Libraries
University of Missouri

ELLIS LIBRARY

FEASIBILITY STUDY FOR SPACE CONSOLIDATION

FINAL REPORT

CP202401 | February 11, 2021

PGAVARCHITECTS

TABLE OF CONTENTS

SECTION **1**

Introduction

SECTION 1 INTRODUCTION

PROJECT DESCRIPTION & SCOPE

In 2019, the University of Missouri worked with Shepley Bulfinch to complete a master plan to re-envision Ellis Library as a 21st Century library in support of its role as the intellectual crossroads of the University and to meet the needs of students both today and in the future.

The master plan developed a preferred planning scenario and identified key components to modernize the library. Key elements included a single service desk for library patrons and the consolidation of Special Collections and University Archives in a visible location with appropriate environmental conditions.
In 2020, PGAV Architects was engaged to perform feasibility studies for the Central Service Desk and collocated Special Collections and University Archives. The design team's scope of work may also include maintaining and updating the master plan and providing basic services for master plan implementation through 2025. This report summarizes the feasibility studies for the service desk relocation and consolidation of Special Collections, University Archives and the Digital Services Department.

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SECTION **2**

Project Vision and Goals

GOALS FOR PROJECT UNDERWAY

To provide context for the feasibility studies for the Central Service Desk and Special Collections and University Archives consolidation, the Library articulated goals and considerations for the master plan update process, the feasibility studies, and master plan implementation through 2025.

Master Plan Update Process

The master planning effort focused on developing a plan for Ellis Library to locate library units in a coherent way to improve adjacencies and workflows without much consideration of existing building systems and constraints. The preferred concept was described as a "Cultural Nexus", reconfiguring the First Level to connect a range of activities including a centrally located library services desk and a new Special Collections and University Archives suite that would become a focal point of the plan. The Library has identified both elements as important space planning drivers that will help inform next steps for the master plan.

ARCHIVAL AND SPECIAL COLLECTIONS CONSOLIDATION

The master plan proposes to collocate Special Collections and University Archives in the northwest corner of the library (1935 building) and to use of the lower four levels of the west stack for storage of both groups' collections. The collocation supports several goals including providing a more visible location for Special Collections and University Archives, and creating a permanent home for University Archives at Ellis Library by vacating their current space in Lewis Hall. Digital Services is a third unit that is closely associated with, and would ideally be collocated with, Special Collections and University Archives.

The Library would like to determine the feasibility of retrofitting the west stack to create the appropriate environmental conditions for collections storage and preservation; and to confirm the future space program for Special Collections, University Archives, and Digital Services can be accommodated in the location proposed in the master plan. The Library has noted it is not committed to this location and is open to studying other options.

CENTRAL SERVICE DESK

The location of the central service desk is key to determining the location of other library services from a planning perspective. The master plan recommends consolidating patron services currently on the Ground and First Levels into a centralized location to improve visibility and wayfinding on the First Level. Two potential locations have been studied by Campus Planning—one at the center of the First Level with a desk positioned within the colonnade, and a second directly south of the north entrance at the west end of the James B. Nutter Information Commons.

The Library would like to further explore both these options, as well as any others that improve visibility, wayfinding, and library operations.

ADDITIONAL CONSIDERATIONS

South Addition: The master plan proposed an addition south of the existing Library. The Library noted apparent limitations of the existing facility, and acknowledged that an addition may be needed to create new space appropriate for the archival storage of collections. The University's strong preference would be a renovation strategy, with a new construction strategy only considered if renovations for archival storage are determined to be infeasible.

Ground Level: Since completion of the master plan in 2019, changes in University priorities include abandoning the plan for a "One Stop Shop" for Student Success and Services on the Ground Level. The University also clarified that the Ground Level space vacated by the State Historical Society is not controlled by the Library, and the University is exploring other uses based on its strategic initiative to consolidate space across campus and remove 750,000 SF by 2023.

Feasibility Studies

Feasibility studies are being conducted to continue the process of rethinking the Library's spaces, and the outcome should continue to refine the master plan process, laying the groundwork for project implementation that will address short term and long term space needs within Ellis Library.

The studies will develop a facilities-based understanding and initial assessment of existing building system needs and constraints, accessibility, and code upgrades needed. The success of the studies lies in not only addressing the infrastructure challenges, but also in developing a solution that feasibly anticipates, fits within, and ideally, facilitates implementation of the entire master plan vision for Ellis Library over time.

The Library has noted it is searching for its future Vice Provost/University Librarian, and the feasibility studies will show continued progress to modernize the library and provide a solid foundation for facility improvements moving forward.

Master Plan Implementation Through 2025

The Library noted the following considerations for master plan implementation:

- Library is working toward accommodating operational changes including trend toward digitization / digital services and opportunity to digitize materials at the UMLD.
- Library recognizes that changes to its organization may be needed based on trends in the profession that will inform spatial organization. These conversations have begun at the departmental head level.
- Library noted they must resist the urge to plan for 2020 needs, but must rather plan for 2025 needs and beyond. Flexibility will be essential for adapting spaces to changing needs over time.
- The campus is actively engaged in space planning issues, synergies, and is enabling other projects; University Libraries Student Advisory Council (ULSAC) has been engaged in a comprehensive planning process.
- Library would like to develop a strategic approach to solving physical problems, embracing a more long-term mindset.
- Library acknowledged challenges with construction to the building and operational disruption that will occur during construction.
- A project is currently underway to improve the building envelope and includes window replacement and masonry restoration / cleaning on the 1914 and 1935 buildings. Library noted desire to do similar restoration on the other parts of the building.

MASTER PLAN GOALS

The master plan articulated a set of goals for space allocation which has been refined in the planning sessions for the feasibility studies as follows:

- Increase number of patron seats by 1,000, a 43% increase of total seats in Ellis Library.
- Plan reconfigurable teaching / learning spaces to allow spacesspaces to double as study seats when classes are not in session, and adaptable to expand into an event space.
- Relocate portion of collection to the off-site storage facility.
- Consolidate Special Collections, University Archives, and Digital Services by bringing staff and prominent collections into the Library. Plan for future growth of Special Collections and University Archives.
- Develop flexible areas to protect rotating, themed collections.
- Develop staff and faculty work environments that meet functional requirements with appropriate adjacencies.
- Plan for faculty touchdown space to foster interdisciplinary research and facilitate meetings with students.
- Develop planning strategies that do not preclude future South Addition, which would develop north / south link through the Library.
- Develop new east entrance at Ground Level to improve ADA access and open flow to and from the Auditorium.
- Reserve space vacated on Ground Level by the State Historical Society for another campus use.
- Accommodate receiving / staging functions near the loading dock.

The master plan identified the following components which are needed to modernize the Library:

- Single service desk
- Consolidate key services on single floor
- Increase seating capacity
- Digital media support
- Enhanced instructional spaces
- Upgraded technology
- Individual and group study spaces
- Event and exhibit space for community engagement
- Appropriate spaces for University Archives and Special Collections
- Climate control; and
- Improved spaces for digitization and digital scholarship

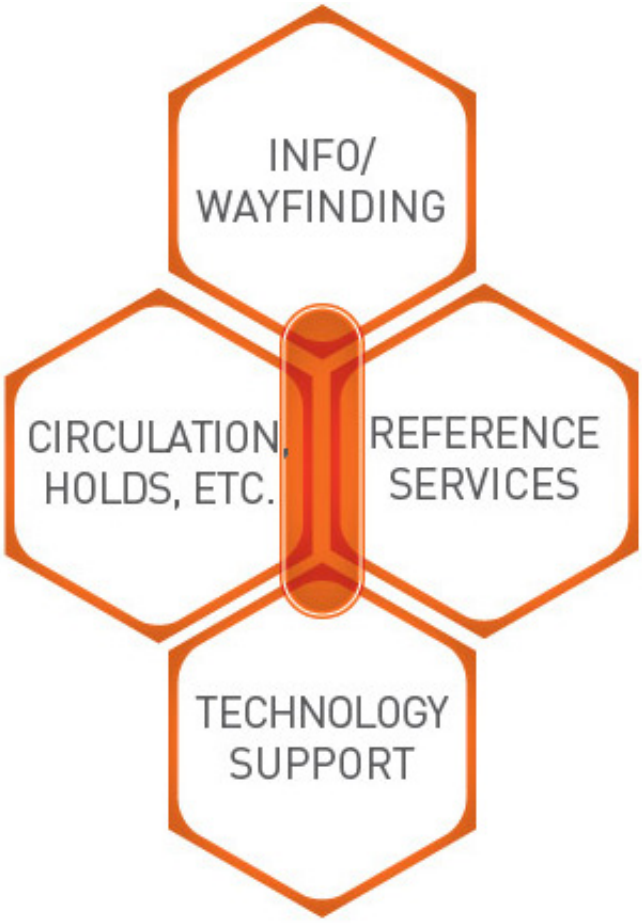
CENTRAL SERVICE DESK

The Central Service desk will consolidate the Main Circulation Desk and Library Circulation and Reference Services in a central location on the First Level of Ellis Library to:

- Improve visibility and wayfinding
- Facilitate new service delivery model
- Improve the patron experience
- Provide a flexible environment that can adapt to evolving services, including self-service options
- Vacate and better utilize existing space for improved daylight and views from north-facing windows

The desk will provide a single point of service to Library patrons including:

- Wayfinding help and assistance with basic questions like hours of operation, etc.
- Transactional services including Interlibrary Loan, Circulation, etc.
- Reference services which may require an appointment (referral), although basic reference conversations will take place at the desk
- Location for technology support services to assist students checking out devices or receiving tech support for Library equipment or devices they bring themselves



The desk will be planned to facilitate equipment loan in partnership with the School of Visual Studies, which may change in the future.

In the programming phase, the Library considered a broad spectrum of service models, exemplified by the Apple retail store on one end, which dissolves boundaries between the service provider and patron, and the traditional monolithic library desk on the other, that exudes permanence and helps anchor services, but can also be intimidating to students and create confusion when there are multiple points of service with varying services available. The Library operates within a continuum of change and concluded that they land somewhere in the middle, preferring a more progressive service desk model. The Library would like to see solutions for the service desk which are as flexible as possible.

SPECIAL COLLECTIONS, UNIVERSITY ARCHIVES AND DIGITAL SERVICES CONSOLIDATION

Key goals associated with the consolidation include:

- Greater visibility and accessibility for Special Collections and University Archives
- Shared Reading Room
- Provide recommended environmental conditions for collections
- Accommodate future growth in Special Collections and University Archives
- Opportunity for gallery space and views into closed stack area and Reading Room from the central circulation core
- Incorporate Digital Services which is organizationally in the same division as SC and UA
- Shared processing space and arrangement that allows for shared use of equipment

In the programming phase, the Library noted the following additional goals and considerations:

- Prominent location is important for these groups; Ground Floor location is an option as far as the Library is concerned
- Appropriate archival space for collections is the highest priority with staff spaces as a secondary concern
- Public Reading Room should be beautiful, functional, practical and inspiring; noted primary purpose for the space is to accommodate scholars working with collection materials
- Interest in having the instruction space on display and in making programming more visible
- Library would like to see collections space contiguous with staff space if possible
- Security is a top priority
- It will be important to accommodate receiving/staging functions near the loading dock
- Integration of rare book collections for Health Sciences and Veterinary Medicine

SECTION **3**

Special Collections, University Archives & Digital Services Consolidation

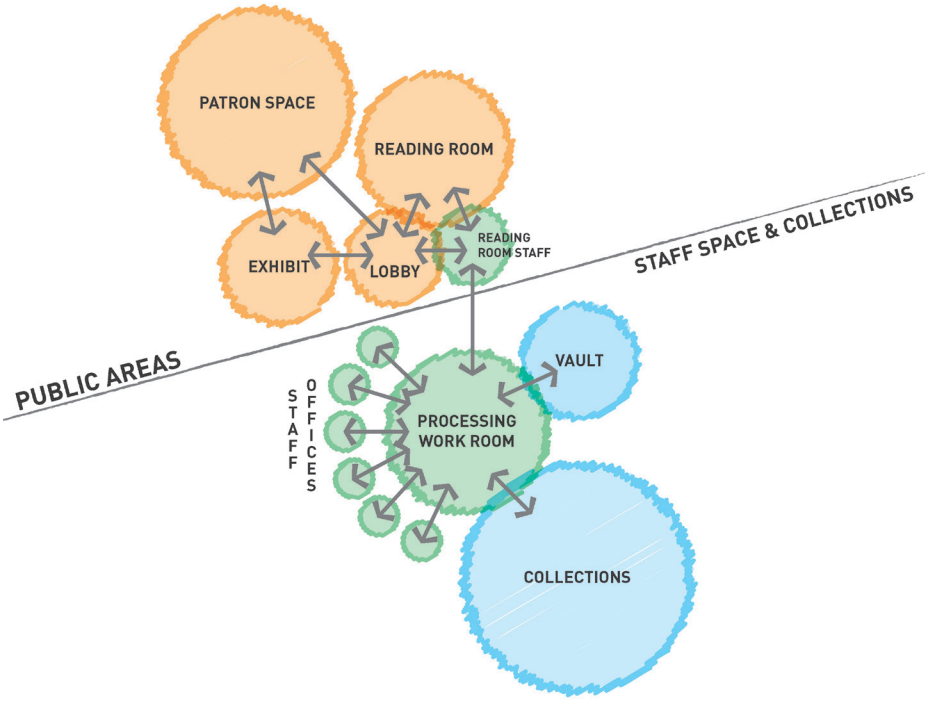
SECTION 3

SPECIAL COLLECTIONS, UNIVERSITY ARCHIVES & DIGITAL SERVICES CONSOLIDATION

CONCEPT OVERVIEW

The concept for the consolidation of Special Collections, University Archives and Digital Services locates these groups within a suite on the Second Level of the Library, utilizing contiguous space within the 1958, 1914 and 1935 buildings. This location provides several key advantages: good visibility and access; adjacency to and compatibility with the historic reading rooms; opportunities for dedicated event and exhibit space; ample daylight in both public and staff spaces; and contiguous space for secure movement of material including elevator access.

The suite is organized with patron space on the north side of the plan and staff/ services spaces and collection storage to the south. This organization is in response to the logic of the existing building floor plan and preferred flows for the public, staff, and movement of collection material through the staff zone only. The north / south organization provides a coherence for how the suite is navigated by the public and staff and defined by the primary circulation zone and need to maintain public access to the east stair for emergency egress.



In the public zone, transparency is an important concept to visually connect primary circulation with the Lobby/Exhibit space and Instructional space, and the Lobby/ Exhibit space with the public Reading Room. The axial relationship between the 1914 Grand Reading Room and the public Reading Room honors the formality and symmetry of the 1914 building.

The Library's goals for the public Reading Room include that the design be beautiful, functional, practical and inspiring. The room's primary purpose is to accommodate scholars working with collection material. The desk is positioned to provide good sightlines to the room entrance and research tables.

The prominent location of the instructional space allows it to be on display with the goal of making Library programming more visible. The instructional space is planned with flexible furnishings and includes an alcove for student cubbies and handwashing.

Planning has considered the use of the Second Level for events. The Grand Reading Room is well utilized for student study and its use for special events is limited to an annual cocktail party typically for 100-130 attendees. The new south lobby will provide needed pre-function space. The Library plans to use the Lobby/Exhibit and Instructional space more frequently for events with 30-40 attendees including guest lectures, exhibit openings, etc.

The public zone lies within the 1958 Building. This building was planned as collections stack space above the First Level, and the floor to floor height between Second and Third Levels is 10'-10". The limited clear height will require a creative design solution that effectively integrates overhead building systems and an inspirational ceiling and lighting design.

The public zone will have a high level of finish, and the Library prefers an architectural style which achieves a balance of classical and more contemporary design in keeping with the architecture of Ellis Library. Staff spaces will have a level of finish appropriate to functions.

PATRON SPACE

Key planning concepts include:

- Centrally located Lobby/Exhibit space accessed from primary circulation and the Grand Reading Room
- Prominent location for Instructional space with visibility from elevator lobby
- Northeast corner location for public Reading Room provides abundant daylight and campus views
- Circulation flow for staff delivering material to the public Reading Room and Instructional space is through staff areas only
- New study space extends the Lobby/Exhibit space to the south and east and provide exposure to the Library's special collections and other resources
- Views into collections space from Lobby allow for the collection to be on display
- Donor recognition opportunity visible to those arriving via stair or elevator

STAFF/SERVICES SPACE

Key planning concepts include:

- Staff offices at exterior walls provide daylight and views with the opportunity for borrowed light through interior glazing
- Open flexible processing space facilitates changing project work and adaptability of the space over time
- Flexible plan configuration for Digital Services' digitization lab includes provision to curtain off equipment requiring light control
- Layout provides direct access to main elevators, and entrances/exits at the east and west ends of the suite

In addition, two staff/service spaces are included on the Ground Level adjacent to the Loading Dock:

- Staging/Receiving and Processing space for Collections – Approximately 500 NSF assigned to Special Collections and University Archives
- Quarantine Room – Approximately 400 NSF for Library use including Special Collections and University Archives

COLLECTIONS

Collection storage areas include:

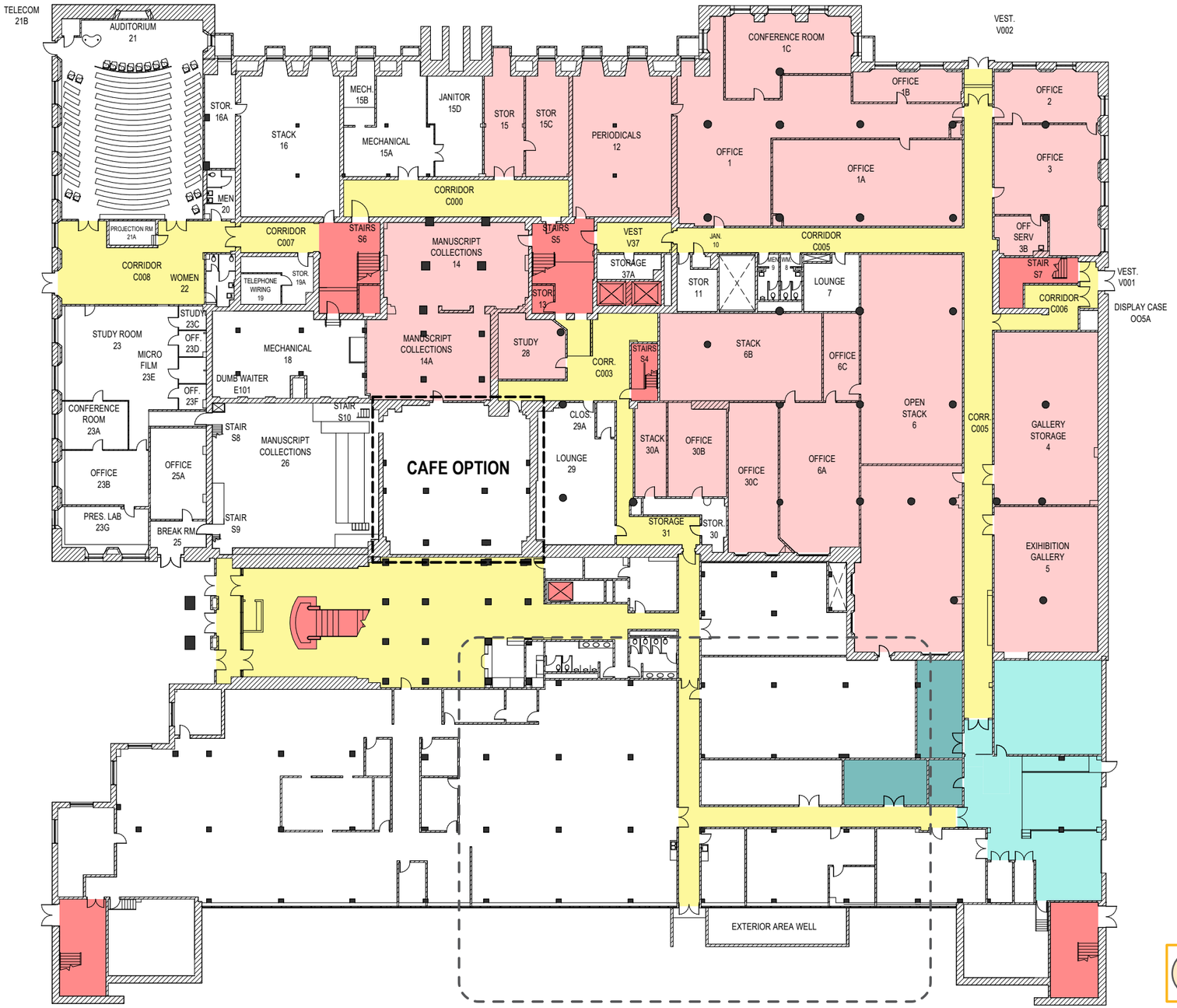
- Vault – For storage of irreplaceable material
- Collections Storage Room – Print material stored on static shelving
- Central Stack – Oversize graphic material and related collections, mainly map cases and flat files
- West Stack – Existing fixed shelving supported by closely spaced vertical posts integral to the building structure

Five levels of the west stack including Second Level are planned to be retrofitted to achieve a temperature and humidity-controlled environment suitable for the archival preservation needs of Special Collections and University Archives.

