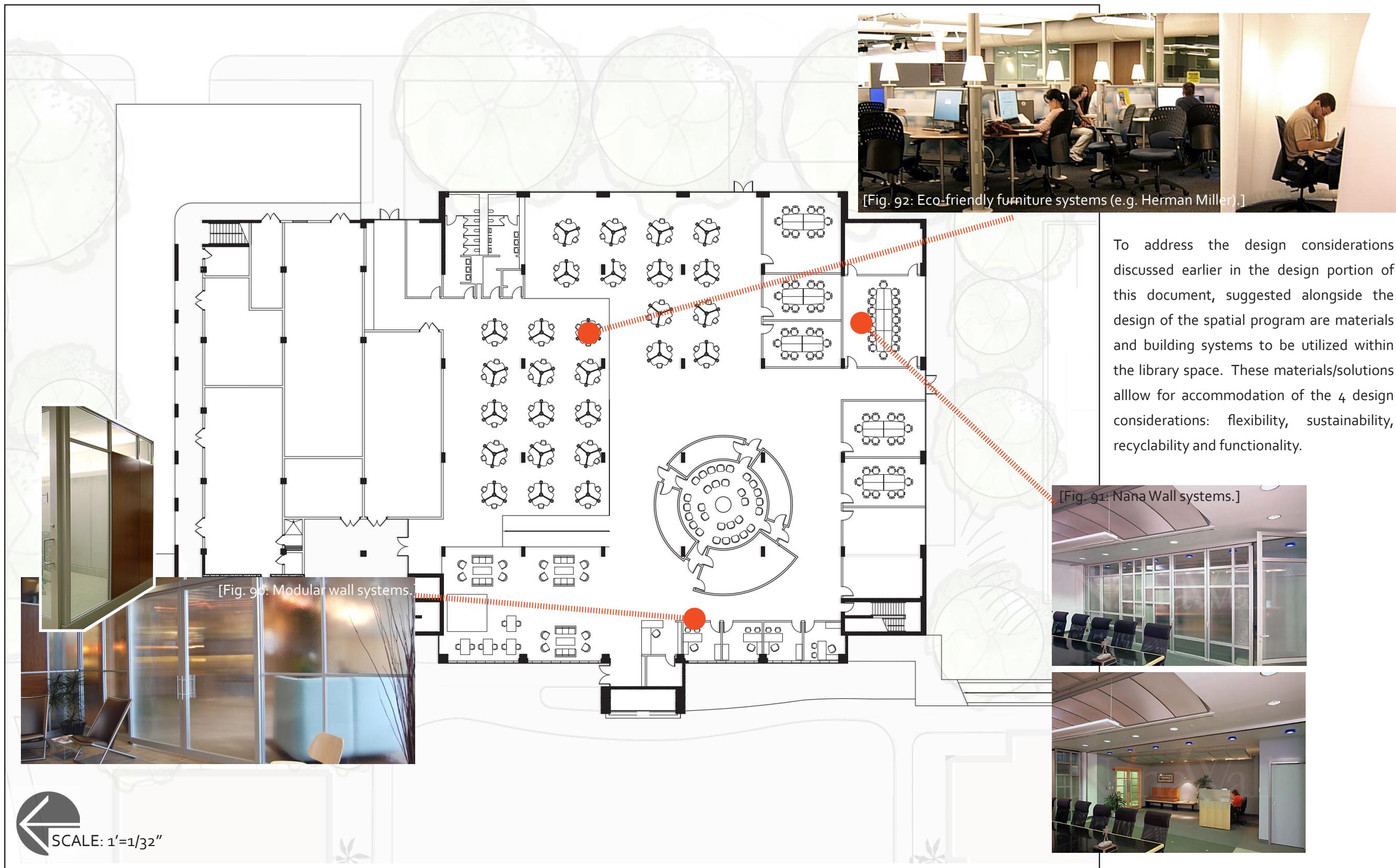
Proposed is the utilization of glass curtain wall on the North, East and West walls of the ground floor of the SoA to add a fresh modern look to the new library/information commons facility present at the building, as well as provide some green methods by allowing natural lighting to the ground floor as well as a secondary, self-sustaining source of power to handle some of the new energy demands the space requires.

SOA EXTERIOR PROPOSAL RENDERINGS



BIRD'S EYE VIEWS

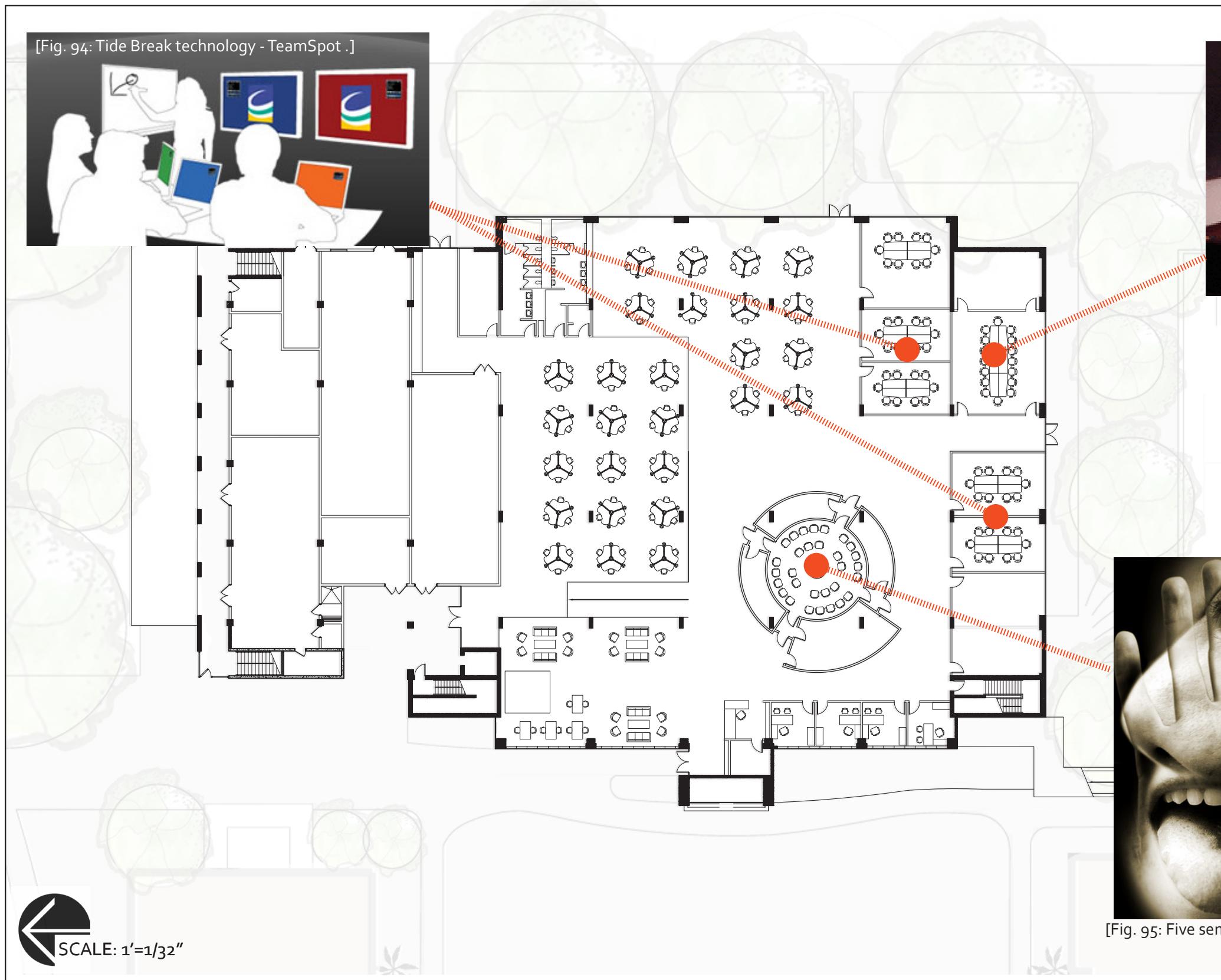




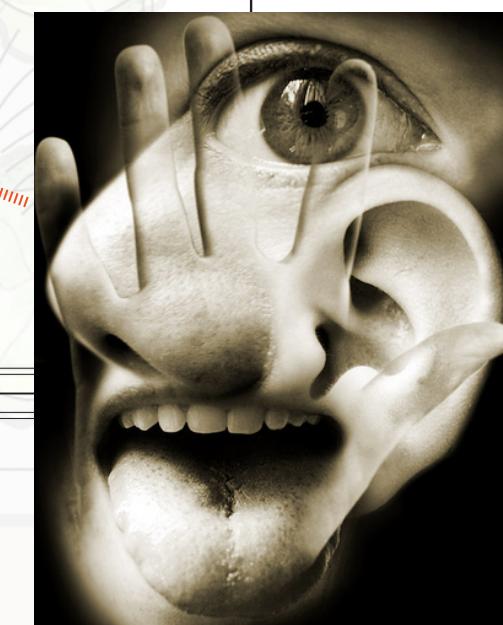
To address the design considerations discussed earlier in the design portion of this document, suggested alongside the design of the spatial program are materials and building systems to be utilized within the library space. These materials/solutions allow for accommodation of the 4 design considerations: flexibility, sustainability, recyclability and functionality.