CONCEPT PLAN

CONCEPT PLAN SECOND LEVEL
SCALE: NTS

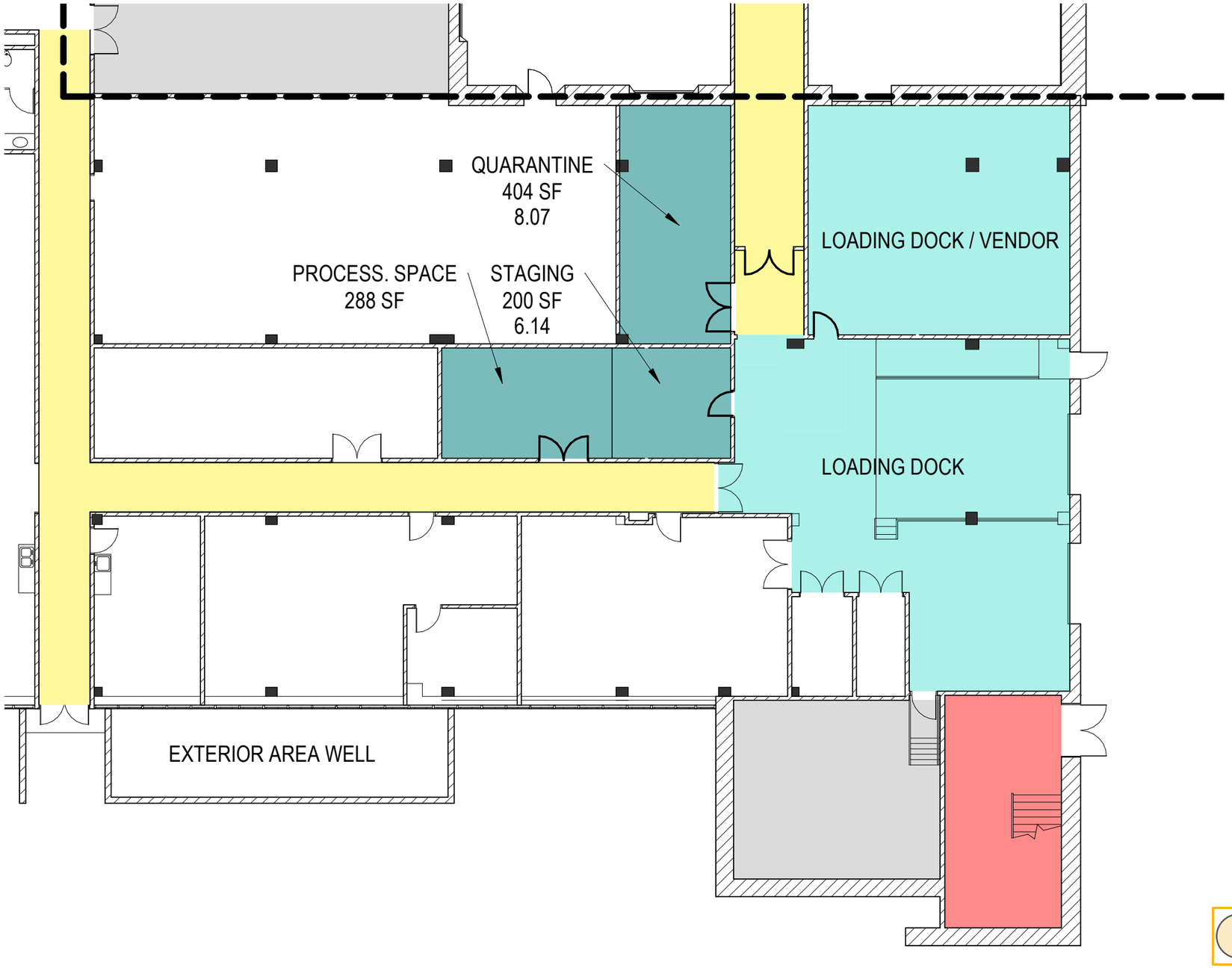
CONCEPT PLAN



- CIRCULATION
- STAFF
- MUSEUM
- NON-LIBRARY
- VERTICAL CIRCULATION

(SEE NEXT PAGE FOR ENLARGED PLAN)

CONCEPT PLAN GROUND LEVEL - KEY PLAN
SCALE: NTS



CIRCULATION
STAFF
MUSEUM
NON-LIBRARY
VERTICAL CIRCULATION

CONCEPT PLAN GROUND LEVEL - ENLARGED PLAN
SCALE: NTS

ARCHIVAL ENVIRONMENT RECOMMENDATIONS

RIT College of Art and Design | Image Permanence Institute

Preservation Consulting Interim Report

PROJECT:

Preservation Input on Ellis Library Planning and Design- Phase II

PREPARED FOR:

PGAV Architects (for the Ellis Library at the University of Missouri- Columbia

PREPARED BY:

Kelly M. Krish, Preventive Conservation Specialist
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DATE:

December 2, 2020

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Introduction

The materials in Special Collections are described as "primarily bound materials on paper. Bindings may incorporate leather, vellum, and/or cloth." This includes books, government documents, and oversized graphic materials (Sanborn and other maps, travel and WWI/WWII posters, prints, etc.). It also covers the University Archives, which, as is common practice, has many material types within its files; although these could be separated out in some instances, the decision to do so for the preservation of these materials will have to be balanced with how it will affect the organization and operation of the Archives. The vault stores works on parchment, photographic materials, and other works that are determined to be irreplaceable.

In order to ensure the preservation of these organic materials, a quality environment needs to be provided, focused on avoiding high temperatures and controlling relative humidity. Higher temperatures accelerate the rate of chemical deterioration in collection materials, causing color change and embrittlement. Lower temperatures generally slow degradation rates, aiding in preservation.

Inappropriate relative humidity (RH) can cause damage to collections in the following ways:

- High RH encourages mold germination, increased insect activity, metal corrosion, bleeding of colorants, and expansion of materials, as well as reinforcing the effects of other forms of deterioration.
- Low RH can cause materials to become desiccated and physically shrink.

Fluctuations in RH beyond what a material has previously experienced can lead to cracking or separation of layers, particularly if the object is composed of multiple materials that respond to moisture changes differently.

Dew point, a measure of the absolute amount of water in the air, determines what the relative humidity will be at a given temperature. Dew point can be changed by humidifying or dehumidifying the air; the extent to which the mechanical system is capable of doing so will determine indoor relative humidity levels. The lower the dew point a system can achieve, the more moisture it is capable of removing from outside air during high humidity seasons, resulting in lower relative humidity conditions.

Impact of environment

The effects of temperature, relative humidity and dew point on collection materials is quantified using IPI's time-weighed preservation index (TWPI), which measures how these environmental factors affect the rate of deterioration of organic materials. The TWPI provides a relative means of comparing the preservation quality between existing environments, and to proposed environmental changes. The lower the TWPI, the faster materials will deteriorate. Therefore, the goal is to increase the TWPI relative to the starting point at the beginning of a project.

Areas that are not conditioned for preservation typically have a TWPI around 40. The collection storage spaces in the Ellis Library currently have TWPIs of 47 to 52, due to high temperatures and low and fluctuating relative humidity (although high relative humidity levels are avoided with dehumidification); the exception is Room 401B, which has a TWPI of 73, its better preservation achieved through a lower temperature and lower dew point.

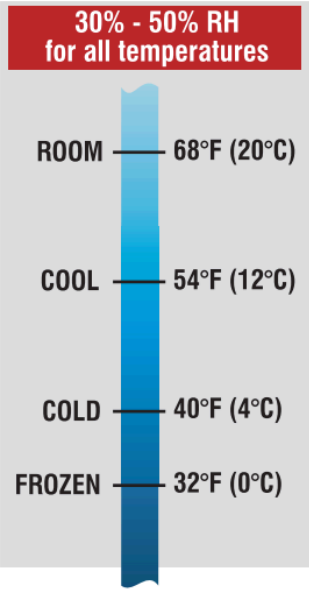
Dew point

Current environmental data indicates that most of the collection spaces achieve no lower than a 50°F dew point. This could be due to the chilled water supply- often for large complexes such as university campuses, the chilled water for the cooling coils comes from a main supply that is controlled to provide human comfort conditions,

which can be achieved with a 50°F dew point. If this is the same source of cooling to be provided, appropriate environmental conditions for preservation cannot be provided.

If dew point is a limiting factor, one way to determine summer set points is to start with the achievable dew point from the identified source of cooling. From there, lower the temperature until the relative humidity is about to exceed the desired range- this is the maximum preservation condition achievable. Ideally, if the dew point is low enough, the desired temperature may be reached before the relative humidity point is, allowing for cool or cold conditions with even lower risks of hydrolysis-related deterioration.

One of the spaces does already achieve a 42°F dew point, which indicates that a lower dew point is possible. It will be critical to install mechanical systems that are capable of achieving a low enough dew point that an appropriate combination of temperature and relative humidity can be provided. The alternative is to use a desiccant system, which keeps the temperature and relative humidity set points independent, as long as the parameters remain within the capabilities of the system.



Temperature

As stated previously, lower temperatures help slow chemical decay in organic materials. The categories of room, cool, cold, and frozen are defined by the anchor point temperatures seen at the left (for all temperatures, the relative humidity should be kept within a safe range of 30-50%RH).

However, the difference in preservation quality between them is not linear: preservation is generally greatly increased at lower temperatures. Tools such as Dew Point Calculator (www.dpcalc.org) can be used to estimate the preservation index (PI) achieved at each set point, which can then be balanced by cost and other factors to achieve the optimal conditions for the specific space.

There are two factors that also need to be taken into account, that can result in warmer temperatures than what might be determined by preservation alone:

1) Retrieval method- assuming that materials will be retrieved directly for researchers and that these spaces (like the Reading Room) will be conditioned to those typical for human comfort (70°F/50%RH/50°F DP), temperatures in Special Collection spaces cannot be lower than 50°F. This is because, in order to prevent condensation, set points should be such that the dew point temperature in spaces where the objects are being taken should always be below the temperature of the object being moved. The full range of allowable fluctuations (for example, +/- 2°F range) should be considered to prevent this risk.

If the spaces are intended to be lower than 50°F for preservation purposes, materials will need to be placed in a moisture-proof container or a temperature and relative humidity-controlled staging room will need to be used, both in conjunction with policies to allow time for equilibration before access.

For the purposes of this report, it is assumed that this is not the approach the University is interested in taking. However, if there are specific objects that would benefit from cold or frozen environments based on

material needs (as can be seen on the chart below), the total volume should be calculated to determine the best approach. For smaller volumes, freezers are the preferred approach; for larger ones, a walk-in vault would be more appropriate.

Storage Conditions	Glass Plates	Nitrate	Acetate		Polyester		Photo Prints		Ink Jet Prints	Magnetic Tape		CDs DVDs
			B&W	Color	B&W	Color	B&W	Color		Acetate	Polyester	
ROOM	Fair	No	No	No	Good	No	Good	No	Fair	No	No	Fair
COOL	Good	No	No	No	Good	No	Good	No	Fair	Fair	Good	Good
COLD	Very Good	Good	Good	Good	Very Good	Good	Very Good	Good	Good	Good	Good	Good
FROZEN	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Good	Good	No

NOTE: Degrading acetate and nitrate should be frozen. The ratings for ink jet prints reflect their susceptibility to pollutants and contaminants.

2) Access frequency- time out of storage can quickly undermine the preservation gains made at low temperatures. For example, the TWPI provided for objects with a storage environment of 50°F and 40%RH is reduced by 30% after just one month at human comfort conditions; after two months, the lifespan of the object has been reduced in half from what would be expected in storage conditions.

Therefore, if materials are likely to be accessed frequently, lower temperature storage may not be worth the associated energy costs since the preservation gains are minimized. With more regular access, 60°F is considered a good compromise.

Storage Conditions			Average number of days per year out of storage at 70°F/21°C & 50% RH							
T°C	T°F	RH%	No Days	2 Days	4 Days	7 Days	30 Days	60 Days	90 Days	120 Days
			Time in Years to Damage							
16	60	20	442	418	396	367	236	161	122	99
16	60	40	133	131	129	127	110	94	82	73
16	60	60	55	55	55	55	53	51	50	48
10	50	20	1110	962	849	721	335	198	140	108
10	50	40	295	284	275	261	190	140	111	92
10	50	60	115	114	113	111	99	86	77	69
4	40	20	2892	2051	1589	1188	405	218	149	113
4	40	40	677	620	572	513	285	180	132	104

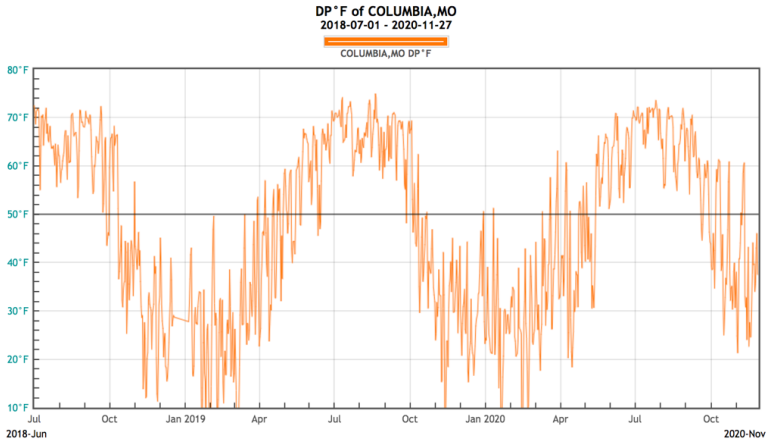
Relative humidity

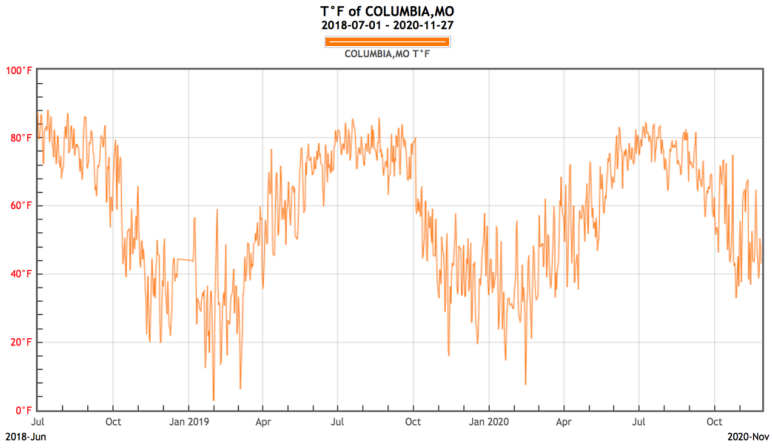
Research and field experience has suggested that 30-50%RH is an appropriate range for mixed collection types. However, the history of the collection must be taken into account- the concept of proofing states that any future pattern of fluctuations similar to a past pattern will likely not cause significant physical damage. Most of the collection spaces currently experience down to 16%RH in the winter, which means anything above 16%RH should prevent further mechanical damage. However, this does not apply to any new materials that are accessioned or post-conservation treatment of existing materials.

Sustainability

Outside climate

The outside climate is key to determining the energy costs associated with a set of environmental parameters. It provides the starting point for the air, which must then be conditioned through heating, cooling, dehumidification, and/or humidification to supply to the collection spaces. The climate of Columbia, Missouri is primarily at odds with meeting these preservation goals. Both cooling and dehumidification will be necessary from May to October at a minimum.





Building envelope

Modifications to the building envelope will be necessary to accommodate appropriate set points to the collections environments. Without appropriate insulation and vapor barriers, conditions will be difficult to maintain and the building structure could be damaged. The space should be insulated enough to allow conditions to be maintained during standard power outages and ideally 8 to 12 hours, as this would allow the Library to implement regular mechanical system shutdowns of typical lengths.

This includes sufficient sealing anywhere the envelope is punctured (as where wire, pipe, duct, etc. Passes through), and full blockage of existing windows. Doors should also be well-fitted and equipped with sweeps to both maintain conditions as well as to prevent pest infiltration.

If the building envelope cannot be modified, one option may be box-in-box construction, whereby a new envelope is built within the existing interior. This allows the new space to contain the appropriate features and operate independently of the needs of the historic envelope.

Mechanical system

While the local outside climate means that work must be done to create desired conditions for collections, with appropriate modifications to the building envelope to be able to maintain conditions and a mechanical system that can employ energy-saving components and strategies, sustainability efforts can be supported.

Seasonal set points

Further recommendations on components and strategies can be provided if requested (or see *IPI's Methodology for: Implementing Sustainable Energy-Saving Strategies in collections environments*), but one is particularly relevant to the current topic of environmental conditions- seasonal set points. This utilizes set point changes as a way to create the most efficient and beneficial preservation environment on a seasonal basis. Mechanical systems that have traditionally maintained constant set point conditions throughout the year may be missing opportunities to both reduce energy consumption and improve preservation conditions.

In the summer, temperatures and relative humidity levels may be slightly higher to reduce energy consumption on dehumidification with minimal impact on the overall preservation risk. In winter, the intention is to use less heating on the supply air to produce a cooler temperature in support of preservation.

	Lower temperature	**Raise temperature**
Summer	Slower rates of chemical decay Higher energy costs	Higher rates of chemical decay Lower energy costs
Winter	Slower rates of chemical decay Lower energy costs	Higher rates of chemical decay Higher energy costs

Combining these factors, the following set points are proposed for the University's consideration:

- Winter (approximately October-May): 55-60°F/25-30%RH (TWPI: 145-219)
- Summer (approximately May-October): 60-65°F/45-50%RH/41-46°F DP (TWPI: 56-95)

IPI's recommendation would be to design for the lower end of conditions, and allow for operation at any point across the range: this allows for the most flexibility for the institution to balance preservation and sustainability concerns. If the Library uses the lower end of conditions (55°F in winter, 60°F in summer), the TWPIs will range from 95 to 219, likely giving a yearly average of around 120. Again, existing spaces offer a TWPI of 47 to 73, which means that the new spaces will roughly increasing the lifespan of the collections by 40-60%.

In the current renovation plans for the Library, there will be three collection spaces and one collections vault. This means that it may be desirable to provide the lower but more energy-intensive temperatures for the vault space, and the higher but less energy-intensive temperatures for the other three collection spaces.

The creation of appropriate set points for collections storage spaces is complicated, and grounded in institutional discussions about balancing priorities of preservation, accessibility, and energy-savings. It is therefore recommended that further meetings address this issue in more depth and that it be re-examined once the spaces are operational through preservation commissioning and the use of small changes to optimize the new preservation environments.

Further recommendations

The following recommendations for components and design of the mechanical system are also proposed for consideration to the project team:

- The mechanical system should be connected to a BMS (Building Management System) to allow for sustainable environmental management.
    - It is ideal for University staff to have access to the system, rather than relying exclusively on an outside contractor to monitor.
    - Sensor locations within rooms should be studied to make sure they are well located with respect to collections.
    - Once installed, programming should be carefully considered and close monitoring should verify that the system is operating optimally under different conditions.
- The mechanical system should use the minimal amount of outside air necessary. The outside air intake should be located away from sources of traffic exhaust, staff smoking areas, and other possible sources of pollutants.
- Air filtration of at least MERV 13 is recommended. This level has been demonstrated to provide a balance between effective filtration and associated costs. It also corresponds with current ASHRAE advice for COVID-19, indicating that it would help the Library meet future mitigation recommendations.
    - This can be paired with a more coarse filter to reduce the rate of replacement for the MERV 13 filter, if high amounts of pollutants are expected.
- Supply fans should be equipped with VFDs (variable fan drives) to allow for fan speeds to be reduced when there is less need. This is demonstrated by the affinity law, which states that reducing fan sped results in an even greater reduction in horsepower.
    - Fan banks can also take advantage of the affinity law.
- Downstream equipment should be minimized since it is more efficient to perform work in one location and it reduces the amount of maintenance to be performed.

- The location of supply and return vents should be spaced to pull air across the room and prevent microclimates. Since compact storage is being considered for these spaces, it will be important to ensure that neither supply nor return vents are blocked, regardless of which shelves are open or closed.
- The collection spaces would benefit from a closed circuit, whereby air from dedicated air handler(s) is sent only to the collection spaces, and returned directly to the same air handler(s), rather than sharing duct lines with spaces with other environmental goals.
    - The collection spaces should not use open plenum type returns, as this can expose the air to heat and moisture loads from surrounding spaces, and then require additional conditioning.

This document is meant to assist the architects and engineers on the design of the collection spaces by detailing how to achieve long-term preservation of the collection through sustainable mechanical system operation. Recommendations are based off of IPI's knowledge of preservation storage environments, gained through laboratory research and experience working with cultural institutions. Consultants are available for further discussion regarding these topics as the project team moves towards successful completion of the project.