Building Systems

As indicated on the previous page, the building and furniture systems proposed are NanaWall systems, modular walls and systems furniture. Why these systems in particular? Each contribute to the fulfillment of the 4 design considerations, especially in regards to their flexibility in being able to constantly transform space, their recyclability in being an eco-friendly and recyclable material and reusable within a variety of spaces, and their functionality in being able to be used in a variety of interior/design applications. They also allow the space to remain an open floor plan as they do not require any permanent fixation within the space.



Out of the discussed emerging technologies in Chapter 7, those with the most potential impact on the future of libraries/information centers are TeamSpot/ClassSpot and Teleportec, which are both currently in use in some educational institutions, however are not in the mainstream of usage quite yet, as well as the potential multi-sensory internet.



Technologies

Why these particular technologies? Aside from having the most potential impact on the future of the academic library in terms of technological advances/enhancement, they also have a great influence on the library as a physical entity, requiring specific amounts of space and additional spaces to support them.

These 3 major technologies have the potential to alter the size of dedicated library facilities and spaces as the transition is being made from collection based to learning and technological access/spaces. The more futuristic, yet quite possible technology being accommodated for in this design intervention is the multi-sensory classroom space. Although the technology is not available, there are many indications of its future fruition as we have technologies now that are major components of what would be considered a multi-sensory internet.

Spatial Prototype: A Multi-Sensory Experience

"We're putting eyes, ears and sensory organs on our computers and our inter-networks in absolutely unprecedeted ways. We are now asking them to observe and manipulate the physical world on our behalf. The internet is bringing about such devices needed to come in multiple flavours depending on the application required. In essence, these interfaces stimulate one of our 5 senses; usually sight, hearing, taste, touch, and smell." -- Arthur Hissey²¹⁸

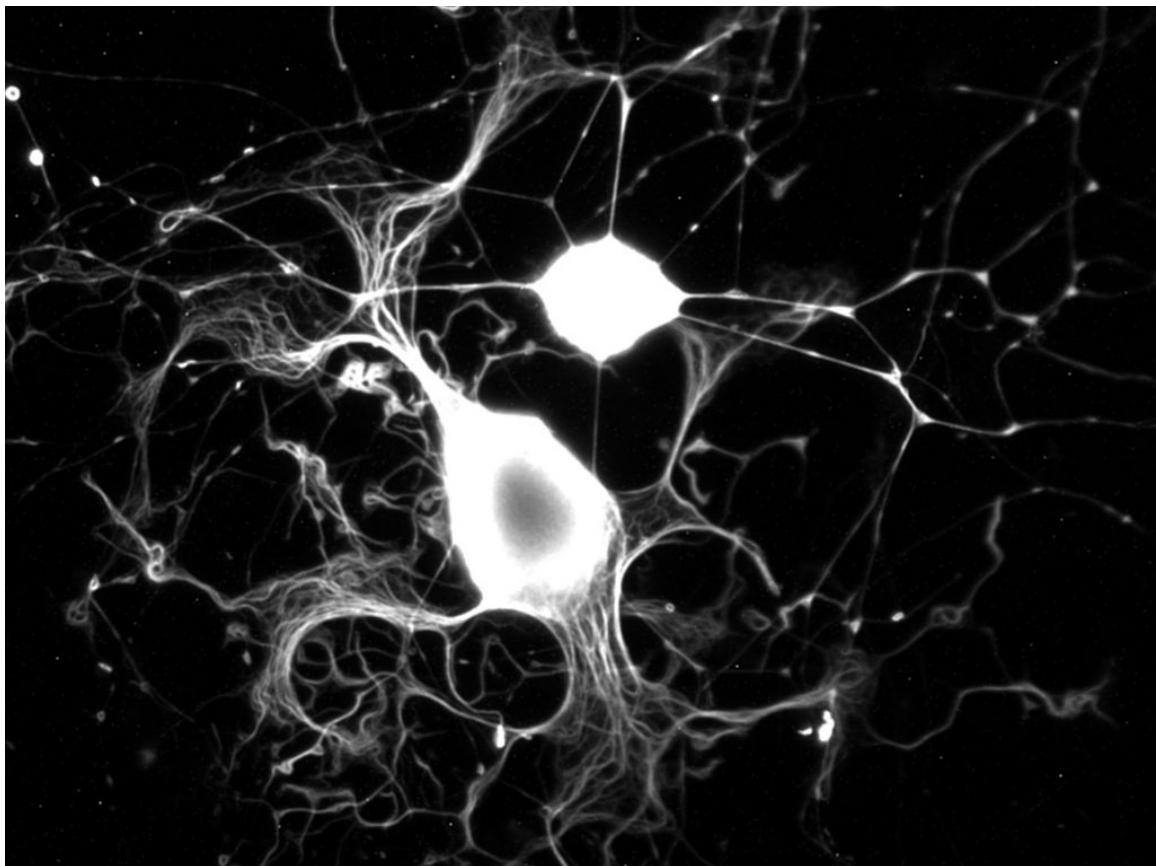
Further developing future spaces within tomorrow's academic library, proposed is the continued design/idea development of how one of these future library spaces will look and function. For this final portion of the proposal design, selected was the most intriguing and futuristic space: the multi-sensory classroom, because of its potential to coming to fruition sometime in the near future, despite not actually in the present like most of the other spaces contained within the proposed spatial program.

²¹⁸ Hissey, "How the net has become multi-sensory," Computer Research & Technology ETopics <http://www.crt.net.au/About/ETopics/Archives/sens.html>.

Design Concept

The design concept stems from the image and definition of a sensory neuron, as this space focuses on the usage of multiple senses to attain information. By function, a sensory neuron "carries signals from receptors (vision, touch, hearing, etc.) and transmit information about the environment to processing centers in the brain and spinal cord"²¹⁹, and therefore plays a major role in the processing of information by the senses.

In form, the sensory neuron is composed of a nucleus, cell body, and dendrite, which are the branching elements as seen in Figure 97 that conduct impulses or signals towards the cell body.²²⁰