MEPT SYSTEMS OVERVIEW

The general MEP infrastructure upgrades and renovations will be as described in the master plan MEPT systems narrative. The following MEPT systems narrative describes the work specific to second floor renovations.

Mechanical Systems

The second floor is currently served by four air handling units. One unit located in the second-floor mechanical room serves the second-floor stack areas, additional offices, study, and computer spaces. This unit also serves third and fourth floor stack areas as well as third floor storage areas. The other three units located in the building penthouse serve the remaining second-floor spaces included in the proposed renovation. Increased internal load due to new space temperature setpoints will require existing units be replaced. In order to accommodate university archives relocation prior to the second-floor renovation a new air handling unit, AHU-5, to be installed next to the existing second floor mechanical room. This unit will serve second floor West Tier Stacks 2 and 2A and second floor Center Stacks. Refer to attached AHU Zoning Plan for proposed air handling unit zoning. AHU-1 to replace existing unit in the second-floor mechanical room. The third-floor spaces, except for the stacks, served by the second-floor unit will be conditioned by a new unit currently serving the third floor. Capacity of the unit may need to increase to account for the additional area. AHU-2, AHU-3 and AHU-4 to replace existing units located in building penthouse. The downstream air distribution ductwork will supply air to multiple variable air volume boxes.

Plumbing Systems

Piping risers and piping within renovated spaces to be replaced. All plumbing fixtures within the scope of renovation to be replaced.

Electrical Systems

Electrical systems will be provided to complement the architectural programming and user needs in the space.

Two new electrical rooms/closets are anticipated for this renovation. Branch panels for plug loads, mechanical equipment, and lighting as well as inverter for emergency lighting will be located in these rooms. The electrical rooms will be located to minimize the losses due to voltage drops. The mechanical equipment serving HVAC in the special collections will be supplied from a manual transfer switch which will enable the library to connect to a temporary generator during extended power outages.

All enclosed spaces will be provided with at least on electrical outlet per wall. Walls longer than 10 feet will have additional outlets. Collaboration and consult room with table centered in the room will have floor outlets. Floor outlets will also be planned for large study and reading rooms so patron seated away from the wall have access to convenient power. All workstation including reception desk stations

will be provided with a quadplex and a duplex receptacle. Equipment such as copier and large printers will be supplied by a dedicated circuit. Power for audio-visual equipment such as projectors and screens in instructional spaces will be provided.

Illumination design will comply with the latest editions of the Illuminating Engineering Society (IES) Lighting Handbook and ASHRAE 90.1 Energy efficient LED lighting system with minimum 80 CRI and 3500K color temperature will be used. In collections restoration labs where true color rendering is important, 90 CRI or higher CRI will be specified. Lighting controls will be a combination of occupancy sensors, multi-zone switches and dimmers to promote occupant comfort, safety as well as energy efficiency.

Fire Protection Systems

Expansion of the existing wet pipe fire sprinkler system to be extended to areas impacted by the renovation. Dry pipe or pre-action system to be provided for vault.

Fire Alarm Systems

New speaker strobe system proposed for the entire facility will be extended to these spaces. Devices placement will be in accordance with NFPA 72 as well as university requirements.

Low Voltage/Telecommunications Systems

There will be telecom and security scope in this renovation area. Due to the new IT room location not being built and commissioned until a later date, all low voltage cabling would need to be routed to the existing IT room located on the second floor. Horizontal Cable support should be installed to support any future cabling that will be done. This will likely include jhooks and/or cable tray depending on the cabling path and accessibility. Low voltage cabling will be installed to provide connectivity to all network devices, including telecom, security cameras, and Wireless Access Points. Security cabling will be installed for monitoring of any locking doors and/or cabinets for any required protection of collection elements. Access control will be installed to control entry to the collection areas. Access Control Points will be installed to provide wireless network coverage for the renovation area. Security cameras will be installed to provide recorded video coverage of the collection area as required. All low voltage systems will need to be served by the existing building telecom rooms and infrastructure. It is assumed that the currently installed technology systems are sufficient to accommodate the scope of this renovation.

CODE SUMMARY

The project involves a renovation to the Second Level of Ellis Library at the University of Missouri to accommodate the consolidation of the Library's Special Collections, University Archives, and the Digital Services Department.

APPLICABLE CODES & DESIGN STANDARDS

- International Building Code – 2018
- International Plumbing Code - 2018
- International Mechanical Code – 2018
- International Existing Building Code – 2018
- International Fire Code - 2018
- International Fuel Gas Code - 2018
- National Electric Code/NFPA 70 - 2017
- NFPA 110 Standard for Emergency and Standby Power Systems - 2016
- NFPA 90A Installation of Air Conditioning and Ventilation Systems - 2018
- NFPA 72 National Fire Alarm Code – 2016
- NFPA 51B Standard for Fire Prevention During Welding, Cutting and other Hot Work - 2014
- NFPA 14 Standard for the Installation of Standpipe, Private Hydrants and Hose Systems - 2016
- NFPA 13 Installation of Fire Sprinkler Systems – 2016
- ASHRAE 90.1 – Energy Standard for Buildings – 2016
- ASME A17.1 – Safety Code for Elevators and Escalators (Per State of Missouri)
- Americans with Disabilities Act Standards for Accessible Design 2010
- UM Consultant Procedure and Design Guidelines
- UM System will serve as the authority having jurisdiction for the project.

EXISTING BUILDING INFORMATION

- 1914 – Original Library Structure – (4) Levels: Ground through Third. Comprises north central portion of the Library including main North Entrance.
- 1935 – Addition – (5) Levels: Ground through Fourth. Comprises west portion of the Library and includes the West Tier Stack which has (8) levels.
- 1958 – Addition – (5) Levels: Ground through Fourth. Comprises east portion of the Library.
- 1987 – South Addition – (2) Levels: Ground through First. Comprises South portion of the Library and the main West Entrance.

Building structure consists of: Concrete frame, columns and beams. Concrete floor slabs. Load bearing masonry walls. Steel truss and steel purlin roof framing protected with plaster ceilings. The 1987 addition has a concrete roof structure except for the lobby and clerestory which has a steel structured roof. The building is partially sprinkled.

RENOVATION EXTENTS

The scope of renovation for the Second Level impacts portions of the 1914 Building, the entire floor plate of the 1958 Building, and the West Stack area of the 1935 Building. A renovated area of approximately 16,000 sf. This Renovation is classified as an IEBC Level 2 Alteration. No additional square footage/area will be added to the building. No Change of Use.

Chapter 3 Use and Occupancy Classification

Section 302.1 Occupancy Classification

- Assembly Group A3: Libraries
- Assembly Group A3: Auditorium with Fixed Seats
- Assembly Group A2: Coffee Shop
- Business Group B: Library Staff Office
- Business Group B: Educational Occupancy for Students Above 12th Grade

Chapter 5 General Building Heights and Areas

Section 508.3 Mixed Use and Occupancy

Use Non-Separated Mixed Occupancy approach: No separation rating required between Business Occupancy and Assembly Occupancy. Defer to Assembly Occupancy for most restrictive requirements.

Table 506.2, Allowable area, A-3 Use, Type IB construction is unlimited.

Existing areas:

Basement:	58,209 gsf
Ground floor:	82,715 gsf
Mezzanine 1:	2,500 gsf
First Floor:	80,119 gsf
Mezzanine 2:	2,500 gsf
Second Floor:	46,609 gsf
Mezzanine 3:	2,500 gsf
Third Floor:	33,657 gsf
Mezzanine 4:	2,500 gsf
Fourth Floor:	33,548 gsf
Penthouse:	4,382 gsf
Total Gross Square Feet:	**349,239 gsf**

Chapter 6 Types of Construction

Table 601, Type IB

2-hour rating for structural frame, bearing walls and floors. 1-hour roof construction.

Section 603

Non-combustible materials to be used except as allowed by this section.

Chapter 7 Fire-Resistance-Rated Construction.

Sections 713.4 & 1023

Shaft enclosure (Stair shafts and elevator hoistways) are required to be 2 Hours where connecting 4 Stories. (Basements are included in the story count for shafts). One Hour where connecting less than 4 Stories. Though, shaft enclosures shall have a fire rating no less than the rating of the floor being penetrated.

Chapter 8 Interior Finishes

Table 803.13, Interior Wall and Ceiling Finish Requirements by Occupancy, Group A-3 nonsprinklered

- Class A Finishes Required for Interior exit stairways and exit passages
- Class A Finishes Required for Corridors
- Class C for Rooms/Enclosed Spaces.

Chapter 9 Fire Protection and Life Safety Systems

FIRE PROTECTION

International Existing Building Code (IEBC) Section 804, fire sprinkler requirements shall be limited to work areas in which the level 2 alterations are being performed.

Section 903.2.1.3, Automatic sprinkler system shall be provided throughout buildings with group A-3 occupancies where fire area exceeds 12,000 sf and an occupant load of 300.

Section 905.3.1, Required Standpipe Systems: Class III standpipe systems shall be installed throughout buildings where floor level of highest story is located more than 30 feet above lowest level of fire department vehicle access. Exception: Class 1 standpipes are allowed in buildings with automatic sprinklers throughout.

Section 905.4, Location of class 1 standpipe hose connections: each standpipe shall be provided with a hose connection located on either the roof or at the highest landing of the stairway with access to the roof.

Section 907.2.1, Group A requires a manual fire alarm system be installed where occupant load is 300 or more. Exception: not required if building is equipped with an automatic sprinkler system and the alarm notification appliances will activate upon sprinkler water flow.

Section 907.2.1.1, Group A with an occupant load of 1000 or more, requires fire alarm activation shall initiate a signal using an emergency voice/alarm communications system.

Chapter 10 Means of Egress

Table 1004.5: Maximum floor area allowance per occupant

- Accessory storage and mechanical equipment rooms, 300 gsf per occupant.
- Assembly A3, Library - Reading Rooms 50 sf per occupant, Stacks 100 gsf per occupant.
- Assembly A3. Exhibit space, 30 sf per occupant.
- Assembly A2/A3 Without Fixed Seats – Unconcentrated (Tables and Chairs) 15 sf per occupant.
- Business Areas, library staff offices and work areas 150 gsf per occupant.
- Educational, Classroom/instructional areas 20 net sf per occupant.
- Accessory storage and mechanical equipment rooms, 300 gsf per occupant.
- Warehouse, storage areas not accessible by the public, 500 gsf per occupant.

Table 1004.9, every room that is an assembly occupancy shall post the occupant load of the room.

Section 1005.3.3, Egress width of Stairways, per occupant served shall allow for 0.3 inches per occupant.

Section 1005.3.2, Egress width of other components, shall allow for 0.2 inches per occupant.

Table 1006.2.1, Common path of travel, 75’ common path of travel for A occupancies.

Table 1006.2.1, one exit up to 49 occupants. Two exits 50-499 occupants. Section 1006.2.1, occupant loads of 500 – 1000 require three exits. Above 1000 Occupants requires 4 Exits.

Section 1007.1.1, Placement of two exits, Separation of exit doors shall not be less than 1/2 the length of the maximum overall diagonal dimension of the area served.

Section 1009, Accessible Means of Egress, two accessible means of egress required where more than one means of egress is required by code.

Section 1009.2.1, Elevators required to be accessible if accessible floor is 4 or more stories above the level of exit discharge. Concept plan 4th floor is 3 stories above the level of exit discharge. Therefore, project is not required to have accessible elevators.

Section 1009.3.3, stairways shall have an Area of Refuge or be accessed from an area of refuge or provide 2-way communication at the elevator landing or a fully sprinklered building.

Section 1011, Stairways, 48” minimum for accessible stairs

Section 1011.12, Stairway to roof is required if building 4 or more stories above grade plane, one stairway shall extend to a roof surface.

Table 1017.2 - Exit access travel distance 250 feet in sprinklered building. 200' without sprinkler.

- Spaces with one means of egress: Occupancy Type A and B = 49 Occupant Load.

Table 1017.2, Exit Travel Distance, 200' for group A, non-sprinklered buildings.

Section 1024.2, minimum corridor width: 44 inches except where capacity is less than 50.

Table 1020.1, Corridors, A & B Occupancies with a greater than 30 occupants, without sprinkler system shall have a 1-hour rating required for corridor.

Section 1020.4, Dead Ends, non-sprinklered buildings, in Group A & B Occupancies, Dead End shall not exceed 20 feet.

Occupant loads and plumbing fixture requirements have been calculated two ways. The first way is referred to as 'normal' use. This is the Use of the spaces as they will be used typically, on a normal day. The second way is referred to as 'assembly' use. On certain occasions, spaces; the Historic Study Room, the Lobby to the Historic Study Room and the Special Collections Exhibit space will be used to host special events and gatherings such as guest lectures, fund raising events, etc. An additional 350 persons has been added to the occupant load to account for these events. Both calculations are presented below.

Occupant Load for Second Level, under normal Use:

Assembly Use =	459 occupants
Business Use =	23 occupants
Storage & Mechanical =	50 occupants
Total 2nd floor occupants =	531 occupants

Occupant Load for Second Level, under Assembly Use:

Assembly Use =	810 occupants
Business Use =	23 occupants
Storage & Mechanical =	50 occupants
Total 2nd floor occupants =	882 occupants

Chapter 11 Accessibility

Section 1109.2.1, Unisex toilet section, in assembly occupancy an accessible unisex toilet room shall be provided where an aggregate of six or more water closets are required. Shall be located not more than one story above or below separate gender toilet rooms.

Chapter 29 Plumbing Systems

Table 2902.1, Plumbing Fixture Count

Second floor occupant load, under normal use, 531 persons

	Men	WC	Lavs	Women	WC	Lavs
Assembly Use	230	1.84	1.15	230	3.54	1.15
Business Use	12	0.48	0.30	12	0.48	0.30
Storage Use	25	0.25	0.25	25	0.25	0.25
Total fixtures		**3**	**2**		**5**	**2**

Second floor occupant load, under assembly use, 752 total persons

	Men	WC	Lavs	Women	WC	Lavs
Assembly Use	680	3.24	2.03	454	6.23	2.03
Business Use	12	0.48	0.30	12	0.48	0.30
Storage Use	25	0.25	0.25	25	0.25	0.25
Total fixtures		**4**	**3**		**7**	**3**

Chapter 30 Elevators and Conveying Systems

Section 3006.2, where elevator connects more than three stories and the building is not protected with a sprinkler system, hoistway openings are to be protected with an elevator lobby.

PRELIMINARY COST ESTIMATE

Special Collections, University Archives & Digital Services Consolidation

The following conceptual estimate is based on unit cost data from recent comparable projects and represents an opinion on the rough order of magnitude of construction and total project costs.

University of Missouri Ellis Library Feasibility Study
Special Collections and University Archives Renovation Cost Estimate
02/04/21

	Qty		Unit Cost		Total
Renovation Construction Costs					
Restroom architectural work	555 SF	x	$170.00 per SF	=	$94,350
Restroom lighting	555 SF	x	$11.00 per SF	=	$6,105
Restroom power	555 SF	x	$9.00 per SF	=	$4,995
Restroom plumbing	555 SF	x	$75.00 per SF	=	$41,625
Restroom fire protection	555 SF	x	$6.00 per SF	=	$3,330
Restroom HVAC	555 SF	x	$44.00 per SF	=	$24,420
Public reading architectural work	4,880 SF	x	$85.00 per SF	=	$414,800
Public reading lighting	4,880 SF	x	$12.00 per SF	=	$58,560
Public reading power	4,880 SF	x	$15.00 per SF	=	$73,200
Public reading fire protection	4,880 SF	x	$6.00 per SF	=	$29,280
Public reading HVAC	4,880 SF	x	$44.00 per SF	=	$214,720
Staff area architectural work	7,200 SF	x	$75.00 per SF	=	$540,000
Staff area lighting	7,200 SF	x	$11.00 per SF	=	$79,200
Staff area power	7,200 SF	x	$15.00 per SF	=	$108,000
Staff area fire protection	7,200 SF	x	$6.00 per SF	=	$43,200
Staff area HVAC	7,200 SF	x	$44.00 per SF	=	$316,800
Collections architectural work	14,500 SF	x	$55.00 per SF	=	$797,500
Collections lighting	14,500 SF	x	$10.00 per SF	=	$145,000
Collections power	14,500 SF	x	$12.00 per SF	=	$174,000
Collections fire protection (inert gas)	690 SF	x	$25.00 per SF	=	$17,250
Collections fire protection (water)	13,810 SF	x	$6.00 per SF	=	$82,860
3rd floor HVAC modifications	1 LS	x	$130,000.00 per LS	=	$130,000
Collections HVAC	14,500 SF	x	$50.00 per SF	=	$725,000
Instructional architectural work	1,225 SF	x	$65.00 per SF	=	$79,625
Instructional lighting	1,225 SF	x	$12.00 per SF	=	$14,700
Instructional power	1,225 SF	x	$15.00 per SF	=	$18,375
Instructional fire protection	1,225 SF	x	$6.00 per SF	=	$7,350
Instructional HVAC	1,225 SF	x	$44.00 per SF	=	$53,900
Circulation & misc space architectural work	3,000 SF	x	$60.00 per SF	=	$180,000
Circulation & misc space lighting	3,000 SF	x	$12.00 per SF	=	$36,000
Circulation & misc space power	3,000 SF	x	$15.00 per SF	=	$45,000
Circulation & misc space fire protection	3,000 SF	x	$6.00 per SF	=	$18,000
Circulation & misc space HVAC	3,000 SF	x	$44.00 per SF	=	$132,000
Misc. structural repairs	1 LS		$69,500.00 LS	=	$69,500
Renovation Subtotal	31,360 SF				**$4,778,645**

Special Collections, University Archives & Digital Services Consolidation (Cont.)

Markups & Contingency						
General Conditions			8.0%			$382,292
Fee			5.0%			$258,047
Design/Estimate Contingency			10.0%			$541,898
Escalation to Midpoint Q4 2021			3.0%			$178,826
Markup & Contingency Subtotal						**$1,361,063**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED CONSTRUCTION TOTAL						**$6,139,708**
Total estimated construction cost per Square Foot						$195.78
Specialty Systems and FF&E						
Public area FF&E	4,500	SF x	$20.00	per SF	=	$90,000
Staff area FF&E	7,650	SF x	$30.00	per SF	=	$229,500
Collections shelving & storage	12,200	SF x	$15.00	per SF	=	$183,000
Signage	1	EA x	$25,000	LS	=	$25,000
Telecom	1	EA x	$132,500	LS	=	$132,500
Security	1	EA x	$70,500	LS	=	$70,500
AV	1	EA x	$28,500	LS	=	$28,500
Active Telecom Electronics	1	EA x	$90,000	LS	=	$90,000
Subtotal						**$849,000**
Other Project Costs						
A/E Basic Services			8.8%			$540,294
Other Desgin Costs						$54,100
Owner's construction contingency			10.0%			$663,952
Other Construction Costs						$81,500
Commissioning						$50,000
Administration Costs						$343,263
Miscellaneous Costs						$30,000
Subtotal						**$1,763,109**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED TOTAL PROJECT COST						**$8,752,000**

UNIVERSITY ARCHIVES INTERIM MOVE

The following pages summarize two alternative scenarios developed for the move of University Archives from Lewis and Clark Halls to an interim location on the Second Level of Ellis Library. After consideration, and based on timing and costs, the Library determined it would proceed with the short term move of University Archives' collections to Stack Area 401A.

The following scenarios were explored:

- Scenario #1 - Interim move to West Stack Levels 2 and 2A, Central Stack (202C), and areas due east
- Scenario #2 - Reduced scope to eliminate areas east of the Central Stack

Following Scenario #1 and #2, the final pages (beginning with the 1/30/21 Memo) provide additional cost information based on breaking out / isolating costs to renovate areas of the West Stack and Central Stack.

UNIVERSITY ARCHIVES INTERIM MOVE SCENARIO #1

The University is making plans to move University Archives from Lewis and Clark Halls in the last quarter of 2021 and would like to identify space needs in Ellis Library for an interim move. Based on the pre-design programming effort, University Archives would require the following spaces:

PATRON SPACE

Utilize existing Special Collections Reading Room on Fourth Level

STAFF SPACE

6.05 – Dept. Head Office =	150 NSF
6.06 – (2) Staff Offices @ 130 NSF =	260 NSF*
6.10 – Processing Workroom =	600 NSF
6.11 – Digitization Lab – Analog to Legacy Formats =	200 NSF
6.12 – Work Copy Room =	120 NSF
6.13 – Supply/Storage Room =	120 NSF
SUBTOTAL =	1,450 NSF
PLUS 35% SUITE CIRCULATION =	*508 NSF*

**(1) Staff position is currently vacant; 2 Staff offices total are included in the interim move*

TOTAL STAFF SPACE = 1,958 NSF

COLLECTIONS SPACE

West Stack - 2 Stack levels (20 ranges total) are needed to accommodate University Archives collection of film and items stored in Cubic Foot Boxes and Oversize Containers. Number of stack levels assumes (4) single sided vertical shelves, 16" deep. (Calculations include reduction to 85% for box maneuvering and 20% growth).