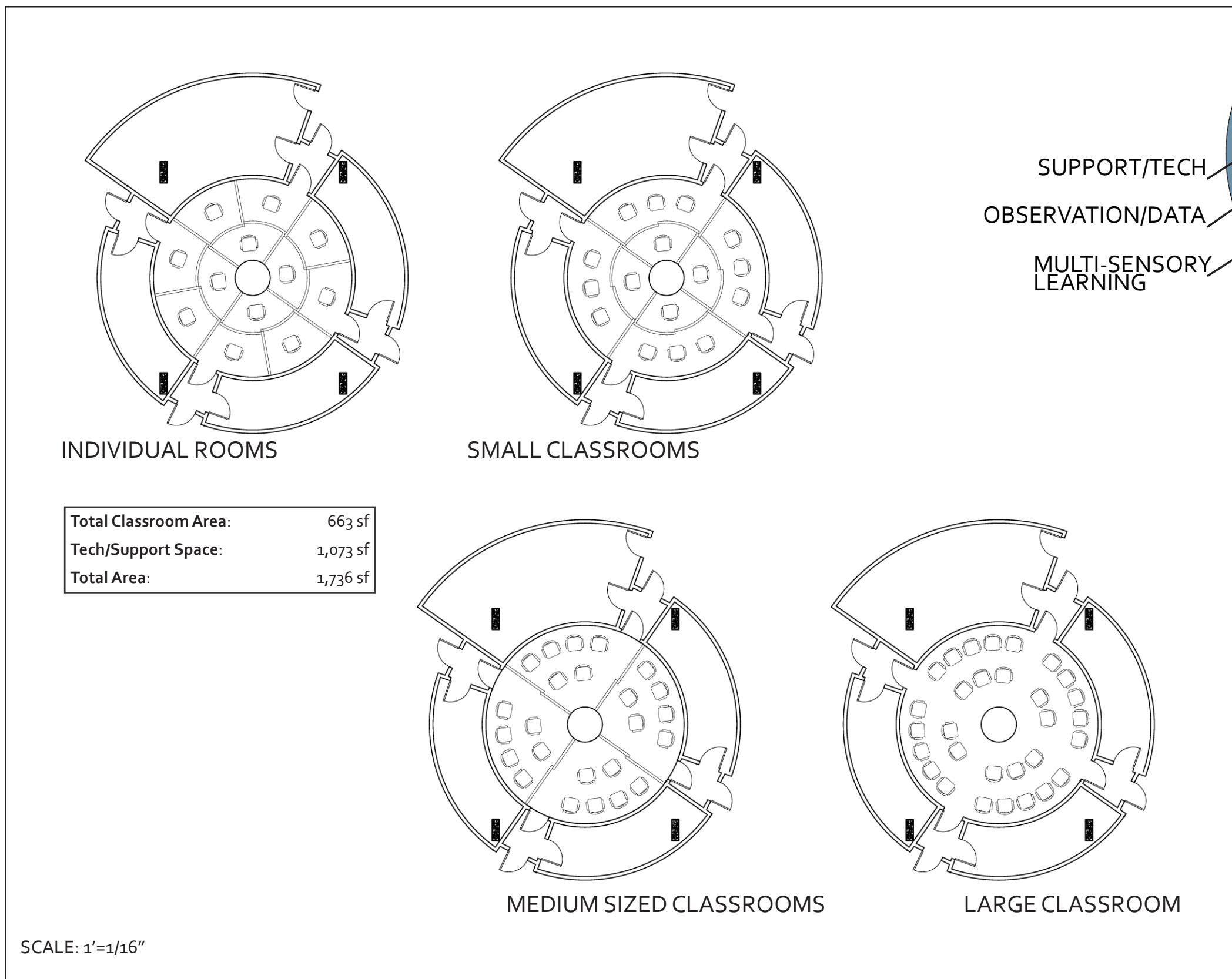


[Figure 97: Sensory neuron.]

²¹⁹ Michael J. Farabee, "Glossary S", *On-Line Biology Book* 2007, www.emc.maricopa.edu/faculty/farabee/BIOBK/biobookglosss.html.

²²⁰ Merriam-Webster, "Dendrite," Merriam-Webster Dictionary, <http://www.merriam-webster.com/dictionary/dendrite>.

MULTI-SENSORY CLASSROOM CONCEPTUAL DESIGN

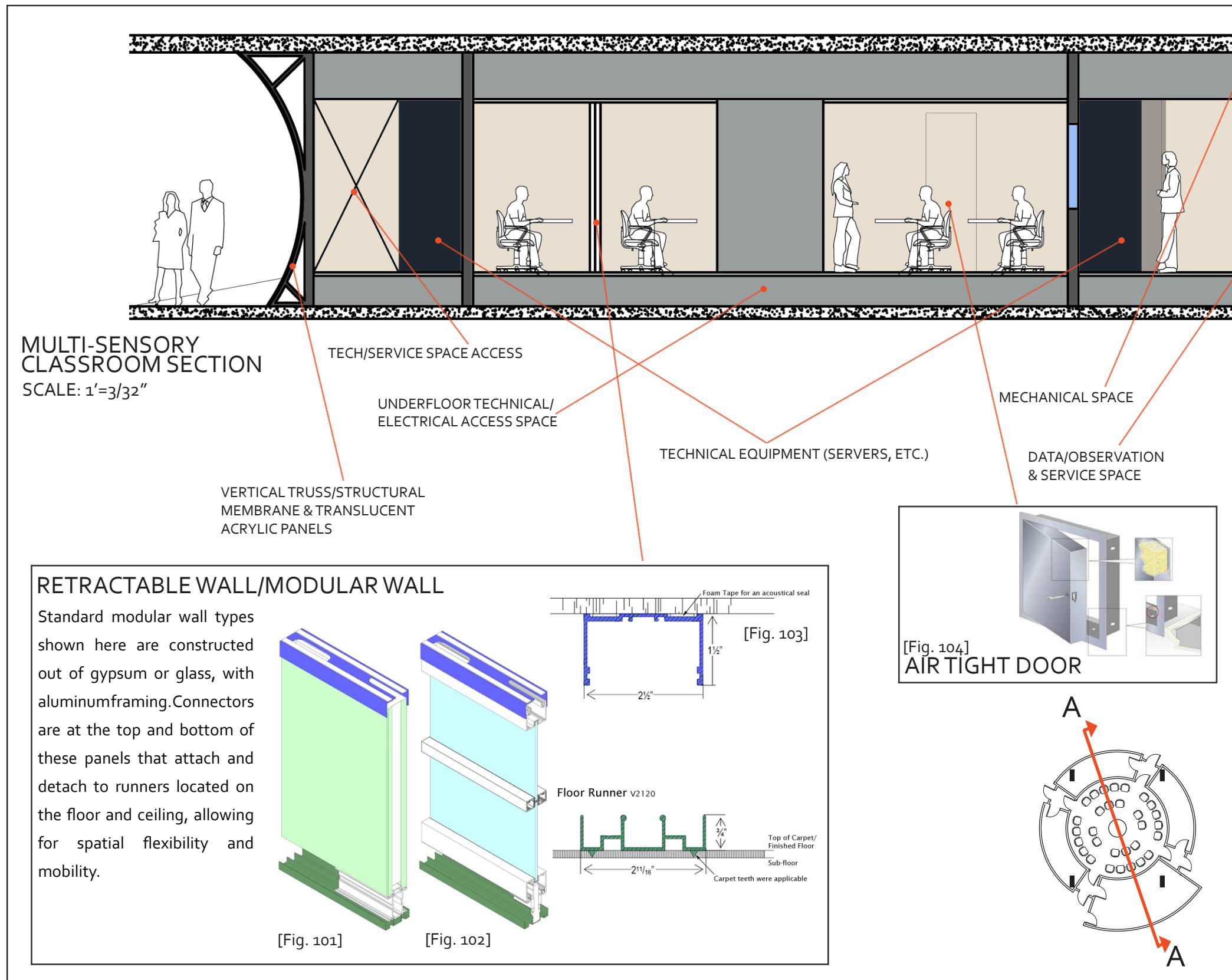


Spatially, similar to the composition of a sensory neuron, 3 major spaces compose the multi-sensory access room. The innermost space is the main learning/experience arena, the surrounding space is left for support, mechanical and tech. It also serves as the transition barrier upon entering the learning arena. Lastly, the outermost space is reserved for observation, data and operation.

As a multi-sensory internet has the potential to heavily influence how education and learning is conducted, retractable walls are utilized in the space to accomodate varying class sizes up to 30 students.

A circular shape was selected for this particular space to provide interior space(s) that would immerse and surround users in a multi-sensorial experience. In this form, there is less restriction continuous experience within the space; without the interruption of corners, comes the perception of not being a room or being enclosed in a box.

MULTI-SENSORY CLASSROOM CONCEPTUAL DESIGN



Utilizing a double wall design, for structure and materials, this space is physically supported by the large structural columns of the SoA which support the inner core, or classroom space. As the interior of this space is intended to be flexible and changeable, a sliding wall/track system will be utilized. This system would connect to the floor and ceiling by a track system which would allow walls to move, and would also be air tight to prevent infiltration of other scents emitted if in the individual, small class or medium class room configurations.

The second wall, or outer wall is supported primarily by steel vertical truss membranes to which custom material panels can attach to, creating an undulating form, while covering the classrooms technical support space.

Conclusion

*"True, the library of the 21st century is a different library. For one thing, traditional prohibitions on food and drink and chatter will change. "The concept of shushing people is going out," Steel said. "We want it to be a comfortable place." And that means a social place with a café, reading gardens and reading rooms with two stories of glass facing the redwoods. Though information may be at one's fingertips from a dorm room or office, today's students and faculty require a place to gather to collaborate."*²²¹

Indeed, tomorrow's academic library is transforming on all fronts. In order to continue its presence in the future, it must change. As seen in the case studies presented in this document, many universities are now realizing the importance of researching and implementing future/emerging ideas in order to continue the proliferation of the academic library not only as an important place of knowledge on campus, but also as an essential and significant source of learning and valid information.