It may be necessary to isolate the film collection based on code compliance or risk mitigation in a separate, fire-rated enclosure. If isolated:

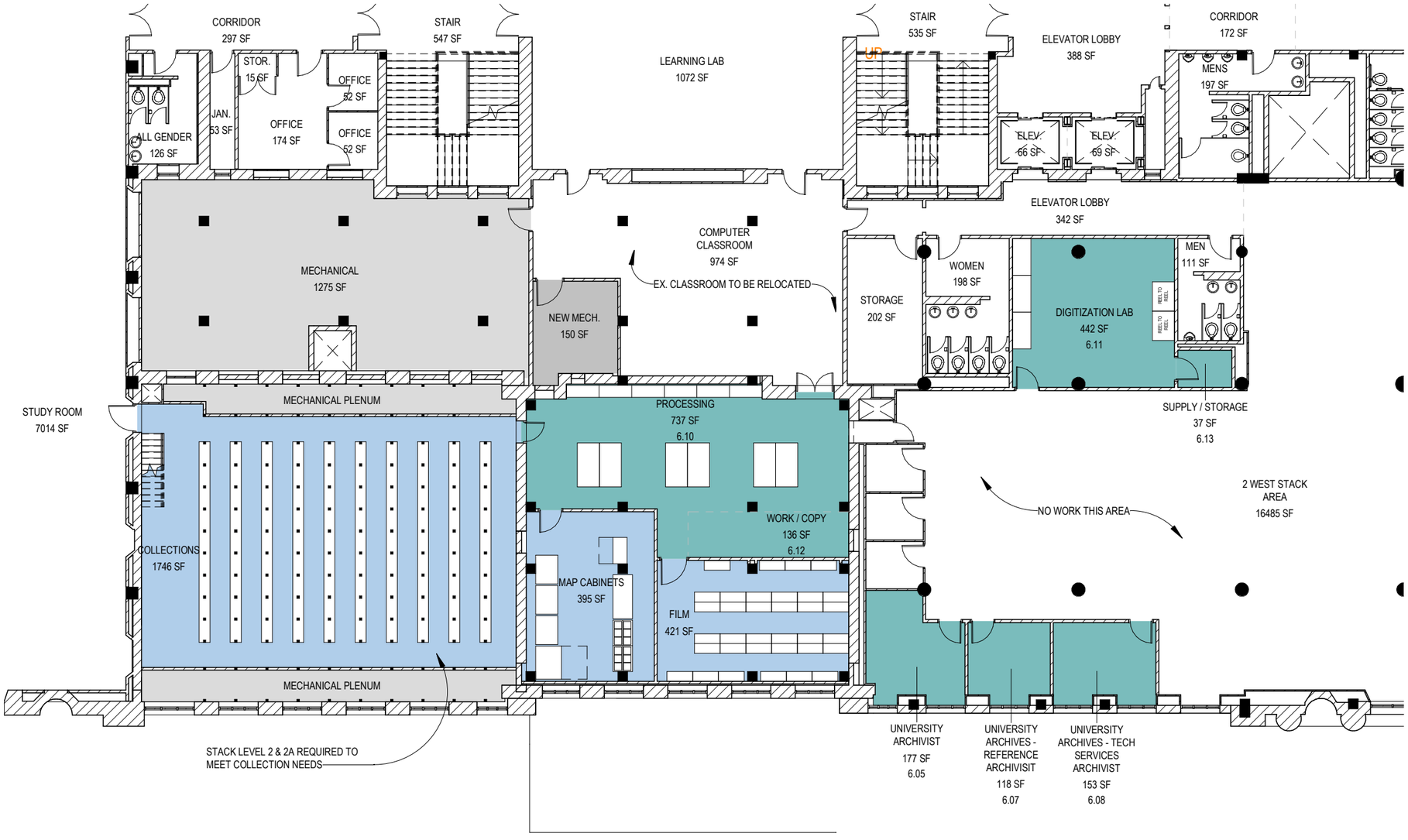
- Number of stack Levels can be reduced to 1.35
- Footprint to store film collection is approximately 420 NSF

Central Stack – Approximately 400 NSF is needed for University Archives' collections of materials that are not shelved (i.e., map cabinets /flat file storage units, microfilm unit, oversize packages and standard size envelopes). This footprint includes a worktable and (1) additional flat file for growth.

TOTAL COLLECTIONS SPACE IF FILM COLLECTION IS ISOLATED:

- WEST STACK = 1.35 LEVELS
- CENTRAL STACK = 400 NSF + 420 NSF (FILM COLLECTION) = 820 NSF

INTERIM MOVE PLAN - SCENARIO #1



INTERIM MOVE PLAN PHASE 1 – LEVEL 2

SCALE: NTS

COST ESTIMATE - SCENARIO #1

University of Missouri Ellis Library Feasibility Study
Special Collections and University Archives TEMPORARY offices Cost Estimate
12.16.20

	Qty		Unit Cost		Total
Renovation Construction Costs					
Private offices architectural work	470 SF	x	$55.00 per SF	=	$25,850
Private offices lighting	470 SF	x	$11.00 per SF	=	$5,170
Private offices power	470 SF	x	$15.00 per SF	=	$7,050
Private offices fire protection (water)	470 SF	x	$6.00 per SF	=	$2,820
Private offices HVAC	470 SF	x	$36.00 per SF	=	$16,920
Digitization architectural work	442 SF	x	$25.00 per SF	=	$11,050
Digitization lighting	442 SF	x	$10.00 per SF	=	$4,420
Digitization power	442 SF	x	$12.00 per SF	=	$5,304
Digitization fire protection (water)	442 SF	x	$6.00 per SF	=	$2,652
Digitization HVAC	442 SF	x	$36.00 per SF	=	$15,912
Center stack processing 2 architectural work	737 SF	x	$45.00 per SF	=	$33,165
Center stack processing 2 lighting	737 SF	x	$10.00 per SF	=	$7,370
Center stack processing 2 power	737 SF	x	$12.00 per SF	=	$8,844
Center stack processing 2 fire protection (water)	737 SF	x	$6.00 per SF	=	$4,422
Center stack processing 2 HVAC	737 SF	x	$44.00 per SF	=	$32,428
Center stack maps 2 architectural work	395 SF	x	$40.00 per SF	=	$15,800
Center stack maps 2 lighting	395 SF	x	$10.00 per SF	=	$3,950
Center stack maps 2 power	395 SF	x	$12.00 per SF	=	$4,740
Center stack maps 2 fire protection (water)	395 SF	x	$6.00 per SF	=	$2,370
Center stack maps 2 HVAC	395 SF	x	$44.00 per SF	=	$17,380
Center stack film 2 architectural work	421 SF	x	$40.00 per SF	=	$16,840
Center stack film 2 lighting	421 SF	x	$10.00 per SF	=	$4,210
Center stack film 2 power	421 SF	x	$12.00 per SF	=	$5,052
Center stack film 2 fire protection (water)	421 SF	x	$6.00 per SF	=	$2,526
Center stack film 2 HVAC	421 SF	x	$44.00 per SF	=	$18,524
Collections tier stack 2-2a architectural work	3,492 SF	x	$25.00 per SF	=	$87,300
Collections tier stack 2-2a lighting	3,492 SF	x	$10.00 per SF	=	$34,920
Collections tier stack 2-2a power	3,492 SF	x	$12.00 per SF	=	$41,904
Collections tier stack 2-2a fire protection (water)	3,492 SF	x	$6.00 per SF	=	$20,952
Collections tier stack 2-2a HVAC	3,492 SF	x	$44.00 per SF	=	$153,648
New mechanical room 2 architectural work	150 SF	x	$40.00 per SF	=	$6,000
New mechanical room 2 lighting	150 SF	x	$10.00 per SF	=	$1,500
New mechanical room 2 power	150 SF	x	$12.00 per SF	=	$1,800
New mechanical room 2 fire protection	150 SF	x	$6.00 per SF	=	$900
New mechanical room 2 HVAC	150 SF	x	$44.00 per SF	=	$6,600
Renovation Subtotal	6,107 SF				**$630,293**
Markups & Contingency					
General Conditions			8.0%		$50,423
Fee			5.0%		$34,036
Design/Estimate Contingency			10.0%		$71,475
Escalation to Midpoint Q4 2021			3.0%		$23,587
Markup & Contingency Subtotal					**$179,521**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED CONSTRUCTION TOTAL					**$809,814**
Total estimated construction cost per Square Foot					$132.60

Specialty Systems and FF&E					
Public area FF&E	0 SF	x	$0.00 per SF	=	$0
Staff area FF&E	470 SF	x	$0.00 per SF	=	$0
Collections shelving & storage	4,308 SF	x	$0.00 per SF	=	$0
Signage	1 EA	x	$0.00 LS	=	$0
Telecom	1 EA	x	$37,500.00 LS	=	$37,500
Security	1 EA	x	$37,500.00 LS	=	$37,500
AV	1 EA	x	$0.00 LS	=	$0
Active Telecom Electronics	1 EA	x	$5,000.00 LS	=	$5,000
Subtotal					**$80,000**
Other Project Costs					
A/E Basic Services			10.5%		$85,031
Other Desgin Costs				???	
Owner's construction contingency			10.0%		$8,000
Other Construction Costs				???	
Commissioning				???	
Administration Costs				???	
Miscellaneous Costs				???	
Subtotal					**$93,031**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED TOTAL PROJECT COST					**$983,000**

MU Ellis Library 2nd Floor University Archives Renovation
Preliminary Project Schedule
12/17/20

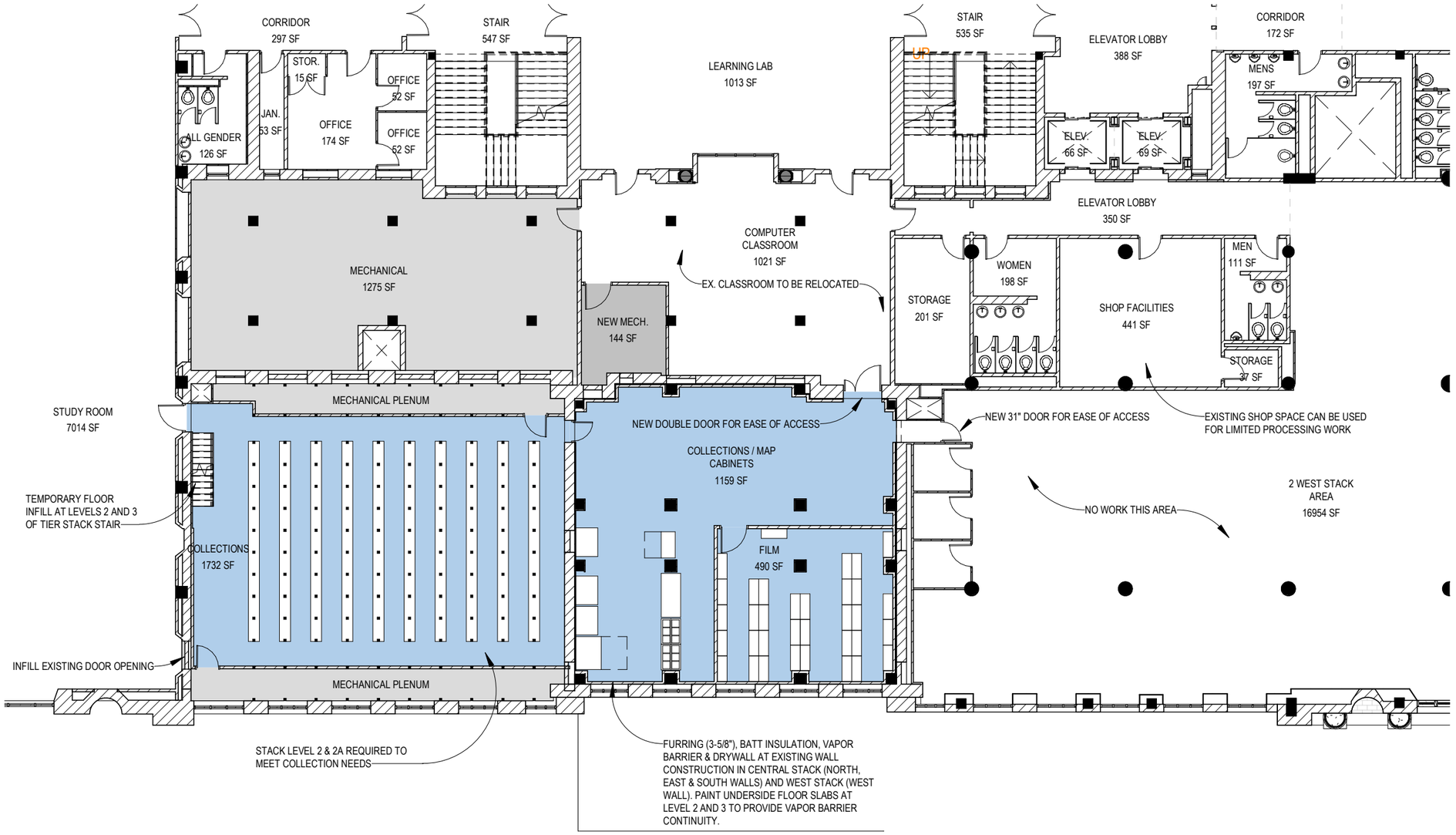
Phase	Duration	2020		2021																					
		21-Dec	28-Dec	4-Jan	11-Jan	18-Jan	25-Jan	1-Feb	8-Feb	15-Feb	22-Feb	1-Mar	8-Mar	15-Mar	22-Mar	29-Mar	5-Apr	12-Apr	19-Apr	26-Apr	3-May	10-May	17-May	24-May	31-May
Meetings & Deliverables				֍				M		֍	M			֍	M			֍	M	֍		M		֍	M
Fee Proposal & Contract	6w	1	2	3	4	5	6																		
Program Verification & Schematic Design	3w							1	2	3															
Design Development	4w										1	2	3	4											
Construction Docs	6w														1	2	3	4	5	6					
Bidding & Award	3w																				1	2	3		
Contract & Early Procurement	2w																							1	2
Construction	21w																								
HVAC Commissioning	4w																								
Move-in	5w																								

Phase	7-Jun	14-Jun	21-Jun	28-Jun	5-Jul	12-Jul	19-Jul	26-Jul	2-Aug	9-Aug	16-Aug	23-Aug	30-Aug	6-Sep	13-Sep	20-Sep	27-Sep
Meetings & Deliverables																	
Fee Proposal & Contract																	
Program Verification & Schematic Design																	
Design Development																	
Construction Docs																	
Bidding & Award																	
Contract & Early Procurement																	
Construction	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
HVAC Commissioning																	
Move-in																	

Phase	4-Oct	11-Oct	18-Oct	25-Oct	1-Nov	8-Nov	15-Nov	22-Nov	29-Nov	6-Dec	13-Dec	20-Dec	27-Dec
Meetings & Deliverables													
Fee Proposal & Contract													
Program Verification & Schematic Design													
Design Development													
Construction Docs													
Bidding & Award													
Contract & Early Procurement													
Construction	18	19	20	21									
HVAC Commissioning					1	2	3	4					
Move-in									1	2	3	4	5

֍ Fee Proposal	January 8, 2021
Kickoff, Plan & Program Confirmation Mtg	Week of February 1, 2021
RFQ for Prequalified GC's Issued	Week of February 8, 2021
֍ SD Deliverable	February 19, 2021
SD Review Meeting, DD Kickoff	Week of February 22, 2021
GC Qualifications Received	Week of March 1, 2021
Shortlist & Interview GC's	Week of March 8, 2021
Notify Prequalified GC's	Week of March 15, 2021
֍ DD Deliverable	March 19, 2021
DD Review Meeting	Week of March 22, 2021
Precon Meetings with Prequalified GC's	Week of March 22, 2021
֍ Issue CD's for Owner/Permit Review	April 16, 2021
CD Review Meeting	Week of April 19, 2021
֍ Issue CD's for Bid	April 30, 2021
Prebid Mtg & Walk-thru	Week of May 10, 2021
Bid Opening/Permit Received	Week of May 17, 2021
֍ Bid Evaluation & Recommendation Letter	May 21, 2021
֍ Issue Conformance Set for Construction	Week of May 24, 2021
Preconstruction Meeting	Week of May 31, 2021
Notice to Proceed	June 4, 2021
Mobilization	June 7, 2021
Substantial Completion	October 29, 2021
Final Completion	November 24, 2021
Move-in Begins	November 26, 2021
First Day of Spring Semester	January 18, 2022

INTERIM MOVE PLAN - SCENARIO #2



INTERIM MOVE PLAN PHASE 1 – LEVEL 2

SCALE: NTS

COST ESTIMATE - SCENARIO #2

University of Missouri Ellis Library Feasibility Study
Special Collections and University Archives TEMPORARY offices Cost Estimate
1.8.21

	Qty		Unit Cost		Total
Renovation Construction Costs					
Demo doors	2 EA	x	$135.00	per EA =	$270
Demo wall	50 SF	x	$1.70	per SF =	$85
Misc Demo/masonry	1 LS	x	$3,500.00	per LS =	$3,500
Study enclosure demo	27 EA	x	$500.00	per EA =	$13,500
Misc rough carpentry	1 LS	x	$1,500.00	per LS =	$1,500
Insulation, vapor barriers	4,750 SF	x	$3.50	per SF =	$16,625
Sealants	1 LS	x	$350.00	per LS =	$350
Doors, farmes & hardware	9 EA	x	$2,445.00	per EA =	$22,005
gyp walls G2S	1,100 SF	x	$9.50	per SF =	$10,450
gyp walls G1S	4,750 SF	x	$7.25	per SF =	$34,438
stairs closure	900 SF	x	$4.50	per SF =	$4,050
horizontal gyp floor infill at stairs at 2 locations	80 SF	x	$14.50	per SF =	$1,160
rubber base	600 SF	x	$2.60	per SF =	$1,560
paint walls	6,500 SF	x	$0.95	per SF =	$6,175
paint, underside of floors, above 1A & 2A	8,000 SF	x	$1.15	per SF =	$9,200
paint doors & frames	8 EA	x	$250.00	per EA =	$2,000
floor sealant	5,300 SF	x	$0.85	per SF =	$4,505
Center stack maps 2 lighting	1,160 SF	x	$10.00	per SF =	$11,600
Center stack maps 2 power	1,160 SF	x	$12.00	per SF =	$13,920
Center stack maps 2 fire protection (water)	1,160 SF	x	$6.00	per SF =	$6,960
Center stack film 2 lighting	490 SF	x	$10.00	per SF =	$4,900
Center stack film 2 power	490 SF	x	$12.00	per SF =	$5,880
Center stack film 2 fire protection (water)	490 SF	x	$6.00	per SF =	$2,940
Collections tier stack 2-2a lighting	3,492 SF	x	$10.00	per SF =	$34,920
Collections tier stack 2-2a power	3,492 SF	x	$12.00	per SF =	$41,904
Collections tier stack 2-2a fire protection (water)	3,492 SF	x	$6.00	per SF =	$20,952
New mechanical room 2 lighting	150 SF	x	$10.00	per SF =	$1,500
New mechanical room 2 power	150 SF	x	$12.00	per SF =	$1,800
New mechanical room 2 fire protection	150 SF	x	$6.00	per SF =	$900
HVAC System	1 LS	x	$185,000.00	per LS =	$185,000
Renovation Subtotal	5,292 SF				**$464,549**
Markups & Contingency					
General Conditions			8.0%		$37,164
Fee			5.0%		$25,086
Design/Estimate Contingency			10.0%		$52,680
Escalation to Midpoint Q4 2021			3.0%		$17,384
Markup & Contingency Subtotal					**$132,314**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED CONSTRUCTION TOTAL					**$596,862**
Total estimated construction cost per Square Foot					$112.79

Specialty Systems and FF&E					
Public area FF&E	0 SF	x	$0.00	per SF =	$0
Staff area FF&E	2 SF	x	$0.00	per SF =	$0
Collections shelving & storage	5,000 SF	x	$0.00	per SF =	$0
Signage	1 EA	x	$0.00	LS =	$0
Telecom	1 EA	x	$37,500.00	LS =	$37,500
Security	1 EA	x	$37,500.00	LS =	$37,500
AV	1 EA	x	$0.00	LS =	$0
Active Telecom Electronics	1 EA	x	$5,000.00	LS =	$5,000
Subtotal					**$80,000**
Other Project Costs					
A/E Basic Services			10.5%		$62,671
Other Desgin Costs				???	
Owner's construction contingency			10.0%		$8,000
Other Construction Costs				???	
Commissioning				???	
Administration Costs				???	
Miscellaneous Costs				???	
Subtotal					**$70,671**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED TOTAL PROJECT COST					**$748,000**

MEMORANDUM

Re:	MU Ellis Library – Phase 1 Univ. Archives Interim Move Additional Cost Information	**To:**	Jody Miller, MU Campus Facilities
Date:	1/30/2021	**From:**	Steve Cramer, PGAV
		CC:	Mike Schaadt, PGAV Jim Hansen, PGAV Kathy Achelpohl, PGAV

To wrap up our team's exploration of the Phase 1 UA Interim move, attached please find (3) cost estimates for the following:

- West Stack Level 2
- West Stack Level 2a
- Central Stack

Each estimate assumes:

- Renovate single area to achieve specialized temperature/humidity control for Special Collections and University Archives collections
- Includes new mechanical unit located in existing Storage Room 212
- Existing equipment in Mechanical Room 209 is not impacted

In addition, we were asked to review the option to renovate West Stack Level 3 and to comment on the cost to renovate the entire West Stack (8 Levels – Basement, Ground, 1, 1a, 2, 2a, 3 and 4):

Renovate West Stack Level 3

- Same assumption as above, with new mechanical unit in existing Room 304 and no impact to existing equipment in Mechanical Room 303A

Our opinion is that the cost to renovate West Stack Level 3 would be comparable to the cost developed to renovate either West Stack Level 2 or 2a.