It is virtually impossible to predict what the future will bring and no one is certain of what tomorrow may bring for the academic library, be it new technology, new pedagogies, new infrastructure, etc. However, it is important to think about the possibilities in order to strategize and "encompass unforeseeable changing conditions."²²² Though some explorations and ideas of what we think the future may be seem absurd or ridiculous, neglecting to explore ideas would be more harmful. By thinking and providing a good strategy for what can potentially occur in the future, "no matter what happens, there will be maneuvering room"²²³ for change, which will definitely occur in the future, as well as aid in preparation for what is to come, based upon current trends and methods of gathering and obtaining information that are shaping the future of tomorrow's academic library.

This project has evolved from a thorough research investigation on the history of the academic library to its current standing within the university, and even to an insight into future pedagogical trends and technologies that have potential impact on what the library may be tomorrow. Through the research, two forms of design proposals were developed: the first on a large scale, campus wide library system, and the second on a smaller scale, satellite library prototype to fit

²²¹ Lasnier, "McHenry Library pioneers tour new construction." University of California, Santa Cruz News/Events, July 30, 2007, http://www.ucsc.edu/news_events/text.asp?pid=1469.

²²² LaGuardia, 81.

²²³ Ibid.

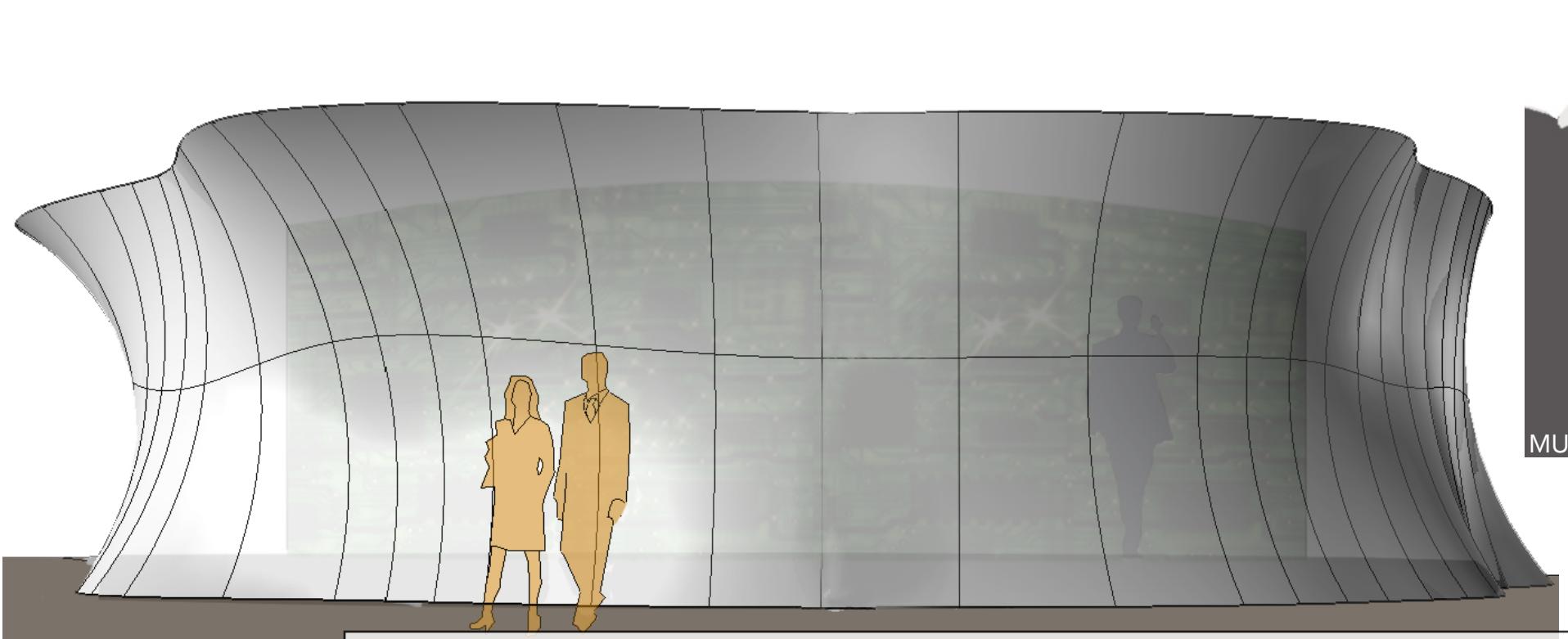
Conclusion

the campus system. Furthering and future-ing the design a futuristic space within the prototype library was developed, giving insight on just one future possibility.

Only time will tell if any of the technologies, pedagogical shifts and other potential changes and influences discussed in this document will become realities, however, there are a number of ways in which the established building parameters can be applied to the design of tomorrow's academic library. The presented proposals are just two potential solutions out of numerous possibilities of solving impending problems the future may bring, in efforts of enhancing existing conditions to make tomorrow's library better than today, and preparing/accommodating for the forthcoming generation of users, emerging technologies and changing instructional and information acquiring methods.

Although the presented future scenario and design may never come to fruition, what has been learned through this process is the importance and necessity of researching and exploring ideas of what the future may be, as well as taking account for potential future user and technical needs in the design process. By keeping the future in mind in design, be it for new or existing buildings, transitions from current needs to tomorrow's can occur promptly and change, which is one thing that is certain in the future of tomorrow's academic libraries.

MULTI-SENSORY CLASSROOM CONCEPTUAL DESIGN



EXTERIOR RENDERING

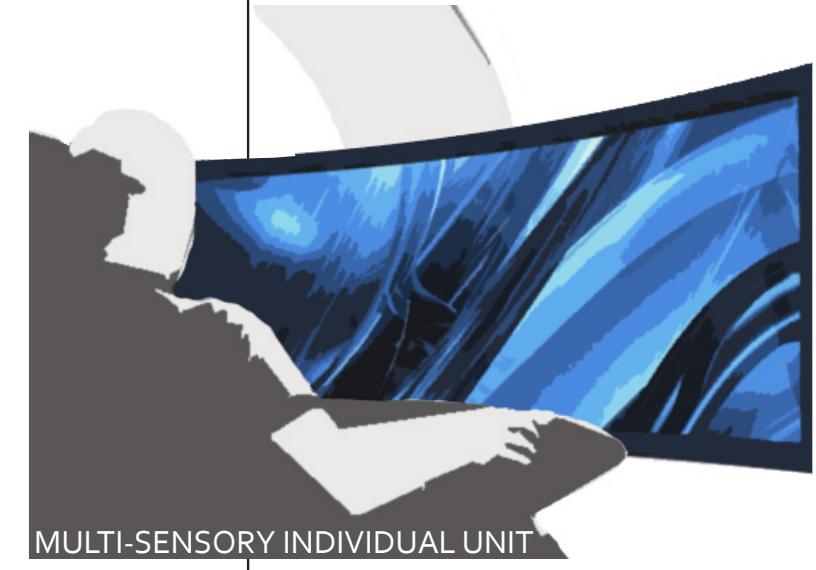




[Fig. 106-108: Views of the Honda Advanced Design Center exterior walls, and interior view revealing structure.]

The Honda Advanced Design Center in Pasadena was created using a translucent acrylic panels, each custom made to create its undulating shape. Each is held in place by steel rods which extend from floor to ceiling. A similar structural method will be applied to the exterior wall of the multi-sensory classroom space, however as mentioned previously, will utilize a double wall, where additional space in between the exterior translucent wall and the classroom wall will be provided to allow for technical equipment, access and support.

MATERIALS STUDY: HONDA ADVANCED DESIGN CENTER PASADENA, CA



MULTI-SENSORY INDIVIDUAL UNIT

The exterior skin that covers the interior spaces was designed to convey the form a sensory neuron which is a neuron activated by sensory input via our 5 senses. Utilizing a translucent acrylic panels library patrons outside can somewhat see lights emitted by circuit, electrical, server,etc. boards that produce the virtual and sensorial experience within.

Appendix A

2008 Top American Research Universities Charts

The Top American Research Universities

Part I – The Top American Research Universities

The Center for Measuring University Performance determines the Top American Research Universities by their rank on nine different measures: Total Research, Federal Research, Endowment Assets, Annual Giving, National Academy Members, Faculty Awards, Doctorates Granted, Postdoctoral Appointees, and SAT/ACT range. (The Source Notes section of this study provides detailed information on each of the nine indicators.) The tables group research institutions according to how many times they rank in the top 25 on each of these nine measures. The top category includes those universities that rank in the top 25 on all nine indicators. The bottom category includes universities with only one of the nine measures ranked in the top 25. Within these groups, institutions are then sorted by how many times they rank between 26 and 50 on the nine performance variables, with ties listed alphabetically. A similar methodology produces a second set of institutions—those ranked 26 through 50 on the same nine measures.