Renovate entire West Stack (8) Levels:

- Renovate entire West Stack and provide for specialized environmental control for Special Collections and University Archives collections for (5) Stack Levels only.

We assume renovating multiple levels of the West Stack would be more cost effective than a floor by floor approach based on the enlarged renovation scope/economies of scale, but without more detailed programming and planning, including identifying new mechanical equipment, it is difficult to quantify the cost savings. Our recommendation for budgeting purposes is to take the cost of renovating West Stack Level 2 or 2a and multiplying that by (8) for a rough order of magnitude cost.

End.

PGAV ARCHITECTS

University of Missouri Ellis Library Feasibility Study
Special Collections and University Archives TEMPORARY offices Cost Estimate
WEST STACKS LEVEL 2 ONLY
1.21.21

	Qty		Unit Cost		Total
Renovation Construction Costs					
Demo doors	1 EA	x	$135.00 per EA	=	$135
Demo wall	0 SF	x	$1.70 per SF	=	$0
Misc Demo/masonry	0 LS	x	$3,500.00 per LS	=	$0
Study enclosure demo	14 EA	x	$500.00 per EA	=	$7,000
Masonry window infill	170 SF	x	$9.50 per SF	=	$1,615
Misc rough carpentry	1 LS	x	$500.00 per LS	=	$500
Insulation, vapor barriers	1,015 SF	x	$3.50 per SF	=	$3,553
Sealants	1 LS	x	$350.00 per LS	=	$350
Doors, farmes & hardware	2 EA	x	$2,445.00 per EA	=	$4,890
gyp walls G2S	250 SF	x	$9.50 per SF	=	$2,375
gyp walls G1S	1,015 SF	x	$7.25 per SF	=	$7,359
stairs closure	450 SF	x	$4.50 per SF	=	$2,025
horizontal gyp floor infill at stairs at 2 locations	80 SF	x	$14.50 per SF	=	$1,160
rubber base	150 SF	x	$2.60 per SF	=	$390
paint walls	1,015 SF	x	$0.95 per SF	=	$964
paint, underside of floors, above and below	4,500 SF	x	$1.15 per SF	=	$5,175
paint doors & frames	2 EA	x	$250.00 per EA	=	$500
floor sealant	1,720 SF	x	$0.85 per SF	=	$1,462
Collections tier stack 2 lighting	1,746 SF	x	$5.00 per SF	=	$8,730
Collections tier stack 2 power	1,746 SF	x	$3.00 per SF	=	$5,238
Collections tier stack 2 fire protection (water)	1,746 SF	x	$6.00 per SF	=	$10,476
HVAC System	1 LS	x	$69,840.00 per LS	=	$69,840
Renovation Subtotal	1,746 SF				**$133,737**
Markups & Contingency					
General Conditions			8.0%		$10,699
Fee			5.0%		$7,222
Design/Estimate Contingency			10.0%		$15,166
Escalation to Midpoint Q4 2021			3.0%		$5,005
Markup & Contingency Subtotal					**$38,091**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED CONSTRUCTION TOTAL					**$171,828**
Total estimated construction cost per Square Foot					$98.41
Other Project Costs					
A/E Basic Services			10.5%		$18,042
Other Desgin Costs					$4,500
Owner's construction contingency			10.0%		$17,183
Other Construction Costs					$46,100
Administration Costs (construction + other construction)			5.0%		$10,896
Miscellaneous Costs					$5,000
Subtotal					**$101,721**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED TOTAL PROJECT COST					**$274,000**

University of Missouri Ellis Library Feasibility Study
Special Collections and University Archives TEMPORARY offices Cost Estimate
WEST STACKS LEVEL 2A ONLY
1.21.21

	Qty		Unit Cost		Total
Renovation Construction Costs					
Demo doors	1 EA	x	$135.00 per EA	=	$135
Demo wall	0 SF	x	$1.70 per SF	=	$0
Misc Demo/masonry	0 LS	x	$3,500.00 per LS	=	$0
Masonry window infill	170 SF	x	$9.50 per SF	=	$1,615
Study enclosure demo	13 EA	x	$500.00 per EA	=	$6,500
Misc rough carpentry	1 LS	x	$500.00 per LS	=	$500
Insulation, vapor barriers	1,015 SF	x	$3.50 per SF	=	$3,553
Sealants	1 LS	x	$350.00 per LS	=	$350
Doors, farmes & hardware	2 EA	x	$2,445.00 per EA	=	$4,890
gyp walls G2S	250 SF	x	$9.50 per SF	=	$2,375
gyp walls G1S	1,015 SF	x	$7.25 per SF	=	$7,359
stairs closure	450 SF	x	$4.50 per SF	=	$2,025
horizontal gyp floor infill at stairs at 2 locations	80 SF	x	$14.50 per SF	=	$1,160
rubber base	150 SF	x	$2.60 per SF	=	$390
paint walls	1,015 SF	x	$0.95 per SF	=	$964
paint, underside of floors, above and below	4,500 SF	x	$1.15 per SF	=	$5,175
paint doors & frames	2 EA	x	$250.00 per EA	=	$500
floor sealant	1,720 SF	x	$0.85 per SF	=	$1,462
Collections tier stack 2A lighting	1,746 SF	x	$5.00 per SF	=	$8,730
Collections tier stack 2A power	1,746 SF	x	$3.00 per SF	=	$5,238
Collections tier stack 2A fire protection (water)	1,746 SF	x	$6.00 per SF	=	$10,476
HVAC System	1 LS	x	$69,840.00 per LS	=	$69,840
Renovation Subtotal	1,746 SF				**$133,237**
Markups & Contingency					
General Conditions			8.0%		$10,659
Fee			5.0%		$7,195
Design/Estimate Contingency			10.0%		$15,109
Escalation to Midpoint Q4 2021			3.0%		$4,986
Markup & Contingency Subtotal					**$37,949**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED CONSTRUCTION TOTAL					**$171,185**
Total estimated construction cost per Square Foot					$98.04
Other Project Costs					
A/E Basic Services			10.5%		$17,974
Other Desgin Costs					$4,500
Owner's construction contingency			10.0%		$17,119
Other Construction Costs					$46,100
Administration Costs (construction + other construction)			5.0%		$10,864
Miscellaneous Costs					$5,000
Subtotal					**$101,557**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED TOTAL PROJECT COST					**$273,000**

University of Missouri Ellis Library Feasibility Study
Special Collections and University Archives TEMPORARY offices Cost Estimate
CENTER STACKS ONLY
1.21.21

	Qty		Unit Cost		Total
Renovation Construction Costs					
Demo doors	1 EA	x	$135.00 per EA	=	$135
Demo wall	50 SF	x	$1.70 per SF	=	$85
Misc Demo/masonry	1 LS	x	$3,500.00 per LS	=	$3,500
Study enclosure demo	0 EA	x	$500.00 per EA	=	$0
Masonry window infill	300 SF	x	$9.50 per SF	=	$2,850
Misc rough carpentry	1 LS	x	$500.00 per LS	=	$500
Insulation, vapor barriers	2,720 SF	x	$3.50 per SF	=	$9,520
Sealants	1 LS	x	$350.00 per LS	=	$350
Doors, farmes & hardware	4 EA	x	$2,445.00 per EA	=	$9,780
gyp walls G2S	250 SF	x	$9.50 per SF	=	$2,375
gyp walls G1S	2,720 SF	x	$7.25 per SF	=	$19,720
stairs closure	0 SF	x	$4.50 per SF	=	$0
horizontal gyp floor infill at stairs at 2 locations	0 SF	x	$14.50 per SF	=	$0
rubber base	200 SF	x	$2.60 per SF	=	$520
paint walls	3,220 SF	x	$0.95 per SF	=	$3,059
paint, underside of floors, above and below	3,535 SF	x	$1.15 per SF	=	$4,065
paint doors & frames	3 EA	x	$250.00 per EA	=	$750
floor sealant	1,760 SF	x	$0.85 per SF	=	$1,496
Center stack maps 2 lighting	1,160 SF	x	$5.00 per SF	=	$5,800
Center stack maps 2 power	1,160 SF	x	$3.00 per SF	=	$3,480
Center stack maps 2 fire protection (water)	1,160 SF	x	$6.00 per SF	=	$6,960
Center stack film 2 lighting	490 SF	x	$5.00 per SF	=	$2,450
Center stack film 2 power	490 SF	x	$3.00 per SF	=	$1,470
Center stack film 2 fire protection (water)	490 SF	x	$6.00 per SF	=	$2,940
HVAC System	1 LS	x	$66,000.00 per LS	=	$66,000
Renovation Subtotal	1,650 SF				**$147,805**
Markups & Contingency					
General Conditions			8.0%		$11,824
Fee			5.0%		$7,981
Design/Estimate Contingency			10.0%		$16,761
Escalation to Midpoint Q4 2021			3.0%		$5,531
Markup & Contingency Subtotal					**$42,098**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED CONSTRUCTION TOTAL					**$189,903**
Total estimated construction cost per Square Foot					$115.09
Other Project Costs					
A/E Basic Services			10.5%		$19,940
Other Desgin Costs					$4,500
Owner's construction contingency			10.0%		$18,990
Other Construction Costs					$46,100
Administration Costs (construction + other construction)			5.0%		$11,800
Miscellaneous Costs					$5,000
Subtotal					**$106,330**
SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES ESTIMATED TOTAL PROJECT COST					**$297,000**

SECTION **4**

Centralized Service Desk

CONCEPT OVERVIEW

The concept for the Centralized Service Desk positions the desk in a prominent location along the building's primary north/south axis within the historic colonnade on the First Level. The primary advantages of this location include:

- Strong visibility from the building's north and west entrances for improved wayfinding
- Easy access for desk staff to the rest of the floor
- Maintains existing traffic flow throughout the floor
- Close proximity to the main elevators for vertical movement of materials
- Makes good use of an inherently awkward part of the Library
- Keeps Nutter Learning Commons intact for student study
- Does not interfere with a future south addition or south entrance as shown in the master plan
- Vacates valuable real estate along the Library's north windows for new student space

The key plan shows the extent of the desk which includes a Patron/Staff Interface Area and a contiguous secure staff work area for staff supervising and supporting the desk and providing circulation and reserve services.

The layout of the desk allows for clear visibility for patrons approaching from the north or south and coordinates with the columns that form the historic colonnade and openings in the 1914 bearing wall which divides the patron/ staff interface area and secure staff space.

The scope of the project includes filling in the floor slab at the top of the west stair and adjacent to the desk's self-help zone. Restoration of the finishes in the area of the existing circulation desk (along the north façade) for future conversion to patron seating space or the Bookmark Café is included, but could be deferred to reduce the cost of the project.

PATRON / STAFF INTERFACE AREA

Concepts for the desk include:

- Desk to be intentional in appearance (not ad-hoc) with a presence that speaks to the formality of the existing architecture
- To address continual change in the delivery of library services, this area to be designed for flexibility, including a modular solution for the desk in anticipation of future changes
- Consider approaching the design of the public space as a transitional space in which the ceiling, lighting, and flooring may deviate from adjoining spaces to the north and south

The desk layout assumes (2-4) staff can be seated at the desk; (1-2) in the north portion and (1-2) in the south portion. The layout shows openings in the desk for ease of movement for staff to step in and out to assist patrons as needed. The desk is planned as standing height with integration of lower counters distributed across the layout for ADA access.

In an initial study of ceiling options, it was preferred to have a higher ceiling plane with large scale suspended light fixtures (running north/south) in front of the desk flanked by lower ceiling planes on the east and west including directly over the desk. This scope too could be minimized to reduce first costs.

The self-help zone south of the desk could include equipment to accommodate a range of activities such as self-checkout of books, self-check room scheduling, accessing hold materials in lockers, scanning and photocopying books, viewing microfilm readers, etc. This area is planned to be developed further in the next phase of the project.

Two areas opposite the desk along the west side of the colonnade are planned with soft seating to create a welcoming experience and provide room for waiting; the north area is shown to include an exhibit / display wall, and the south area features popular reading materials.

SECURE STAFF AREA

The layout of the staff area prioritizes two key functions:

- Ease of access for desk staff to materials and equipment requested by patrons
- Location of Circulation and Reserve manager office proximate to the desk staff in order to monitor and support desk activities

Gates or grilles (along the two bearing wall openings) secure this area from the service desk after hours. Based on the size and location of the existing openings, a one-way flow for staff could be considered.

Research focused elements of the desk program are arranged along the south edge of the desk area, opening to the student study zone including the Research manager's office, Reserve Reading Room (for materials reserved for in-Library use only), and consultation room.

The renovation area is intended to have all new finishes and lighting. Acoustic privacy is a consideration and the perimeter walls will be extended to the bottom of structure. Opportunities for daylight and for connection to the student space beyond through sidelight and clerestory glazing will be explored further in the next stage of development.

CONCEPT PLAN

Project Scope includes restoration of finishes in this area for future conversion to patron seating or cafe.

STAFF
STUDENT
MECHANICAL
VERTICAL CIRCULATION

(SEE NEXT PAGE FOR ENLARGED PLAN)

SERVICE DESK - KEY PLAN
SCALE: NTS

MECHANICAL
NEW MECHANICAL
RESTROOM
STAFF
STORAGE
STUDENT
VERTICAL CIRCULATION

SERVICE DESK – ENLARGED PLAN
SCALE: NTS

MEPT SYSTEMS OVERVIEW

The general MEP infrastructure upgrades and renovations will be as described in the Masterplan MEPT Systems narrative. The following MEPT systems narrative describes the work specific to the Service Desk renovation on first floor.

Mechanical Systems

The first-floor area proposed for the Centralized Service Desk is served by two air handling units located in the sub-basement. Increased internal load due to additional equipment and people load may require new units with increased capacity. If the internal loads do not increase, the existing air handling units may be reused with updated air distribution. The downstream air distribution ductwork will supply air to multiple variable air volume boxes. Additional VAV boxes and ductwork serving adjacent spaces to be relocated as building load calculations require.

Electrical Systems

Electrical systems will be provided to complement the architectural programming and user needs in the space.

One new branch panel is anticipated for this renovation. All enclosed spaces will be provided with at least on electrical outlet per wall. Walls longer than 10 feet will have additional outlets. The systems furniture power will be via floor poke thrus. Receptacles integrated within the system furniture base panel are anticipated. Study room with table centered in the room will have floor outlets. All workstation including reception desk stations will be provided with a quadplex and a duplex receptacle. Equipment such as copier and large printers will be supplied by a dedicated circuit.

Illumination design will comply with the latest editions of the Illuminating Engineering Society (IES) Lighting Handbook and ASHRAE 90.1 Energy efficient LED lighting system with minimum 80 CRI and 3500K color temperature will be used. Lighting controls will be a combination of occupancy sensors, multi-zone switches and dimmers to promote occupant comfort, safety as well as energy efficiency.

Fire Protection Systems

Expansion of the existing wet fire sprinkler system to be extended to areas impacted by the renovation.

Fire Alarm Systems

New speaker strobe system proposed for the entire facility will be extended to these spaces. Devices placement will be in accordance with NFPA 72 as well as university requirements.

Low Voltage/Telecommunications Systems

The Centralized Service Desk area's low voltage cabling will be served out of the new IT Room proposed within the remodel space. Copper and fiber telecom feed cables will need to be pulled from the main IT room on the Ground floor and routed to this new IT room. Cabling will need to change elevations between floors and will likely require floor penetrations, preferably within the IT room space. It is recommended that no fewer than (2) 4" sleeves be installed through the floor to allow for future expansion. Data racks, wire management and ladder racking will be installed in the IT room. Flame retardant plywood will be installed on all walls of the new IT room, and a Telecommunications Ground Busbar (TGB) will be installed and connected to the building Telecommunications Main Ground Busbar (TMGB) using the properly sized Bonding Conductor for Telecommunications (BCT). If a TMGB does not exist, a new one will be installed and cabled to the Ground Equalizer (GE) via a properly sized Telecommunications Bonding Backbone Conductor (TBBC). This will be done in accordance with ANSI standard J-STD-607-B. Cable tray and j-hook paths will be routed from the IT room out through the renovation space. Cable tray will be planned and installed along a path that can easily be extended during future expansion. All network and telecom devices will be cabled with the appropriate cabling and quantities at each device location. This cabling will be properly terminated and labeled for simple, clear identification.

CODE SUMMARY

Refer to the Code Summary in Chapter 3 for Special Collections, University Archives and Digital Services for building-wide code information.

Project Description

The project involves relocating the circulation desk and associated staff from their existing location adjacent to the north building entrance on the First Level to a more central location on the same floor. As part of the project, the approximately 160 sf floor opening at the top of the west stairs is to be infilled.

Renovation Extents

The scope of the renovation for the Centralized Service Desk impacts portions of the 1914 Building, portions of the 1958 Building, and a portion of the 1987 Building. The area of the service desk and supporting office space is approximately 4,500 sf. This renovation is classified as an IEBC Level 2 Alteration. No additional square footage/area will be added to the building. No Change of Use. As part of the project, the vacated area will be converted to patron space.

PRELIMINARY COST ESTIMATE

Centralized Service Desk

The following conceptual estimate is based on unit cost data from recent comparable projects and represents an opinion on the rough order of magnitude of construction and total project costs.

	Qty		Unit Cost			Total
Renovation Construction Costs						
Restore existing circ desk area	4,250 SF	x	$50.00	per SF	=	$212,500
Restore existing circ desk area lighting	4,250 SF	x	$8.00	per SF	=	$34,000
restore existing circ desk area power	4,250 SF	x	$10.50	per SF	=	$44,625
Restore existing circ desk area fire protection	4,250 SF	x	$6.00	per SF	=	$25,500
restore existing circ desk area HVAC	4,250 SF	x	$36.00	per SF	=	$153,000
Public area architectural work	3,500 SF	x	$75.00	per SF	=	$262,500
Public area lighting	3,500 SF	x	$12.00	per SF	=	$42,000
Public area power	3,500 SF	x	$15.00	per SF	=	$52,500
Public area fire protection	3,500 SF	x	$6.00	per SF	=	$21,000
Public area HVAC	3,500 SF	x	$36.00	per SF	=	$126,000
Staff area architectural work	3,750 SF	x	$75.00	per SF	=	$281,250
Staff area lighting	3,750 SF	x	$12.00	per SF	=	$45,000
Staff area power	3,750 SF	x	$15.00	per SF	=	$56,250
Staff area fire protection	3,750 SF	x	$6.00	per SF	=	$22,500
Staff area HVAC	3,750 SF	x	$36.00	per SF	=	$135,000
Floor infill architectural	170 SF	x	$75.00	per SF	=	$12,750
Floor infill structural	170 SF	x	$55.00	per SF	=	$9,350
Misc. structural repairs	1 EA	x	$19,000.00	LS	=	$19,000
Renovation Subtotal	11,670 SF					**$1,554,725**
Markups & Contingency						
General Conditions			8.0%			$124,378
Fee			5.0%			$83,955
Design/Estimate Contingency			10.0%			$176,306
Escalation to Midpoint Q4 2021			3.0%			$58,181
Markup & Contingency Subtotal						**$442,820**
SERVICE DESK ESTIMATED CONSTRUCTION TOTAL						**$1,997,545**
Total estimated construction cost per Square Foot						$171.17

Centralized Service Desk (Cont.)

Specialty Systems and FF&E						
Public area FF&E	3,450	SF	x	$20.00	per SF	= $69,000
Staff area FF&E	3,750	SF	x	$30.00	per SF	= $112,500
Signage	1	EA	x	$25,000	LS	= $25,000
Telecom	1	EA	x	$53,500	LS	= $53,500
Security	1	EA	x	$17,250	LS	= $17,250
AV	1	EA	x	$3,500	LS	= $3,500
Active Telecom Electronics	1	EA	x	$30,000	LS	= $30,000
Subtotal						**$310,750**
Other Project Costs						
A/E Basic Services				9.4%		$187,769
Other Design costs						$12,100
Owner's Construction Contingency				10.0%		$218,335
Other Construction Costs						$40,500
Commissioning						$20,000
Administrative Costs						$112,879
Miscellaneous Costs						$12,793
Subtotal						**$604,376**
SERVICE DESK ESTIMATED TOTAL PROJECT COST						**$2,912,671**

SECTION **5**

Space Program

MU Ellis Library
Central Service Desk / Archival and Special Collections Consolidation

		From Library			FALL 2020 PROGRAM						
		No. 36" Shelves	Linear Feet	No. 2-Sided Sections (5 Vert. Shelves)	Staff Count	No. Occ. / Space	NSF/ Occupant	NSF/ Space	No. of Spaces	Total NSF	Notes
CENTRAL SERVICE DESK											*Patron Spaces*
1.0 Central Service Desk - Patron / Staff Interface Area											
	Frontline Service Counter:										*Central service desk providing integrated services including assistance with general questions, Circulation, Reference, equipment check-out functions.*
1.01	Staff Workstations				4	4	120	480	1	480	*Includes circulation space behind counter. Add'l detail from 8/20 Desk Space Needs doc - desktop computer each workstation; (2) hand-held scanners; (2) tabletop desensitizers (10" x 6") accessible to (3) workstations; space for (6) reference binders. To include: phones, undercounter shelving for supplies, lockable drawers.*
1.02	Printer							10	1	10	*Desktop printer with easy access behind service desk.*
1.03	Book Carts							18	1	18	*Add'l detail from 8/20 Desk Space Needs doc - (10) 12" x 16" patron book carts; (4) 14" x 30" processing book carts.*
1.04	Return Book Drop Bins							25	2	50	*Sized per 8/20 Desk Space Needs doc.*
	Plus estimated internal circulation 35%									195	
					4					**753**	***Subtotal - Patron / Staff Interface Area***
2.0 Central Service Desk - Secure Areas											
2.01	Reserve Reading Room (In-Library Use)					2	75	150	1	150	*11/30 Note from Library - Though it would also be ideal for room to be overseen by desk staff, it is a lower priority than hold/equipment access. If needed, the room can move further back into the office area. The space needs (1) microform reader/printer/scanner and (1) computer workstation.*
2.02	Consultation Room					3	50	150	1	150	*Accessed from public circulation and Secure Staff Area. Add'l detail from 8/20 Space Needs doc - table and seating for (3); computer; wall mounted flat screen; whiteboard. (Existing Room 157 is well equipped with group table, large screen / monitor, whiteboard, small printer, and phone). 30-60 min. sessions.*
2.03	Microfilm Scanners							0	1	0	*10/8 Note from Library - microfilm scanners will be placed as follows. (1) in Reserve Reading Room; (1) in self-service patron area - TBD - considerations include accessibility after hours and patron assistance.*
	Plus estimated internal circulation 35%									105	
	Subtotal - Public Areas									**405**	
	Staff Work Area:										
2.04	Head Access Services				1	1	120	120	1	120	*Cotner - Private office; 11/30 Note from Library - Does need to be in the circulation office space, but does not have to be near the desk. Office door needs to open into staffing area.*
2.05	Circulation & Reserve - Library Spec. Sr.				1	1	120	120	1	120	*Fields - Private office; 11/30 Note from Library - Office does need to be contingent to the desk area in some way.*
2.06	Head Research Services				1	1	120	120	1	120	*Whithaus - Private office; 11/30 Note from Library - does not have to be in Circulation office space. (Long term, position to have office on level one and possibly near circulation.)*
2.07	Open Work Stations				6	1	64	64	6	384	*Preference for (2) workstations to have direct view of front line service counter. Size TBC.*
2.08	Office Equipment / Copy Area							150	1	150	*Work counter with equipment and computers; sorting shelves above. Add'l detail from 8/20 Desk Space Needs doc - (1) Large copier, printer, scanner; (1) shredder; (4) office supply cabinets.*
2.09	Processing Area							80	1	80	*Detail from 8/20 Desk Space Needs doc - Large worksurface for processing, sorting, resensitizing; (2) resensitizing machines.*
2.10	Student Lockers							20	1	20	*Student workers' coats / backpacks*
2.11	Staff Break Area							80	1	80	*Counter with coffee maker, microwave, refrigerator; prefer open vs. enclosed space*
2.12	Meeting Room							120	1	120	*For private meetings.*
	Plus estimated internal circulation 35%									418	
	Subtotal - Staff Work Area									**1,612**	
	Shelving:										*11/30 Note from Library - Ideally, both hold shelves and equip cabinets would be easy/quick to access from the service desk area.*

MU Ellis Library
Central Service Desk / Archival and Special Collections Consolidation

		From Library			**FALL 2020 PROGRAM**						
		No. 36" Shelves	**Linear Feet**	**No. 2-Sided Sections (5 Vert. Shelves)**	**Staff Count**	**No. Occ. / Space**	**NSF/ Occupant**	**NSF/ Space**	**No. of Spaces**	**Total NSF**	**Notes**
	Cabinets:										
2.19	Storage Cabinets / Drawers - Equipment							4	3	11	*Equipment reserves / DST; 60"H x 30"W x 18"D. Cabinets #1, 2, 4*
2.20	Storage Cabinets / Drawers							6	1	6	*DST; 65"H x 42"W x 18"D. Cabinet #3*
2.21	Storage Cabinets / Drawers							4	2	8	*DST, Cash Box, 3D print; 37"H x 30"W x 18"D. Cabinets #9, 13*
2.22	File Cabinet							2	1	2	*DST; 27"H x 15"W x 24"D. Cabinet #10*
2.23	Storage Cabinets / Drawers							6	1	6	*DST 4880; 28"H x 42"W x 18"D. Cabinet #8, Lower unit to #7, combined height 70"*
2.24	Storage Cabinets							6	1	6	*DST 4880; 42"H x 36"W x 18"D. Cabinet #7, Upper unit to #8*
2.25	Storage Cabinets							5	1	5	*DST; 78"H x 36"W x 18"D. Cabinet #5*
2.26	Storage Cabinets							5	1	5	*DST; 60"H x 36"W x 18"D. Cabinets #6, 14, 15*
2.27	Storage Drawer							6	2	12	*DST: 65"H x 52"W x 18"D. Cabinets #11, 12*
	Subtotal - Cabinets									**308**	*Based on Graphic Space Program*
	Misc. Items:										
2.28	UV Sanitizer Cabinet							36	1	36	*For equip returned by patrons. Locate close to desk area or equipment cabinets. 60"H x 48"W x 24"D; on casters.*
2.29	Storage Tubs							21	1	21	*(6) @ 18"H x 28" W x 18"D; DST umbrellas, reserve umbrellas*
2.30	Laptop Cart							5	1	5	*40"H x 30"W x 20"D on casters*
2.31	Print Station Stand							5	1	5	*45"H x 30"D x 20"W; circulation paid to print station; on casters*
	Plus estimated internal circulation 100%									67	
	Subtotal - Misc. Items									**134**	
	Book Trucks/Carts:										
2.32	Book Trucks							4	5	20	*43"H x 40"L x 14"W; Mobius, DST Bescore light kit; on casters*
2.33	Book Trucks							3	3	9	*37"H x 30"L x 14"W; Book returns, misc.*
2.34	Patron Book Carts							1.30	6	8	*43"H x 16"L x 13"W; Patron, staff book retrieval; on casters*
2.35	Book Cart							3	1	3	*43"H x 28"W x 14"D; DVD, recorded sound returns; on casters*
	Plus estimated internal circulation 100%									40	
	Subtotal - Book Trucks									**80**	
					9					**2,947**	***Subtotal - Secure Areas***
3.0	**Central Service Desk - Self-Service Patron Areas**										*10/8 Note from Library - Location of desk in relation to general computing areas in the Library is a question - i.e., should printer banks and print station be located nearby.*
3.01	Self-Service & Chat Kiosks					1	15	15	4	60	*~3' wide x 5' deep per kiosk. 10/8 Note from Library - Self-service/kiosks to include - Merlin Catalog; (2) KIC Scanners; Chat Kiosk; space for supplies (staplers, etc.); (1) microform workstation; self-checkout station; Print station (if near printers).*
3.02	Print Reference Collection							120	1	120	*10/8 Note from Library - Low level shelving for small print reference collection - specifications to follow. NSF assumes (3) low shelving units / 18 LF of shelving.*
3.03	Reception and Popular Reading							200	1	200	*10/8 Note from Library - Reception/direction (analog/digital)/sofa and popular reading/digital signage with interactive screens that allow reservations making or lookup.*
3.04	Circulation - Help Zone					12	15	180	1	180	*Area in front of the Service Desk for patron's waiting to be served*
	Plus estimated internal circulation 35%									196	
					0					**756**	***Subtotal - Self-Service Patron Areas***
	Total Central Service Desk			500						**4,456**	*10/8 Note from Library - other items - current newspaper shelving; new book shelves; potential popular reading collection; exhibit space that is not Special Collections.*

MU Ellis Library
Central Service Desk / Archival and Special Collections Consolidation

		Existing NSF	Existing Room #	UMLD Program (4/19)	SB Master Plan Program	FALL 2020 PROGRAM Staff Count	No. Occ. / Space	NSF/ Occupant	NSF/ Space	No. of Spaces	Total NSF	Notes
SPECIAL COLLECTIONS / ARCHIVES												
4.0 Special Collections and Archives - Public Areas												*Per SB Master Plan: Cultural Portal and Heritage Collection and need to be adjacent to Digital Services*
4.01	Entry / Lobby	0			500				500	1	500	*Outside secure zone of Reading Room. Described as Transition Space - Exhibit space - announcing one is entering the SC/UA area.*
4.02	Reading Room	1,324	401		960	2	4	240	960	1	960	*Reception desk, discrete lockers for patrons. (4) large tables to accomm. 4-8 visiting researchers. House Library's reference collection.*
4.03	Reading Room - Staff Workstations						1	65	65	2	130	*(2) Library Specialists (Gille-Thompson and vacant) for reception and Reading Room supervision*
4.04	Secure Holding Room								15	1	15	*To hold items retrieved for visiting researchers; should accommodate cart*
4.05	Consultation Room	0			300				150	2	300	*Per SB Master Plan: Shared with Preservation and Conservation*
4.06	Instructional Room	1,175	406		960		24	40	960	1	960	*Current classes are typ. 15-20 students; existing room can hold up to 35-students and has vestibule with cubbies.*
4.07	Cubbies / Vestibule	153					24	7	168	1	168	
4.08	Exhibit Space	0			500				500	1	500	*Library would like this area to draw the attention of those passing by; Colonnade may be attractive exhibit space. Traveling exhibits have not occurred; exhibit of internal material is planned. Need for exhibit prep space. Climate control / security needed.*
	Plus estimated internal circulation 30%				365						1,060	
		2,652			3,585	**2**					**4,593**	***Subtotal - Public Areas***
5.0 Special Collections and Archives - Collections Space												
5.01	Closed Collections	4,726			7,000				8,138	1	8,243	*Based on Graphic Space Program for Regular Shelving; additional NSF will be needed for storage of materials in West Stack due to limited vertical height.*
5.02	Vault	370			750				740	1	740	*Assumes doubling size of existing vault*
		5,096			7,750						**8,983**	***Subtotal - Collections Space***
6.0 Special Collections and Archives - Staff Space												
	Special Collections											
6.01	Head Special Collections & Rare Books	154	402			1	1	150	150	1	150	*Hansen - Private office*
6.02	Special Collections Librarian	290	405			1	1	130	130	1	130	*John Fifield - Private office*
6.03	Research & Instruction Librarian	108	408			1	1	130	130	1	130	*John Henry Adams - Private office*
	Library Specialist (PT) - In Reading Room					0	1	65	65	0	0	*See Public Areas*
6.04	Future Staff Office					1	1	130	130	1	130	
					800	4						
	Indus Scanner and Photography Table	173	409						173	0	0	*See Consolidated Staff Workspace (below)*
	Storage - Supplies and Flat Files	191	410						191	0	0	*10/6 Note from SC - Items stored in flat file cabinets are collection materials and need to be located in secure collection storage environments. See Consolidated Staff Workspace and Collections.*
	Unprocessed Materials	55	307E						55	0	0	*See Consolidated Staff Workspace (below)*
		971										*Existing NSF does not include Room 403 (vacant), 404 (Microfilm)*
	University Archives											*(UA Reading Room noted in comments above)*
6.05	University Archivist	130	726 Lewis	174		1	1	150	150	1	150	*Huelsbergen - Private office*
6.06	Univ. Archives Library Specialist	65	704 Lewis			1	1	130	130	1	130	*Anstine - Private office*
6.07	Univ. Archives - Reference Archivist	150	705 Lewis			1	1	130	130	1	130	*Cox - Private office*
6.08	Univ. Archives - Tech Services Archivist					1	1	130	130	1	130	*Private office - Univ. Archivist is currently filling this add'l position*
					600	4						
	Processing Work Room	375	723 Lewis	616					375	0	0	*See Consolidated Staff Workspace (below)*
	Processing Work Room	242	725 Lewis						242	0	0	*See Consolidated Staff Workspace (below)*
	Digitization Lab - Analog to Legacy Formats	108	722 Lewis	182					108	0	0	*See Consolidated Staff Workspace (below)*
	Work & Storage Area / Collections Processing	225	706 Lewis						225	0	0	*10/8 Note from UA - This is a Collections processing space (not an A/V processing space). See Consolidated Staff Workspace (below)*
	Supply Storage	0		253					0	0	0	*See Consolidated Staff Workspace (below)*
		1,295		1,225								
	Consolidated Staff Workspace:											
6.09	PT Staff / Student Workstations				160	4	1	40	40	4	160	*Per SB Master Plan: Number TBC; reside in processing space; may have laptops and float within the space*
												10/8 Note from UA - Accommodate electronic records/legacy computer media area (currently (1) large desk in 723 Lewis Hall). This could be separate room but doesn't need to be. Area would need desk surface for computer equipment as

MU Ellis Library
Central Service Desk / Archival and Special Collections Consolidation

		Existing NSF	Existing Room #	UMLD Program (4/19)	SB Master Plan Program	FALL 2020 PROGRAM Staff Count	No. Occ. / Space	NSF/ Occupant	NSF/ Space	No. of Spaces	Total NSF	Notes
6.11	Digitization Lab - Analog to Legacy Formats	108	722 Lewis	182					200	1	200	*Per Anselm 8 add'l pieces of equip are anticipated. 10/8 Note from UA - Enclosed space needed to allow for lighting control (dark room when transferring film with current methods) and sound reduction (to keep sounds from transfers from bothering others in the workspace).*
6.12	Work/Copy Room								120	1	120	
6.13	Supply / Storage Room								120	1	120	*Temp/humidity control; for paper goods; storage of archival boxes that arrive assembled.*
6.14	Staging Space				200				200	1	200	*10/8 Note from UA - Near loading dock to facilitate deliveries and returns of items stored off-site. Secure space, preferably with keycard/code access for deliveries so that these can occur without need for staff member to be present.*
						4						
	Plus estimated internal circulation 35%				390						1,078	
		2,266			2,150	**12**					**4,158**	***Subtotal - Staff Space***

Total Special Collections / Archives 10,014 13,485 **17,734** ***Total - Special Collections & Archives***

8,751 ***Total - Special Collections & Archives - Without Collections***

DIGITAL SERVICES DEPARTMENT

7.0	**Digital Services Department**											*Collocated with Special Collections and Archives*
7.01	Head, Digital Services	66		132	0	1	1	150	150	1	150	*Dykas - Private office*
7.02	Processing								125	1	125	
7.03	Library Information Specialist			726	600	3	1	130	130	3	390	*Hu, Tirone, and Saunders (PT). 10/6 Note from Library - These are seen as private or semi-private offices for permanent staff. Space needs would be same for 6.09. Note (1) to be located with Digitization Production Lab.*
7.04	Graduate and Undergraduate Workstations				200	5	1	40	40	5	200	*(5) workstations for 10 students; potential to share with SC / UA. Note (2) to be located with staff offices and (3) to be located with Digitization Production Lab.*
7.05	Future Staff				400	1	1	130	130	1	130	*(1) future staff growth*
7.06	Digitization Production Lab			182	0				400	1	400	*10/6 Note from Library - We have (7) Scanners / not all need to be in the lab. A couple of scanners are attached to student workstations. Need 400 SF for Digitization Lab, to provide better space for scanners and for a work table.*
7.07	Secured Storage				200				200	0	0	*Not needed if collocated w/ SC and UA*
7.08	Meeting Room			176	0		6	30	180	1	180	*Accommodate 6-8 at table seating and shelving.*
7.09	Shelving / Storage								125	1	125	*10/6 Note from Library - Add 125 NSF for this item.*
												10/6 Note from Library - Some space needs will depend on whether Digital Services is located with SC/UA. If not, add'l space is needed for photocopier, recycling, and processing.
	Plus estimated internal circulation 35%			0	300						595	
				1,216	1,700	**10**					**2,295**	***Subtotal - Digital Services Department***

Total Special Collections / Univ. Archives / Digital Services

20,029 ***Total - Special Collections, Univ. Archives and Digital Services Dept.***

11,046 ***Total - Special Collections, Univ. Archives and Digital Services - Without Collections***

PRESERVATION & CONSERVATION

8.0	**Preservation & Conservation**											
8.01	Conservation Supervisor Office			174	0	1	1	130	130	1	130	*Dorsey - Private office*
8.02	Main Lab Staff - FTE				360	2	1	180	180	2	360	*Feldkamp, Gaughan - workstations TBC*
8.03	Main Lab Staff - PT / Student				80	2	1	40	40	2	80	*Workstations*
8.04	Main Lab Processing & Equipment			1,452	350				1,000	1	1,000	*Requires natural lighting; ceiling mounted electrical cord reels; fume hood / ventilation*
8.05	Aqueous / Solvent Room			264	200				264	1	264	*No windows; chemical fume hood; floor drain; eyewash; large worktable; work counter with large basin sink; aspirational space*
8.06	Collections Storage Room			182	0				182	1	182	*Per SB Master Plan: Share with Special Collections and Archives*
	Photography			0	0				0	0	0	*Per SB Master Plan: Share with Digital Services*
	Book Repair			0	0				0	0	0	*May be needed if in today's incarnation*
8.07	Dirty Processing / Quarantine			448	0				448	1	448	*No windows; close to loading dock and areas where materials will be treated to minimize contamination.*
8.08	Examination / Meeting Room			176	0				180	1	180	
	Plus estimated internal circulation 35%			0	248						925	
				2,696	1,238	**5**					**3,569**	***Subtotal - Preservation and Conservation***

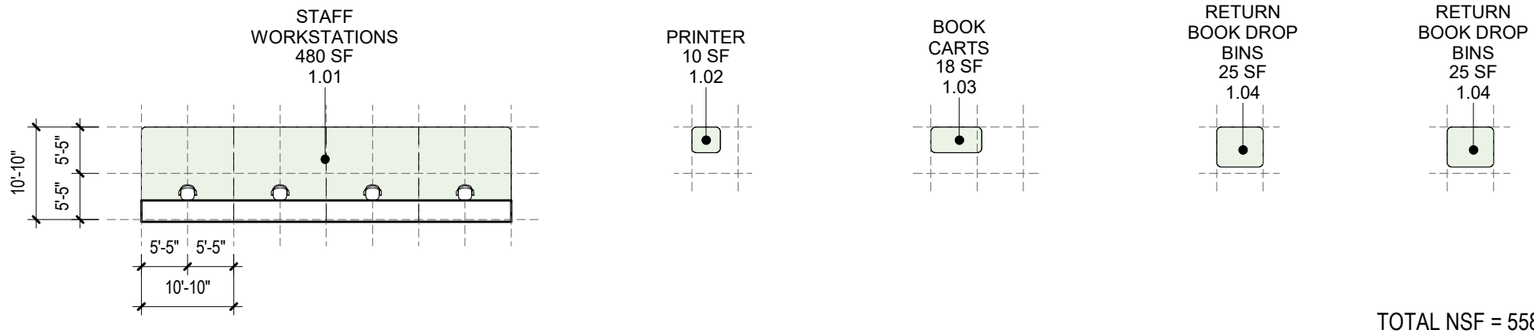
Total Special Collections / Archives / Digital Services / Preservation & Conservation

23,598 ***Total - All Above***

14,615 ***Total - All Above - Without Collections***

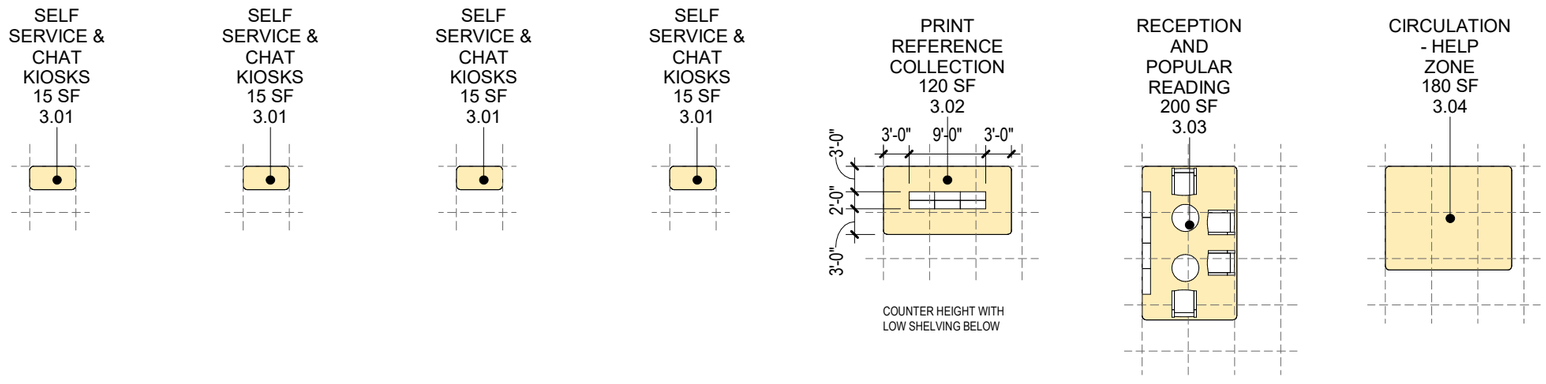
1.0 CENTRAL SERVICE DESK - PATRON / STAFF INTERFACE AREA

FRONT LINE SERVICE COUNTER



TOTAL NSF = 558
TOTAL NSF INCLUDING 35% SUITE CIRCULATION = 753

3.0 CENTRAL SERVICE DESK - SELF-SERVICE PATRON AREA



TOTAL NSF = 560
TOTAL NSF INCLUDING 35% SUITE CIRCULATION = 756

Ellis Library Feasibility Study
53615-00
University of Missouri
12/17/2020

PGAV ARCHITECTS
Integrated Design. Exceptional Results.