For the purpose of this study, *The Center for Measuring University Performance* includes only those institutions that had at least \$40 million in federal research expenditures in fiscal year 2006. This is a new threshold which replaced our previous \$20 million cutoff. There were 156 institutions who met our criteria for fiscal year 2006, 108 public and 48 private.

The first two tables list each institution with the most current data available for each measure and its corresponding national rank (i.e., rank among all institutions regardless of whether they are privately or publicly controlled). The other tables provide the same nine data measures but with the groupings determined by the control rank (i.e., rank among all private or all public institutions). Institutions ranking in the top 25 on at least one measure are included in the tables with the (1-25) identifier, while those ranking 26 through 50 are found in the tables labeled with the (26-50) header.

- **The Top American Research Universities (1-25)** identifies the 54 institutions (28 private, 26 public) that rank in the top 25 nationally on at least one of the nine measures.

- **The Top American Research Universities (26-50)** identifies the 31 institutions (8 private, 23 public) that rank 26 through 50 nationally on at least one of the nine measures.
- **The Top Private Research Universities (1-25)** identifies the 36 private institutions that rank in the top 25 among all private universities on at least one of the nine measures.
- **The Top Private Research Universities (26-50)** identifies the 12 private institutions that rank 26 through 50 among their private counterparts on at least one of the nine measures.
- **The Top Public Research Universities (1-25)** identifies the 44 public institutions that rank in the top 25 among all public universities on at least one of the nine measures.
- **The Top Public Research Universities (26-50)** identifies the 41 public institutions that rank 26 through 50 among their public counterparts on at least one of the nine measures.

Many research universities rank highly both nationally and among their public or private peers, and therefore appear in more than one table. For example, of the 36 private institutions in the Top Private Research Universities (1-25) table, 28 universities also appear in the Top American Research Universities (1-25) table.

Data found in these tables may not always match the figures published by the original source. *The Center for Measuring University Performance* makes adjustments, when necessary, to ensure that the data reflect the activity at a single campus rather than that of a multiple-campus institution or state university system. When data are missing from the original source, *The Center for Measuring University Performance* may substitute another figure, if available. A full discussion of this subject, and the various adjustments or substitutions made to the original data, is in the Data Notes section of this report.

The Center for Measuring University Performance presents these tables, along with prior years' top universities, in Microsoft Excel spreadsheets on its web site [<http://mup.asu.edu>].

Appendix A

The Top American Research Universities

Top American Research Universities (1-25)			Research				Private		
	Institutions in Order of Top 25 Score, then Top 26-50 Score, then Alphabetically	Number of Measures in Top 25 Nationally	Number of Measures in Top 26-50 Nationally	2006 Total Research x \$1000	2006 National Rank	2006 Federal Research x \$1000	2006 National Rank	2007 Endowment Assets x \$1000	2007 National Rank
Private	Columbia University	9	0	529,945	21	451,187	11	7,149,803	7
Private	Massachusetts Institute of Technology	9	0	600,748	12	476,362	8	9,980,410	5
Private	Stanford University	9	0	679,196	8	540,069	4	17,164,836	3
Private	Harvard University	8	1	453,156	27	403,458	15	34,634,906	1
Private	University of Pennsylvania	8	1	676,052	9	478,773	7	6,635,187	9
Private	Yale University	8	1	460,075	25	348,500	16	22,530,200	2
Private	Duke University	8	0	657,080	10	414,419	13	5,910,280	14
Public	University of Michigan - Ann Arbor	8	0	800,488	4	565,739	3	7,089,830	8
Private	Johns Hopkins University	7	2	1,499,977	1	1,307,453	1	2,800,377	25
Public	University of California - Berkeley	7	1	546,035	18	261,718	32	2,894,932	23
Public	University of California - Los Angeles	7	1	811,493	3	483,873	6	2,683,872	27
Public	University of Minnesota - Twin Cities	7	1	594,877	13	326,170	19	2,804,466	24
Public	University of Washington - Seattle	7	1	778,148	6	650,394	2	2,184,374	30
Public	University of Wisconsin - Madison	7	1	831,895	2	481,810	5	1,916,701	34
Private	Washington University in St. Louis	6	3	547,674	17	408,402	14	5,567,843	15
Public	University of California - San Francisco	6	0	796,149	5	464,660	9	1,362,656	52
Private	Cornell University	5	4	443,879	29	253,277	35	4,448,281	18
Private	University of Chicago	5	3	305,301	51	253,471	34	6,204,189	11
Public	University of California - San Diego	5	2	754,766	7	463,807	10	522,842	136
Public	University of Texas - Austin	5	2	431,398	32	273,147	28	7,190,136	6
Private	Princeton University	5	1	188,165	89	117,845	79	15,787,200	4
Private	Northwestern University	4	5	419,985	33	249,980	36	6,503,292	10
Public	Ohio State University - Columbus	4	4	652,329	11	315,914	21	2,338,103	28
Public	University of North Carolina - Chapel Hill	4	4	443,790	30	329,215	18	2,164,444	31
Private	University of Southern California	4	4	450,173	28	333,378	17	3,715,272	21
Private	Vanderbilt University	4	4	376,893	35	300,423	24	3,487,500	22
Public	University of Florida	4	3	565,491	16	248,322	38	1,219,026	58
Public	University of Illinois - Urbana-Champaign	4	3	476,198	23	264,645	31	1,100,000	67
Public	University of Pittsburgh - Pittsburgh	3	5	530,162	20	422,316	12	2,254,379	29
Public	Pennsylvania State Univ. - Univ. Park	3	4	567,549	15	320,258	20	1,173,420	61
Public	Texas A&M University	3	4	492,955	22	206,242	47	6,149,804	12
Private	New York University	3	3	284,164	56	189,276	53	2,161,800	32
Private	University of Notre Dame	3	1	78,553	143	55,710	129	5,976,973	13
Private	California Institute of Technology	2	5	270,269	61	248,591	37	1,860,052	36
Private	Emory University	2	5	345,989	43	267,894	30	5,561,743	16
Public	University of Arizona	2	5	535,847	19	301,619	23	532,351	132
Public	University of Virginia	2	5	238,754	71	203,778	49	4,370,209	19
Public	University of California - Davis	2	4	573,002	14	248,190	39	650,691	110
Private	Baylor College of Medicine	2	1	462,375	24	287,679	26	1,278,011	55
Private	Dartmouth College	2	1	200,277	83	140,430	68	3,760,234	20
Private	Rice University	2	0	66,564	156	53,880	131	4,669,544	17
Public	Purdue University - West Lafayette	1	6	372,958	36	157,438	61	1,786,592	38
Public	Michigan State University	1	4	358,097	40	169,116	60	1,247,713	57
Public	University of Maryland - College Park	1	4	354,244	41	209,764	46	446,648	147
Private	Brown University	1	3	157,926	99	96,922	95	2,780,798	26
Public	University of Colorado - Boulder	1	3	250,255	65	223,666	42	404,648	163
Private	Boston University	1	2	255,615	63	238,560	40	1,101,386	66
Private	Case Western Reserve University	1	2	369,264	37	306,980	22	1,841,234	37
Private	Rockefeller University	1	2	215,417	76	93,742	100	2,145,203	33
Private	Tufts University	1	2	128,965	110	95,964	97	1,452,058	47
Public	Univ. of Texas MD Anderson Cancer Ctr.	1	2	457,696	26	182,028	57	564,505	124
Private	Carnegie Mellon University	1	1	212,506	80	185,389	55	1,115,740	63
Public	University of Alabama - Birmingham	1	1	331,436	46	292,962	25	382,360	171
Public	University of California - Santa Barbara	1	1	174,429	97	106,169	85	190,038	285