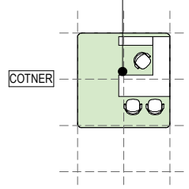
PB-1 - BUBBLE DIAGRAMS

2.0 CENTRAL SERVICE DESK - SECURE STAFF AREA

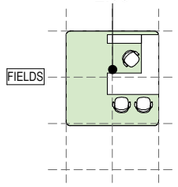
STAFF

2.04 & 2.05 TO OPEN INTO STAFF AREA; 2.06 CAN BE REMOTE

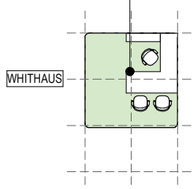
HEAD ACCESS SERVICES 120 SF 2.04



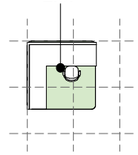
CIRCULATION & RESERVE - LIBRARY SPEC. SR. 120 SF 2.05



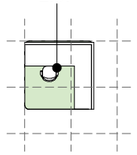
HEAD RESEARCH SERVICES 120 SF 2.06



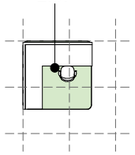
OPEN WORK STATIONS 64 SF 2.07



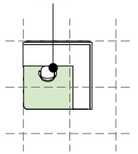
OPEN WORK STATIONS 64 SF 2.07



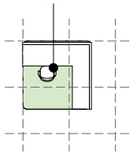
OPEN WORK STATIONS 64 SF 2.07



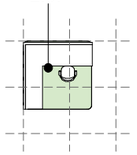
OPEN WORK STATIONS 64 SF 2.07



OPEN WORK STATIONS 64 SF 2.07



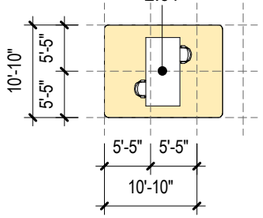
OPEN WORK STATIONS 64 SF 2.07



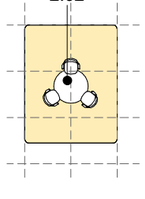
PREFERENCE FOR (2) WORKSTATIONS TO HAVE DIRECT VIEW OF FRONT-LINE SERVICE COUNTER

PROGRAM SUPPORT

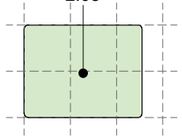
RESERVE READING ROOM (IN-LIBRARY USE) 150 SF 2.01



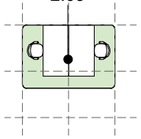
CONSULTATION ROOM 150 SF 2.02



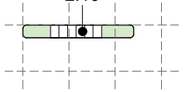
OFFICE EQUIPMENT / COPY AREA 150 SF 2.08



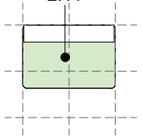
PROCESSING AREA 80 SF 2.09



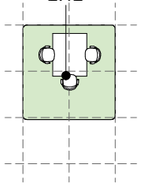
STUDENT LOCKERS 20 SF 2.10



STAFF BREAK AREA 80 SF 2.11

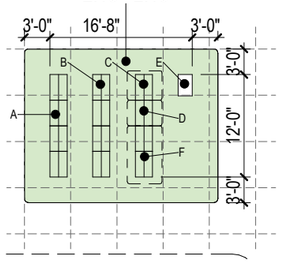


MEETING ROOM 120 SF 2.12



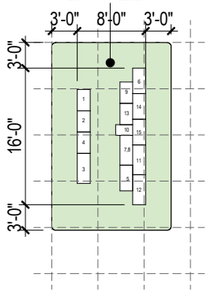
(A) 2.13
HOLDS
(120 LF = 40 SHELVES)
(B) 2.14
RESERVES
(120 LF = 40 SHELVES
(C) 2.15
RETURNS
(30 LF = 10 SHELVES)
(D) 2.16
BRANCH TRANSFERS
(24 LF = 8 SHELVES)
(E) 2.17
SUPPLY STORAGE
(10 LF) 1'-8" x 2'-6"
(F) 2.18
DVD DRAWERS
(30 LF)

SHELVING 408 SF 2.13 - 2.18



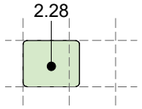
STORAGE CABINETS 308 SF 2.19 - 2.27

(1,2,4) 2.19
EQUIP
30"W x 18"D x 60" H
(3) 2.20
DST
42"W x 18"D x 65"H
(9,13) 2.21
DST, CASHBOX, 3-D PRINT
30"W x 18"D x 37"H
(10) 2.22
DST - FILE CAB.
15"W x 24"D x 27"H

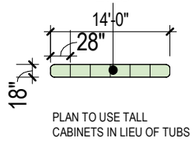


(7,8) 2.23,2.24
STACKED
42"W x 18"D x 70"H
(5) 2.25
DST
36"W x 18"D x 78" H
(6,14,15) 2.26
DST
36"W x 18"D x 60"H
(11,12) 2.27
DST
42"W x 18"D x 54"H

UV STERILIZER 36 SF 2.28

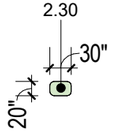


STORAGE TUBS 21 SF 2.29

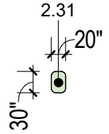


PLAN TO USE TALL CABINETS IN LIEU OF TUBS

LAPTOP CART 4 SF 2.30

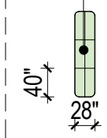


PRINT STATION STAND 4 SF 2.31



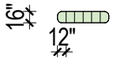
BOOK TRUCKS / CARTS

MOBIUS, ETC. 23 SF 2.32



BOOK RETURNS 9 SF 2.33

PATRON CARTS 8 SF 2.34



DVD 3 SF 2.35

TOTAL NSF = 2,317
TOTAL NSF INCLUDING 35% SUITE CIRCULATION = 2,947

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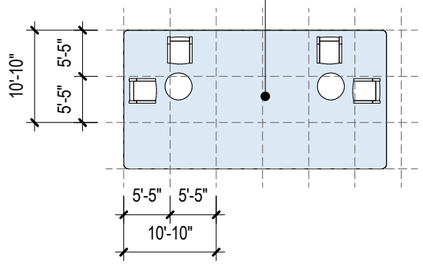
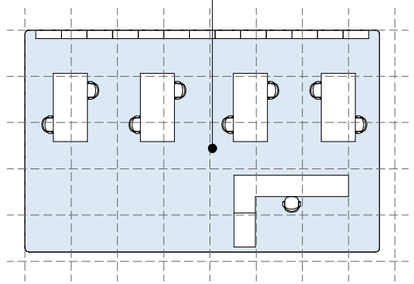
PB-1 - BUBBLE DIAGRAMS

4.0 SPECIAL COLLECTIONS AND ARCHIVES - PUBLIC AREAS

ENTRY / LOBBY
500 SF
4.01

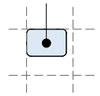


READING ROOM
1080 SF
4.02 & 4.03

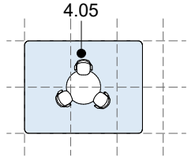


4.02 READING ROOM - 960 NSF; 4.03 STAFF WORKSTATIONS - 2 @ 65 = 130 NSF

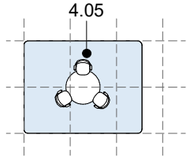
SECURE HOLDING ROOM
15 SF
4.04



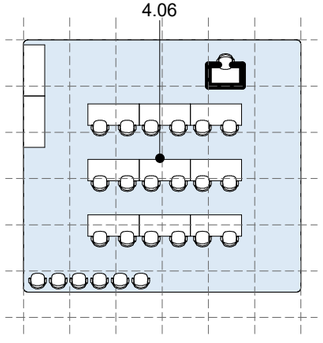
CONSULTATION ROOM
150 SF
4.05



CONSULTATION ROOM
150 SF
4.05



INSTRUCTIONAL ROOM
960 SF
4.06



TARGET 20-SEATS AT TABLES WITH ADDITIONAL SEATS AT ROOM PERIMETER

CUBBIES / VESTIBULE
163 SF
4.07

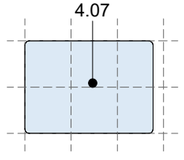
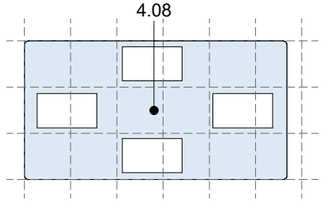


EXHIBIT SPACE
500 SF
4.08



TOTAL NSF = 3,533
TOTAL NSF INCLUDING 35% SUITE CIRCULATION = 4,593

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6.0 SPECIAL COLLECTIONS AND ARCHIVES - STAFF SPACE

CONSOLIDATED STAFF WORKSPACE

PT STAFF / STUDENT WORKSTATIONS TO RESIDE IN PROCESSING WORK ROOM

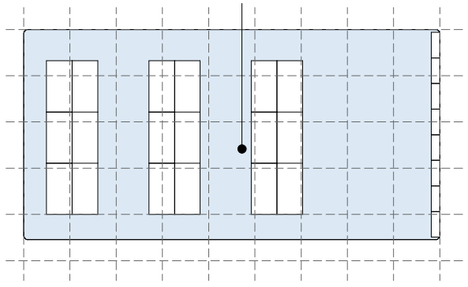
PT STAFF / STUDENT WORKSTATIONS 40 SF 6.09

PT STAFF / STUDENT WORKSTATIONS 40 SF 6.09

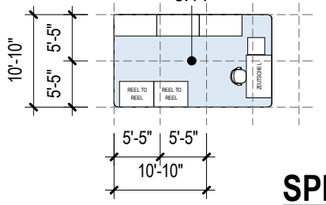
PT STAFF / STUDENT WORKSTATIONS 40 SF 6.09

PT STAFF / STUDENT WORKSTATIONS 40 SF 6.09

PROCESSING WORK ROOM 1200 SF 6.10



DIGITIZATION LAB - ANALOG TO LEGACY FORMATS 200 SF 6.11



WORK/COPY ROOM 120 SF 6.12

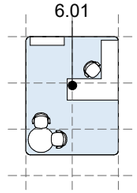
SUPPLY/STORAGE ROOM 120 SF 6.13

STAGING SPACE 200 SF 6.14

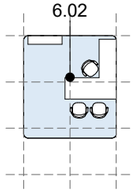
TO BE LOCATED NEAR LOADING DOCK

SPECIAL COLLECTIONS

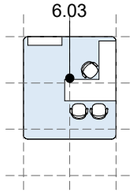
HEAD SPECIAL COLLECTIONS & RARE BOOKS 150 SF 6.01



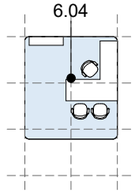
SPECIAL COLLECTIONS LIBRARIAN 130 SF 6.02



RESEARCH & INSTRUCTION LIBRARIAN 130 SF 6.03

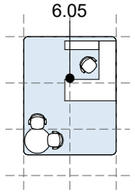


FUTURE STAFF OFFICE 130 SF 6.04

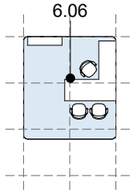


UNIVERSITY ARCHIVES

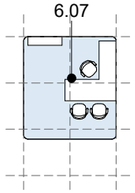
UNIVERSITY ARCHIVIST 150 SF 6.05



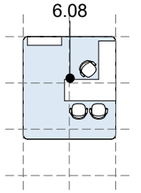
UNIVERSITY ARCHIVES - LIBRARY SPECIALIST 130 SF 6.06



UNIVERSITY ARCHIVES - REFERENCE ARCHIVIST 130 SF 6.07



UNIVERSITY ARCHIVES - TECH SERVICES ARCHIVIST 130 SF 6.08



TOTAL NSF = 3,080
TOTAL NSF INCLUDING 35% SUITE CIRCULATION = 4,158

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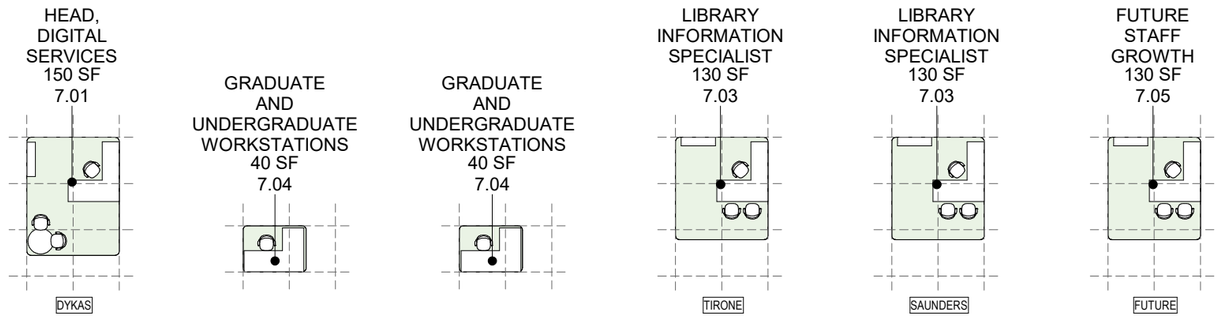
PB-1 - BUBBLE DIAGRAMS

7.0 DIGITAL SERVICES DEPARTMENT



TOTAL NSF = 1,700
TOTAL NSF INCLUDING 35% SUITE CIRCULATION = 2,295

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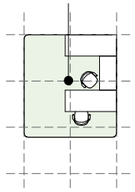
PB-1 - BUBBLE DIAGRAMS

8.0 PRESERVATION AND CONSERVATION

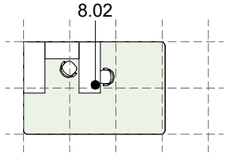
CONSERVATION SUPERVISOR OFFICE
130 SF
8.01



DORSEY

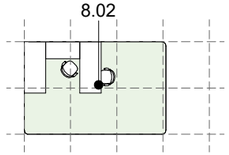
LOCATE WITH MAIN LAB

MAIN LAB STAFF - FTE
180 SF
8.02



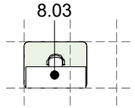
FELDKAMP

MAIN LAB STAFF - FTE
180 SF
8.02

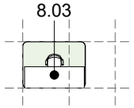


GAUGHAN

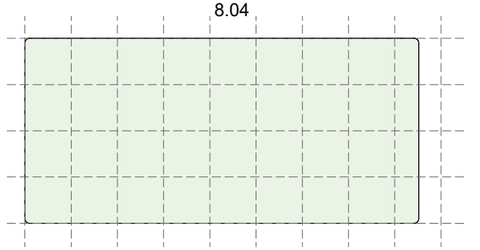
MAIN LAB STAFF - PT / STUDENT
40 SF
8.03



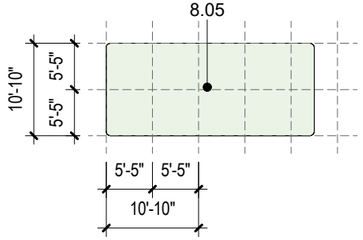
MAIN LAB STAFF - PT / STUDENT
40 SF
8.03



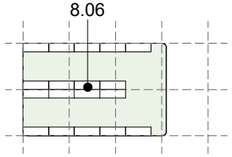
MAIN LAB PROCESSING & EQUIPMENT
1000 SF
8.04



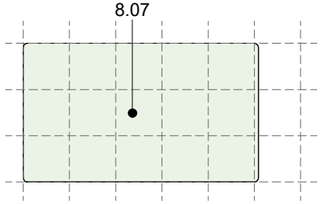
AQUEOUS / SOLVENT ROOM
264 SF
8.05



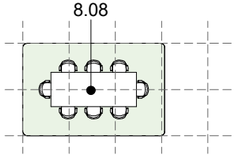
COLLECTIONS STORAGE ROOM
182 SF
8.06



DIRTY PROCESSING/QUARANTINE
448 SF
8.07



EXAMINATION / MEETING ROOM
180 SF
8.08



TOTAL NSF = 2,644
TOTAL NSF INCLUDING 35% SUITE CIRCULATION = 3,569

DIGITAL SERVICES SCANNERS

OpticBook - Plustek OpticBook A300 Plus

Workstation: Dedicated
Light control: Not needed
Tech sits or stands: Sits
Foot pedal: No
Table size (for scanner): 4 x 3 ft
Workstation information: Need side table for material and supplies; an L-shaped station would work for scanner and work surface
Other: Scanner is a bit loud

https://plustek.com/us/products/book-scanners/opticbook-a300-plus/index.php

Indus - Indus Book Scanner 5005C

Workstation: Dedicated
Light control: Needed to reduce glare on glass
Tech sits or stands: Stand
Foot pedal: Yes
Table size (for scanner): 5 x 3 feet
Workstation information: Need computer stand and table for material
Other: Best to have computer on separate table to avoid shaking the scanner table

Different version: https://www.indususa.com/book-scanners/book-scanner-5004c-5004gs/

Fijutsu - fi-7460

Workstation: Can be shared with student workstation
Light control: Not needed
Tech sits or stands: Sits
Foot pedal: No
Table size (for scanner): 4 x 2.5 feet; This is a side table for the scanner and provides surface for material
Workstation information: Ergonomic computer workstation (46 x 35")
Other:

https://www.fujitsu.com/us/products/computing/peripheral/scanners/business/fi7460/

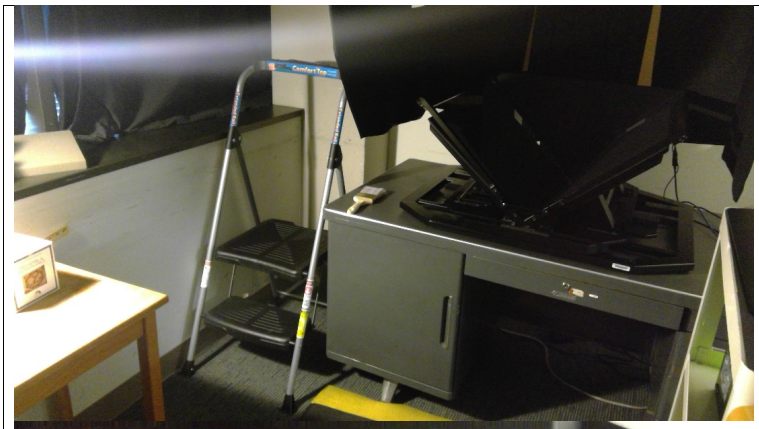
Creo - Creo IQsmart3

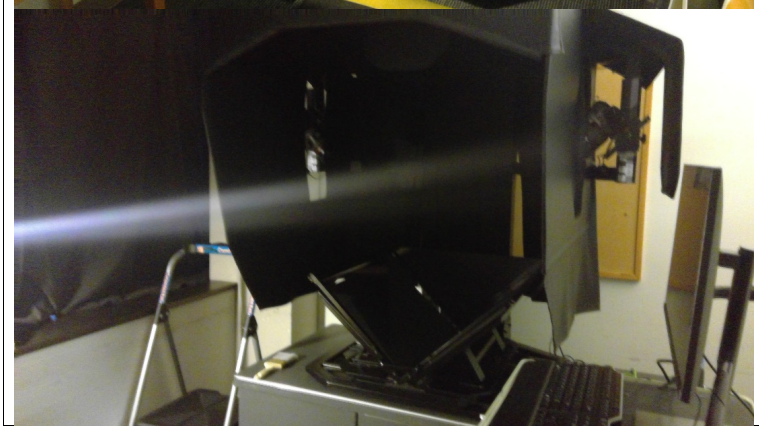
Workstation: Dedicated; no internet
Light control: No
Tech sits or stands: Sits
Foot pedal: No
Table size (for scanner): 5 x 3 ft
Workstation information: Low use, so don't need another dedicated table
Other:

http://www.promarketinc.com/catalog/scanners/creo-iqsmart3.html (not company we used)