Appendix A

The Top American Research Universities

Support		Faculty			Advanced Training				Undergraduate		
2007 Annual Giving x \$1000	2007 National Rank	2007 National Academy Members	2007 National Rank	2007 Faculty Awards	2007 National Rank	2007 Doctorates Granted	2007 National Rank	2006 Post Docs	2006 National Rank	2006 SAT Range (V; Q) or ACT Range	2006 National Rank
423,849	5	101	8	35	13	568	20	807	12	670-760,670-780	13
329,158	10	239	3	36	11	601	18	971	7	660-760,720-800	6
832,345	1	264	2	44	4	720	9	1,405	2	660-760,680-780	13
613,985	2	284	1	78	1	683	12	4,286	1	690-800,700-790	3
392,421	6	88	12	23	26	483	25	817	11	620-720,680-770	25
391,315	7	106	7	42	5	360	44	978	6	700-790,700-790	3
372,328	8	54	20	30	21	277	64	771	14	690-770,690-790	6
293,403	14	77	14	45	3	789	5	758	15	27-31	73
430,455	4	85	13	50	2	397	34	1,329	3	620-730,650-760	35
242,602	21	214	4	42	5	903	2	894	9	590-710,630-740	54
364,780	9	73	15	38	10	734	8	918	8	570-690,600-720	81
288,750	15	36	28	24	24	819	3	676	17	23-28	232
300,200	13	90	11	40	7	631	16	1,044	5	530-650,570-670	164
325,337	12	72	16	35	13	775	7	609	20	26-30	104
158,213	36	43	23	33	18	347	49	411	31	670-750,700-780	10
251,945	19	99	10	39	9	145	119	1,060	4		
284,848	17	63	17	32	20	485	24	405	33	620-730,660-760	32
328,328	11	52	21	26	22	357	45	312	49	690-780,680-780	9
134,094	42	110	5	40	7	387	38	886	10	550-660,600-710	104
228,759	23	59	18	36	11	779	6	216	68	530-660,570-690	140
230,572	22	101	8	34	16	332	53	340	41	680-800,690-790	5
187,926	27	39	25	34	16	462	27	318	48	650-740,670-760	20
225,558	24	21	46	16	40	667	13	413	30	24-29	168
246,864	20	32	33	22	28	512	22	662	18	600-690,610-700	73
469,647	3	38	27	22	28	691	11	266	57	630-720,650-740	40
137,273	41	20	50	25	23	274	66	505	25	630-720,650-740	40
182,617	29	21	46	24	24	794	4	601	22	560-670,580-690	115
133,256	43	56	19	35	13	698	10	411	31	26-31	87
121,137	47	25	42	22	28	410	32	782	13	560-660,570-670	132
129,829	44	26	39	23	26	646	15	396	34	530-630,570-670	178
168,477	33	22	45	16	40	598	19	301	51	520-630,560-660	211
287,587	16	39	25	33	18	364	42	329	45	600-700,610-710	69
207,641	25	2	125	16	40	159	110	144	93	630-740,660-760	25
183,257	28	107	6	20	33	206	82	493	26	690-770,780-800	1
156,108	38	23	44	12	55	217	78	605	21	640-730,660-740	32
143,957	39	30	34	22	28	460	28	384	36	490-600,500-630	388
282,611	18	30	34	18	37	348	48	473	28	600-710,620-720	57
94,730	60	34	31	15	47	474	26	701	16	500-630,560-670	213
64,098	92	16	56	9	69	65	211	585	23		
156,604	37	14	59	9	69	73	194	203	73	670-770,680-780	10
67,768	86	16	56	2	183	143	121	140	94	650-760,680-770	16
200,683	26	21	46	21	32	613	17	322	47	490-600,530-650	310
115,934	49	7	82	16	40	493	23	416	29	22-27	316
85,575	69	26	39	19	36	653	14	203	73	570-680,600-710	87
181,622	30	18	51	16	40	170	99	200	75	670-760,680-770	13
45,990	124	26	39	17	38	319	54	650	19	23-28	232
84,160	71	16	56	13	50	540	21	258	58	580-680,600-690	92
69,392	82	17	52	9	69	232	75	101	112	600-700,630-730	56
78,401	75	43	23	12	55	28	342	343	40		
84,436	70	8	73	6	96	101	158	350	39	670-740,670-740	20
142,313	40	2	125	1	266	0	653	547	24		
74,717	77	30	34	11	61	205	83	166	82	610-710,690-780	25
97,014	58	5	96	7	86	192	88	156	89	21-26	463
51,259	110	52	21	16	40	310	57	232	63	530-650,550-670	178

The Top American Research Universities

Top American Research Universities (26-50)		Number of Measures in Top 26-50 Nationally	Research				Private	
			2006 Total Research x \$1000	2006 National Rank	2006 Federal Research x \$1000	2006 National Rank	2007 Endowment Assets x \$1000	2007 National Rank
Public	Georgia Institute of Technology	7	440,898	31	257,751	33	1,608,682	46
Public	University of Iowa	6	346,357	42	216,521	45	982,428	74
Public	University of Texas SW Medical Center - Dallas	6	333,237	44	196,621	52	1,434,560	49
Public	North Carolina State University	4	330,936	47	131,262	72	535,003	131
Private	Scripps Research Institute	4	367,375	38	268,533	29		
Private	University of Rochester	4	366,658	39	278,399	27	1,726,318	40
Public	Indiana University - Bloomington	3	142,002	105	68,254	117	924,420	80
Public	Rutgers - State University of NJ - New Brunswick	3	280,994	57	118,732	77	601,849	117
Public	Arizona State University - Tempe	2	201,955	82	109,893	84	478,385	141
Private	Mount Sinai School of Medicine	2	273,216	59	224,911	41		
Public	Oregon Health & Science University	2	272,174	60	223,204	43	446,634	148
Public	University of California - Irvine	2	300,229	52	169,983	59	226,738	247
Public	University of Georgia	2	323,843	49	92,652	101	705,316	97
Public	University of Illinois - Chicago	2	332,176	45	203,875	48	194,700	273
Public	University of Kentucky	2	323,958	48	151,238	65	957,608	78
Public	Univ. of Massachusetts Medical Sch - Worcester	2	191,659	85	136,141	71	66,541	490
Public	University of Utah	2	248,168	67	174,888	58	610,469	116
Public	Virginia Polytechnic Institute and State University	2	321,722	50	119,994	76	524,731	133
Private	Yeshiva University	2	189,416	88	153,785	62	1,409,576	50
Private	Brandeis University	1	57,017	167	41,184	156	691,370	101
Private	Cornell University Weill Medical College	1	204,923	81	136,766	70	976,452	75
Public	Florida State University	1	185,633	90	110,358	83	548,994	128
Private	Georgetown University	1	118,558	118	92,268	102	1,059,343	70
Public	Stony Brook University	1	234,635	72	112,973	82	104,574	389
Public	Temple University	1	79,736	142	50,904	135	236,712	236
Public	University at Buffalo	1	297,909	53	153,152	64	566,362	123
Public	University of Colorado Health Sciences Center	1	258,030	62	221,214	44	295,360	205
Public	University of Hawaii - Manoa	1	249,635	66	202,419	50	231,065	245
Public	University of Maryland - Baltimore	1	405,260	34	186,160	54	197,731	272
Private	University of Miami	1	213,516	78	150,408	66	741,382	92
Public	University of Tennessee - Knoxville	1	240,379	70	113,559	81	742,541	91

Appendix A

The Top American Research Universities

Support		Faculty			Advanced Training				Undergraduate		
2007 Annual Giving x \$1000	2007 National Rank	2007 National Academy Members	2007 National Rank	2007 Faculty Awards	2007 National Rank	2007 Doctorates Granted	2007 National Rank	2006 Post Docs	2006 National Rank	2006 SAT Range (V; Q) or ACT Range	2006 National Rank
119,455	48	30	34	16	40	459	29	208	70	590-680,640-720	68
115,484	50	21	46	12	55	376	39	328	46	23-27	283
166,326	34	36	28	20	33	84	179	482	27		
162,352	35	17	52	10	64	411	31	337	44	530-620,560-660	211
		25	42	13	50						
80,943	73	27	38	12	55	239	73	290	54	600-700,630-720	57
169,639	32	10	68	17	38	370	41	163	84	490-610,510-630	357
88,336	65	35	30	14	49	406	33	161	86	520-630,560-680	187
104,011	54	17	52	13	50	376	39	94	119	480-600,490-620	458
		11	66	6	96	24	362	387	35		
		6	86	13	50	41	275	130	98		
74,237	78	34	31	20	33	298	59	297	52	530-630,570-670	178
88,434	64	8	73	10	64	388	37	226	64	560-660,570-670	132
45,465	129	6	86	10	64	317	55	236	61	21-26	463
55,014	105	2	125	12	55	292	63	338	42	22-27	316
		3	112	15	47	35	304	303	50		
		17	52	13	50	345	51	338	42	21-27	388
81,601	72	14	59	12	55	356	46	181	79	530-630,570-660	187
		13	61	8	75	128	134	363	38	540-670,550-670	158
86,297	66	11	66	4	130	93	168	100	113	630-720,640-720	44
122,078	46	10	68	8	75	41	275	276	55		
56,975	100	7	82	11	61	350	47	252	59	530-620,540-630	269
105,425	53	5	96	9	69	99	163	170	81	640-750,650-740	30
25,224	199	12	63	5	109	364	42	91	120	510-610,570-670	213
48,085	116	0	202	5	109	392	36	76	128	490-590,500-600	463
26,899	187	6	86	5	109	394	35	295	53	510-600,540-640	304
49,439	113	13	61	7	86	163	105	200	75		
39,436	136	8	73	4	130	149	116	98	115	480-580,520-620	448
46,157	123	8	73	9	69	128	134	119	101		
180,026	31	6	86	1	266	187	91	236	61	580-670,600-690	95
85,868	68	3	112	7	86	347	49	134	97	23-28	232

Appendix A

The Top American Research Universities									
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Top Private Research Universities (1-25)			Research				Private		
Institutions in Order of Top 25 Score, then Top 26-50 Score, then Alphabetically		Number of Measures in Top 25 Control	Number of Measures in Top 26-50 Control	2006 Total Research x \$1000	2006 Control Rank	2006 Federal Research x \$1000	2006 Control Rank	2007 Endowment Assets x \$1000	2007 Control Rank
Private	Columbia University	9	0	529,945	7	451,187	5	7,149,803	6
Private	Duke University	9	0	657,080	4	414,419	6	5,910,280	11
Private	Harvard University	9	0	453,156	10	403,458	8	34,634,906	1
Private	Massachusetts Institute of Technology	9	0	600,748	5	476,362	4	9,980,410	5
Private	Northwestern University	9	0	419,985	13	249,980	19	6,503,292	8
Private	Stanford University	9	0	679,196	2	540,069	2	17,164,836	3
Private	University of Chicago	9	0	305,301	19	253,471	17	6,204,189	9
Private	University of Pennsylvania	9	0	676,052	3	478,773	3	6,635,187	7
Private	Washington University in St. Louis	9	0	547,674	6	408,402	7	5,567,843	12
Private	Yale University	9	0	460,075	9	348,500	9	22,530,200	2
Private	California Institute of Technology	8	1	270,269	22	248,591	20	1,860,052	24
Private	Cornell University	8	1	443,879	12	253,277	18	4,448,281	15
Private	Emory University	8	1	345,989	18	267,894	16	5,561,743	13
Private	Johns Hopkins University	8	1	1,499,977	1	1,307,453	1	2,800,377	19
Private	Vanderbilt University	8	1	376,893	14	300,423	12	3,487,500	18
Private	New York University	8	0	284,164	20	189,276	23	2,161,800	21
Private	Princeton University	7	2	188,165	30	117,845	30	15,787,200	4
Private	University of Southern California	7	2	450,173	11	333,378	10	3,715,272	17
Private	University of Rochester	6	2	366,658	17	278,399	14	1,726,318	27
Private	Brown University	5	4	157,926	32	96,922	33	2,780,798	20
Private	Boston University	5	3	255,615	23	238,560	21	1,101,386	45
Private	Case Western Reserve University	5	3	369,264	15	306,980	11	1,841,234	25
Private	Rockefeller University	5	2	215,417	24	93,742	35	2,145,203	22
Private	Carnegie Mellon University	4	5	212,506	26	185,389	24	1,115,740	42
Private	University of Notre Dame	4	4	78,553	42	55,710	42	5,976,973	10
Private	Baylor College of Medicine	4	3	462,375	8	287,679	13	1,278,011	38
Private	Scripps Research Institute	4	0	367,375	16	268,533	15		
Private	Dartmouth College	3	5	200,277	28	140,430	27	3,760,234	16
Private	Rice University	3	5	66,564	45	53,880	43	4,669,544	14
Private	Mount Sinai School of Medicine	3	2	273,216	21	224,911	22		
Private	Tufts University	2	6	128,965	34	95,964	34	1,452,058	33
Private	Yeshiva University	2	5	189,416	29	153,785	25	1,409,576	35
Private	Cornell University Weill Medical College	2	4	204,923	27	136,766	29	976,452	52
Private	University of Miami	2	4	213,516	25	150,408	26	741,382	61
Private	Georgetown University	1	7	118,558	36	92,268	36	1,059,343	48
Private	George Washington University	1	6	113,982	38	75,209	39	1,147,451	41

Appendix A

The Top American Research Universities

Support		Faculty			Advanced Training				Undergraduate		
2007 Annual Giving x \$1000	2007 Control Rank	2007 National Academy Members	2007 Control Rank	2007 Faculty Awards	2007 Control Rank	2007 Doctorates Granted	2007 Control Rank	2006 Post Docs	2006 Control Rank	2006 SAT Range (V; Q) or ACT Range	2006 Control Rank
423,849	5	101	6	35	6	568	6	807	7	670-760,670-780	13
372,328	8	54	11	30	12	277	19	771	8	690-770,690-790	6
613,985	2	284	1	78	1	683	4	4,286	1	690-800,700-790	3
329,158	9	239	3	36	5	601	5	971	5	660-760,720-800	6
187,926	15	39	15	34	7	462	10	318	22	650-740,670-760	20
832,345	1	264	2	44	3	720	2	1,405	2	660-760,680-780	13
328,328	10	52	12	26	13	357	15	312	23	690-780,680-780	9
392,421	6	88	8	23	15	483	9	817	6	620-720,680-770	25
158,213	19	43	13	33	9	347	16	411	13	670-750,700-780	10
391,315	7	106	5	42	4	360	14	978	4	700-790,700-790	3
183,257	16	107	4	20	17	206	26	493	12	690-770,780-800	1
284,848	12	63	10	32	11	485	8	405	14	620-730,660-760	32
156,108	21	23	21	12	22	217	25	605	9	640-730,660-740	32
430,455	4	85	9	50	2	397	12	1,329	3	620-730,650-760	35
137,273	22	20	22	25	14	274	21	505	11	630-720,650-740	40
287,587	11	39	15	33	9	364	13	329	21	600-700,610-710	64
230,572	13	101	6	34	7	332	17	340	20	680-800,690-790	5
469,647	3	38	17	22	16	691	3	266	26	630-720,650-740	40
80,943	30	27	19	12	22	239	23	290	24	600-700,630-720	54
181,622	17	18	23	16	18	170	31	200	30	670-760,680-770	13
84,160	29	16	25	13	20	540	7	258	27	580-680,600-690	81
69,392	33	17	24	9	26	232	24	101	38	600-700,630-730	53
78,401	31	43	13	12	22	28	159	343	19		
74,717	32	30	18	11	25	205	27	166	32	610-710,690-780	25
207,641	14	2	52	16	18	159	36	144	35	630-740,660-760	25
64,098	42	16	25	9	26	65	84	585	10		
		25	20	13	20						
156,604	20	14	28	9	26	73	75	203	29	670-770,680-780	10
67,768	37	16	25	2	57	143	42	140	36	650-760,680-770	16
		11	31	6	34	24	173	387	15		
84,436	28	8	35	6	34	101	59	350	18	670-740,670-740	20
		13	29	8	30	128	49	363	17	540-670,550-670	128
122,078	23	10	33	8	30	41	112	276	25		
180,026	18	6	38	1	90	187	29	236	28	580-670,600-690	83
105,425	25	5	40	9	26	99	61	170	31	640-750,650-740	30
59,313	43	6	38	8	30	264	22	19	60	600-700,600-690	70

The Top American Research Universities

Top Private Research Universities (26-50)		Research				Private		
Institutions in Order of Top 26-50 Score, then Alphabetically		Number of Measures in Top 26-50 Control	2006 Total Research x \$1000	2006 Control Rank	2006 Federal Research x \$1000	2006 Control Rank	2007 Endowment Assets x \$1000	2007 Control Rank
Private	Tulane University	8	114,397	37	84,052	37	1,009,129	50
Private	Brandeis University	7	57,017	47	41,184	48	691,370	69
Private	Rensselaer Polytechnic Institute	7	70,576	43	44,690	46	812,996	59
Private	Wake Forest University	6	183,129	31	139,549	28	1,248,695	39
Private	Drexel University	5	96,687	40	68,499	40	628,467	78
Private	Saint Louis University - St. Louis	4	48,133	48	45,183	44	959,486	53
Private	Thomas Jefferson University	4	106,986	39	82,551	38	614,338	80
Private	Woods Hole Oceanographic Institution	4	121,888	35	101,631	31	383,400	103
Private	Medical College of Wisconsin	3	147,140	33	100,128	32	507,065	89
Private	Rush University	3	83,194	41	45,044	45	443,497	95
Private	Charles R. Drew Univ. of Medicine and Science	2	47,188	49	44,394	47		
Private	University of Dayton	2	69,080	44	56,779	41	410,355	98

Appendix B

ALA Library Fact Sheet No. 22

ALA Library Fact Sheet 22 - The Nation's Largest Libraries



<http://www.ala.org/ala/professionalresources/libfactsheets/alalibraryfactsheet22.cfm>
ALA Library Fact Sheet tallying the 100 largest libraries in the United States, in order by size of each library's collection.

The Nation's Largest Libraries: A Listing By Volumes Held

ALA Library Fact Sheet Number 22

This fact sheet lists the top 100 largest libraries in the United States by volumes held.

Number	Source	Institution	Volumes Held
1	L	Library of Congress	32,332,832
2	A	Harvard University	15,965,675
3	P	Boston Public Library	15,760,879
4	A	Yale University	12,283,594
5	A	University of California - Berkeley	10,725,334
6	A	University of Illinois - Urbana-Champaign	10,712,706
7	A	Columbia University	10,004,848
8	A	University of Texas - Austin	9,323,252
9	P	Public Library of Cincinnati & Hamilton County	9,154,039
10	S	Stanford University	8,500,000
11	A	University of Michigan	8,414,070
12	A	University of California - Los Angeles	8,272,112
13	A	Cornell University	7,999,177
14	A	University of Chicago	7,926,905
15	A	University of Wisconsin - Madison	7,916,419
16	P	County of Los Angeles Public Library	7,838,277
17	A	Indiana University	7,553,823
18	P	Detroit Public Library	7,459,353
19	A	University of Washington	7,304,234
20	A	University of Minnesota	6,867,777
21	A	Princeton University	6,778,675
22	P	Queens Borough Public Library	6,488,198
23	P	Free Library of Philadelphia	6,410,841
24	P	Los Angeles Public Library	6,285,760
25	A	Ohio State University	6,244,095
26	A	University of North Carolina - Chapel Hill	6,154,365
27	A	University of Pennsylvania	5,994,465
28	P	Chicago Public Library	5,891,306
29	A	Duke University	5,872,136
30	A	University of Arizona	5,632,559
31	A	University of Virginia	5,465,077
32	A	Pennsylvania State University	5,220,080

33	P	New York Public Library	5,169,953
34	P	Brooklyn Public Library	5,120,690
35	A	University of Pittsburgh	5,116,305
36	A	University of Oklahoma	5,047,646
37	A	New York University	4,946,277
38	A	Michigan State University	4,915,621
39	A	Northwestern University	4,768,588
40	A	University of Iowa	4,765,690
41	P	Dallas Public Library	4,609,883
42	A	University of Georgia	4,559,220
43	P	Cleveland Public Library	4,552,843
44	A	Rutgers University	4,462,249
45	A	Arizona State University	4,342,425
46	A	University of Florida	4,229,717
47	A	University of Kansas	4,210,639
48	A	Washington University - St. Louis	4,162,980
49	A	University of Southern California	4,039,228
50	A	Brigham Young University	3,908,127
51	A	North Carolina State University	3,857,365
52	A	University of Colorado	3,843,458
53	P	Houston Public Library	3,834,967
54	P	King County Library System	3,767,233
55	A	Texas A&M University	3,739,081
56	A	Johns Hopkins University	3,726,532
57	A	Brown University	3,720,244
58	A	University of Rochester	3,672,976
59	A	State University of New York - Buffalo	3,655,089
60	A	University of Connecticut	3,637,190
61	P	Hawaii State Public Library System	3,627,769
62	A	University of Maryland	3,623,376
63	A	University of California - Davis	3,599,983
64	A	University of South Carolina	3,579,504
65	A	Louisiana State University	3,548,726
66	P	Mid-Continent Public Library	3,537,916
67	A	University of Kentucky	3,537,710
68	A	University of Massachusetts	3,529,419
69	P	Miami-Dade Public Library System	3,516,466
70	A	University of Hawaii	3,486,937
71	A	Wayne State University	3,458,773
72	A	University of Missouri - Columbia	3,454,585
73	A	Florida State University	3,442,420
74	P	San Diego Public Library	3,428,594
75	A	University of Cincinnati	3,418,599
76	P	Montgomery County Dept. of Public Libraries	3,397,660
77	P	St. Louis Public Library	3,367,334
78	A	University of California - San Diego	3,360,442
79	A	University of Notre Dame	3,322,395
80	A	University of Utah	3,320,167
81	A	Vanderbilt University	3,311,665
82	P	Buffalo & Erie County Public Library	3,304,567
83	A	Emory University	3,298,971
84	P	Broward County Libraries Division	3,289,920

85	A	University of Tennessee - Knoxville	3,251,893
86	A	University of Miami	3,227,943
87	P	Cuyahoga County Public Library	3,182,260
88	A	University of Nebraska - Lincoln	3,171,134
89	P	Allen County Public Library	3,170,395
90	A	Syracuse University	3,160,240
<hr/>			
91	A	Temple University	3,137,142
92	A	Tulane University	3,106,645
93	A	Southern Illinois University - Carbondale	3,073,665
94	P	Jacksonville Public Library	3,065,817
95	A	Auburn University	3,016,986
96	A	Georgetown University	2,955,278
97	A	University of California - Santa Barbara	2,914,539
98	A	Ohio University	2,913,522
99	A	University of Oregon	2,905,608
100	A	Massachusetts Institute of Technology	2,847,680

Sources

L=Library of Congress - [Annual Report, FY 2007: Facts at a Glance](#). Member of ARL (Association of Research Libraries <<http://www.arl.org>>).

A=[ARL Statistics 2006-07](#).

P=*Public Library Data Service Statistical Report 2008*. Chicago: Public Library Association (PLA, a division of the American Library Association <<http://www.ala.org/pla>>), 2008. See the [PLDS Statistical Report](#) web page for more information.

S=[Stanford Facts: Libraries & Computing](#). Former member of ARL.

Users should be aware that public library and academic library collections are dissimilar.

The ARL **academic library** study takes its definition of **volume** from the [National Information Standards Organization](#) (NISO): A single physical unit of any printed, typewritten, handwritten, mimeographed, or processed work, distinguished from other units by a separate binding, encasement, portfolio, or other clear distinction, which has been **cataloged, classified, and made ready for use**, and which is typically the unit used to charge circulation transactions.

The PLDS **public library** report defines "holdings" on its questionnaire: For the purpose of this data service, holdings will be defined as the number of cataloged items (number of items, **NOT** number of titles) plus paperbacks and videocassettes even if uncataloged.

NOTE: Previous versions of this fact sheet can be accessed via the [Internet Archive Wayback Machine](#) using the *original URL* <<http://www.ala.org/library/fact22.html>>. And this URL *still works* as a "shortcut" link to this web page.

Last updated: May 2009

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Appendix C

Nielsenwire -Americans Watching More TV Than Ever

Monthly Time Spent in Hours:Minutes Per User 2+				
	1Q09	4Q08	1Q08	% Diff Yr to Yr (1Q09 to 1Q08)
Watching TV in the home*	153:27	151:03	150:38	1.9%
Watching Timeshifted TV*	8:13	7:11	5:52	40.1%
Using the Internet**	29:15	27:04	27:57	4.6%
Watching Video on Internet**	3:00	2:53	1:57	53.2%
Mobile Subscribers Watching Video on a Mobile Phone^	3:37	3:42	n/a	n/a

Source: The Nielsen Company

[2]

Overall Usage Number of Users 2+ (in 000's) – Monthly Reach				
	1Q09	4Q08	1Q08	% Diff Yr to Yr
Watching TV in the home°	284,574	285,313	281,106	1.2%
Watching Timeshifted TV°	79,533	73,934	57,934	37.3%
Using the Internet**	163,110	161,525	158,002	3.2%
Watching Video on Internet**	131,102	123,195	115,970	13.0%
Using a Mobile Phone^	230,436	228,920	219,619	4.9%
Mobile Subscribers Watching Video on a Mobile Phone^	13,419	11,198	8,817	52.2%

Source: The Nielsen Company

[3]

More Time Watching All Screens

In addition, Nielsen data shows that consumers' time with TV, Internet and Mobile video continues to increase across the board. Online video grew 13% in Q1 2009, driven by both strong brand marketing and large media events including the [Presidential inauguration](#) [4], the [Super Bowl](#) [5] and [March Madness](#) [6]. With broadband levels increasing in the U.S., online video audiences will continue to grow as consumers begin to upgrade their PCs to support increased video consumption. Mobile video viewing has grown a significant 52% from the previous year, up to 13.4 million Americans. Much of this growth continues to come from increased mobile content and the rise of the mobile web as a viewing option.

Out of all different age groups, 18-24 year olds show signs of watching DVR and online video the same amount of time – timeshifting 5 hrs, 47 minutes per month, and watching video online 5 hrs, 3 minutes each month.

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