ScanPro 3000

Workstation: Can be shared with student workstation
Light control: Not needed
Tech sits or stands: Sits
Foot pedal: No
Table size (for scanner): 6 x 3 feet; This is a side table for the scanner and surface for material
Workstation information: Ergonomic computer workstation (46 x 35”)
Other:





Mark 2 – Atiz Mark 2

Workstation: Dedicated
Light control: Needed to reduce light from behind technician
Tech sits or stands: Stand
Foot pedal: Yes
Table size (for scanner): 5 x 4 feet
Workstation information: Need computer stand (2 x 2 feet) and separate table for material
Other: Need space on each side for step ladders (needed to focus cameras)

https://mark2.atiz.com/

	Zeutschel 15000 Workstation: Dedicated Light control: Needed to reduce light to prevent glare Tech sits or stands: Stand or sit Foot pedal: Yes Table size (for scanner): 5 x 3 feet (provides work area, too) Workstation information: Need computer stand (2 x 2 feet) Other: Best to have computer on own table to avoid shaking the scanner table https://thecrowleycompany.com/digitization-products/large-format-book-scanners/a3-overhead-scanners/zeutschel-os-15000-models/
Camera on stand with light shields	Camera now in Special Collections Workstation: Dedicated Light control: Needed to reduce light to prevent glare Tech sits or stands: Stand Foot pedal: No Table size (for camera): 5 x 3 feet Workstation information: Need computer stand (2 x 2 feet) Other:

	Disbinding station Standing station for disbinding Table: 4 x 2 feet

SECTION **6**

Collections Program

MU Ellis Library
Collections Storage - Univ. Archives and Special Collections

PGAV Architects

Ellis Library - Collection Summary - SPECIAL COLLECTIONS & UNIVERSITY ARCHIVES

12/14/2020

University Archives

Location	Cubic Feet	Capacity in Cubic Feet	Notes	Proposed NFS Reg. Shelv.	Proposed NFS Compact Shelv.	
Lewis & Clark Halls	1,100	2,000	Clark Hall - Existing Storage SF	822	282	1,104
Univ. of Missouri Library Depositories	250	*Unknown*				Total
Univ. of Missouri Records Center	11,000	*Unknown*				
Est. Total	12,350					

INCLUDED in Lewis & Clark Halls Count Above:

		Location	Total No Boxes or Items	Dimension of Box or Items	No of Cubic Feet	No. Shelves - (3) Cubic Foot boxes each (42" wide x 16" deep)	No. Double-sided Units (12 vert. shelves)	Notes
Film								
Photographic Negatives, Footage	TBD	Lewis & Clark			500			*Rough Estimate Cubic Feet*
Total Existing					**500**	167	13.89	
20% Growth					**600**	200	16.67	
Cubic Foot Boxes								
				15" L x 12" W x				
(1) Cubic Foot Boxes	Compact	Lewis & Clark	624	10" H	624	208	17.33	Vert. Shelf spacing to allow 1'-1" clear
(1/6) Cubic Foot Boxes	Compact	Lewis & Clark	280		47	16	1.30	
(1/3) Cubic Foot Boxes	Compact	Lewis & Clark	601		200	67	5.56	
(1/2) Cubic Foot Boxes	Compact	Lewis & Clark	17		9	3	0.24	
Total Existing					**880**	293	24.43	
20% Growth					**1,055**	352	29.32	
Oversize Containers								
Oversize Containers (est. to be .41 CF each)	Compact	Lewis & Clark	320	*See notes*	131			*Sizes range from 5.75"x4.5"x12" to 25"x36"x2"*
Total Existing					**131**	44	3.64	
20% Growth					**157**	52	4.37	
Total Cubic Feet (above)					**1,511**	**504**	**42**	
20% Growth					**1,813**	604	50	

	1,402	876

NOT INCLUDED in Lewis & Clark Halls Count Above:

		Location	Total No of Cabinets	Total No of Drawers	Total No. of Items	Cab. Dim. (W" x D" x H")	Notes
Map Cabinets / Flat File Storage Units							
Oversized Folders	Flat File	Lewis & Clark	2	20	243	47x36x39	*(4) units stacked to form 2 units; height includes 6" base*
Oversized Folders	Cabinet	Clark	1	10	10	54x42x39	*Cabinet is two stacked units w/ base*
			3	**30**	**253**		
20% Growth			3.6				

		Location	Total No of Boxes or Items	Dimension of Box or Items	No of Cubic Feet	No. of Single-Sided 36" Shelves (3 cubic foot boxes each)	Notes
Misc. Boxes							
Envelopes - Average Size Standard Manila Type	Compact	Lewis & Clark	199		?		*What is preferred storage type?*
Oversized Packages (Varying Dimension)	Compact	Lewis & Clark	183		40	13	
			382		**40**	**13**	
20% Growth					**48**		

		Location	Total No of Cab.	No of Drawers	Notes		
Microfilm							
Microfilm Storage Unit	Cabinet	Lewis & Clark	1	12	*Stacked with a 23" x43" footprint. Configured to (9) rows per drawer. Each row can hold (12) 35mm or (19) 16mm*	311	311
					Should 20% growth factor be applied?		
					Total NSF - University Archives	**1,713**	**1,187**

Special Collections

			Total No of 36" Shelves	Assumed Vols. Per LF (Existing)	Total No of Double-sided 36" Sections *See notes for vertical height*	Adjusted Total Linear Feet of Shelving (+10%)	Total Est. Volumes (from MU)	Total Linear Feet of Shelving (from MU)	Notes		
Bound Materials - Regular Shelving											
Regular Shelving	Stationary	No. Ranges	**1,540**	15	128	4,620	65,000	4,200	*Books under 30 cm tall - 6 shelves high*		
20% Growth		**31**	**1,848**		154	5,544	78,000			3,318	1,588
Tall Shelving	Stationary	No. Ranges	**165**	8	28	495	3,500	450	*Books 30-40 cm (16") tall - 3 shelves high*		
20% Growth		**7**	**198**		33	594	4,200			798	508
Bound Materials - Flat Shelving											
XL Shelving	Stationary	No. Ranges	**523**	2	37	1,568	3,500	1,425	*Bound materials stored flat, more than 40 cm tall or 8 cm thick - 7 shelves high*		
20% Growth		**9**	**627**		45	1,881	4,200			1,166	767
XXL Shelving - Oversize Materials						**8,019**	**86,400**	**6,075**	*Bound materials that won't fit in XL. See "Shelving Unit" below.*		

12/14/2020

Special Collections, Cont'd.

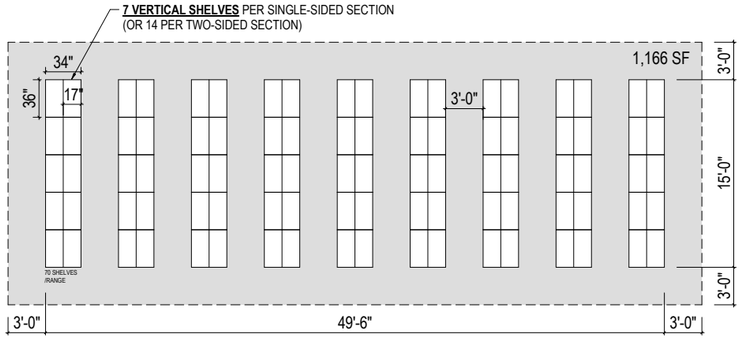
			Total No of Cabinets	No of Drawers		Cab. Dim. (W" x D" x H")		Proposed NFS Reg. Shelv.	Proposed NFS Compact Shelv.
Oversize Graphic Materials (maps, posters, prints, etc.)									
Map Cases:									
Venable Maps	Cabinets	401B	1	10		41" x 28.5" x 42.5"			
Travel Posters	Cabinets	410	1	6		67" x 36" x 40.5"	*Wooden cabinet that needs to be replaced*		
WWI/WWII Posters	Cabinets	304 Corridor	1	30		49.5" x 39" x 66.5"	*Cabinet filled over capacity*		
WWI/WWII Posters	Cabinets	307	1	10		70" x 55" x 43.5"	*Cabinet filled over capacity*		
WWI/WWII Posters	Cabinets	307	1	5		53.5" x 41.5" x 16.5"	*Currently stacked on top of larger cabinet*		
Older Gov. Docs and Misc. Maps	Cabinets	3 East	8	120	*Est.*	54" x 42" x 51"	*SC Room List - mostly digitized and rarely used; could be sent to UMLD if procedures can be worked out to recall large mat.*		
Sanborn Maps	Cabinets	303	2	20	*Est.*	48" x 36" x 56"			
			15	201					
50% Growth			**23**	302					

				No. of Items	Shelvg Unit Dim. (W" x D" x H")			
Shelving Unit:								
XXL Bound Volumes Stored in Open Rack	Stationary	307	1	103	120" x 32" x 43"	*Shelving unit filled over capacity; second unit this size is needed*		
Est. Total			**1**					
100% Growth			**2**				1,248	1,248

	Total No of 36" Shelves	Assumed Vols. Per 36" Shelf	Total No of Single-sided 36" Sections	Total Est. Items (from MU)	Total Linear Feet of Shelving (from MU)			
Total NSF - Special Collections (w/o Vault)							**6,530**	**4,111**
Total NSF - UA and SC (w/out Vault)							**8,243**	**5,298**

Propose to double size of existing vault = 370 NFS to 740 NSF							
Vault Material							
Regular Shelving	Stationary	401B		156		*Under 40 cm tall - 6 shelves tall*	
Flat Shelving	Stationary	401B		55		*Over 40 cm tall - 10 shelves tall*	
				211			
100% Growth				**253**			

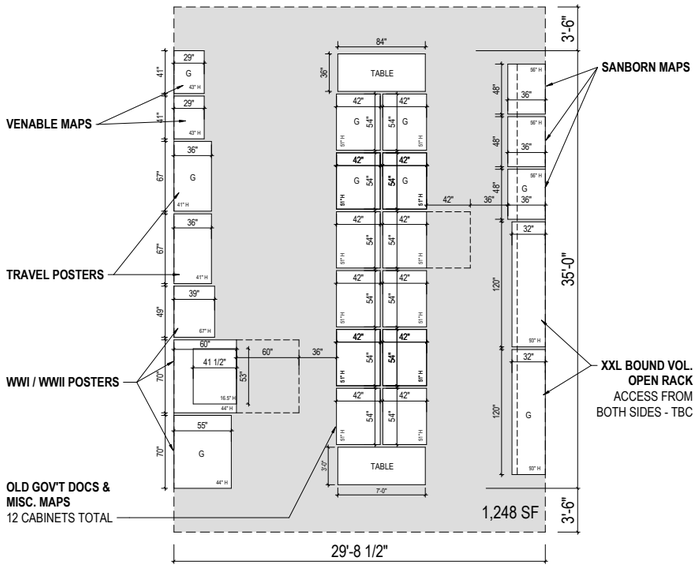
			Total No of 36" Shelves	Total Linear Feet (from MU)	Total No of Single-sided 36" Sections	No of Cubic Feet (from MU)	No. Shelves - (3) Cubic Foot boxes each	No. Single-sided Units (6 vert. shelves)			
					6 shelves vert.		42" wide x 32" deep				
Manuscript Collections	Stationary	401B	75	224	12	155	52	9	*Various box sizes and shapes, including oversize*		
Est. Total				224	12	155	52	9			
100% Growth				**448**	25	**310**	**103**	17			
Total NSF - Vault										**740**	**740**



SPECIAL COLLECTIONS FLAT SHELVING

TARGET: 627 @ 36" SHELVES; INCLUDES 10% ADJUST. (WORKING CAPACITY) / 20% GROWTH = 45 @ TWO-SIDED SECTIONS

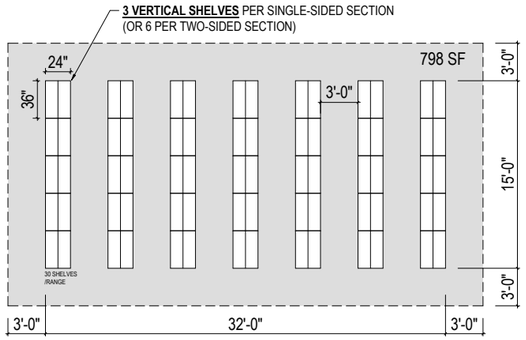
(EXIST'G: 475 @ 36" SHELVES)



SPECIAL COLLECTIONS

OVERSIZE GRAPHIC MATERIALS

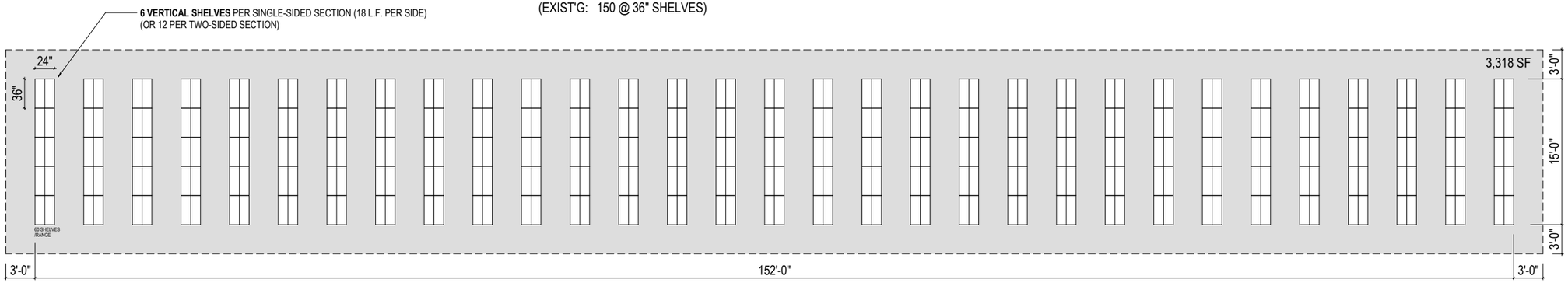
"G" = NEW CABINET / GROWTH



SPECIAL COLLECTIONS TALL SHELVING

TARGET: 198 @ 36" SHELVES; INCLUDES 10% ADJUST. (WORKING CAPACITY) / 20% GROWTH = 33 @ TWO-SIDED SECTIONS

(EXIST'G: 150 @ 36" SHELVES)



SPECIAL COLLECTIONS REGULAR SHELVING

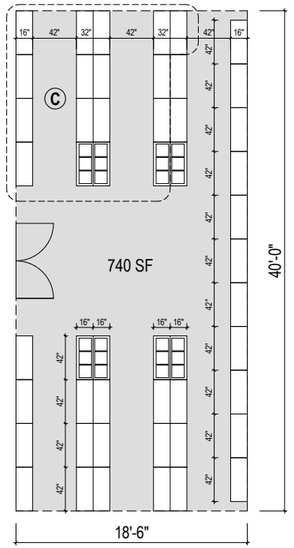
TARGET: 1,848 @ 36" SHELVES; INCLUDES 10% ADJUST. (WORKING CAPACITY) / 20% GROWTH = 154 @ TWO-SIDED SECTIONS

(EXISTING: 1,367 @ 36" SHELVES)

Ellis Library Feasibility Study
University of Missouri

VAULT MATERIALS

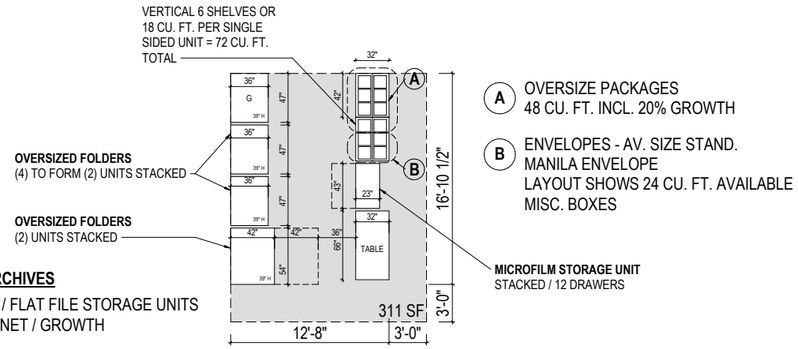
		EXISTING	PROPOSED
A	REGULAR SHELVING	156 ITEMS	
B	FLAT SHELVING	55 ITEMS	
C	MANUSCRIPT COLLECTIONS	224 L.F. / 155 CU. FT.	448 L.F. / 310 CU. FT.
	TOTAL	235 SHELVES / 640 L.F.	470 SHELVES / 1,280 L.F.



SPECIAL COLLECTIONS VAULT

LAYOUT ASSUMES:

- DOUBLE THE SIZE OF EXISTING VAULT
- (6) VERTICAL SHELVES PER UNIT
- (51) ONE SIDED UNITS @ 18 EACH = 918 CU. FT. OR 306 SHELVES



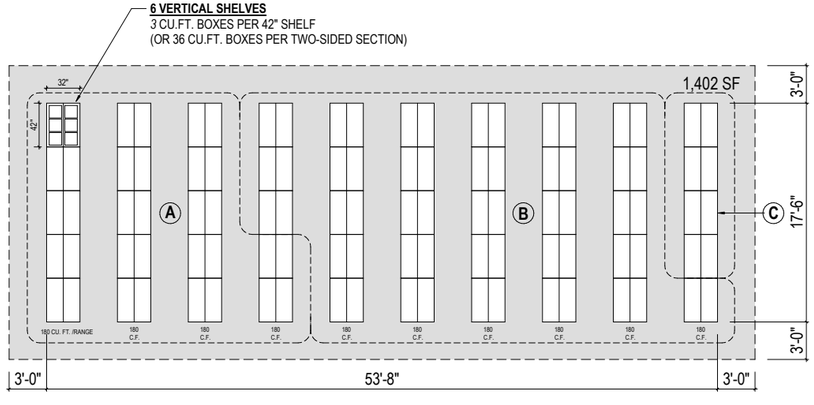
UNIVERSITY ARCHIVES

MAP CABINETS / FLAT FILE STORAGE UNITS
"G" = NEW CABINET / GROWTH

A OVERSIZE PACKAGES
48 CU. FT. INCL. 20% GROWTH

B ENVELOPES - AV. SIZE STAND.
MANILA ENVELOPE
LAYOUT SHOWS 24 CU. FT. AVAILABLE
MISC. BOXES

MICROFILM STORAGE UNIT
STACKED / 12 DRAWERS



A FILM = 600 CU. FT. OR
17 DOUBLE-SIDED UNITS.

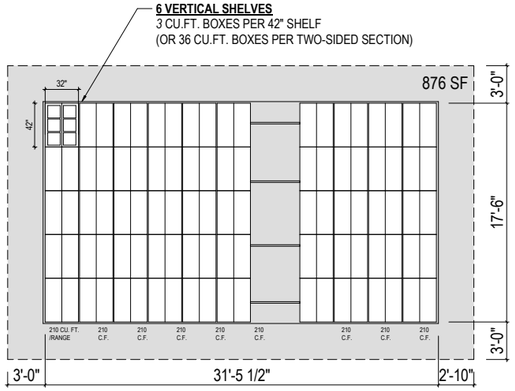
B CUBIC FOOT BOXES = 1,055 CU. FT.
OR 29 DOUBLE SIDED UNITS

C OVERSIZE CONTAINERS = 157 CU. FT.
OR 4 DOUBLE SIDED UNITS

UNIVERSITY ARCHIVES CUBIC FEET STORAGE

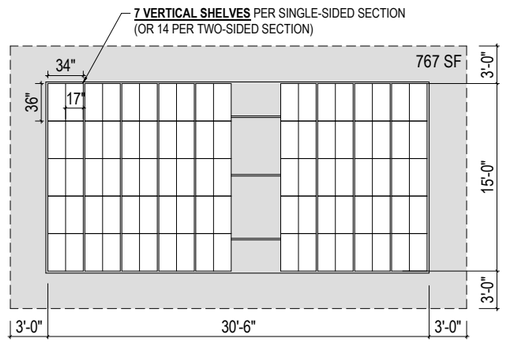
TARGET: 1,800 CU. FT.; INCLUDES FILM, CUBIC FOOT BOXES, OVERSIZE CONTAINERS + 20% GROWTH = 50 @ TWO-SIDED SECTIONS
(EXIST'G: 1,511 CU. FT.)

Ellis Library Feasibility Study
University of Missouri



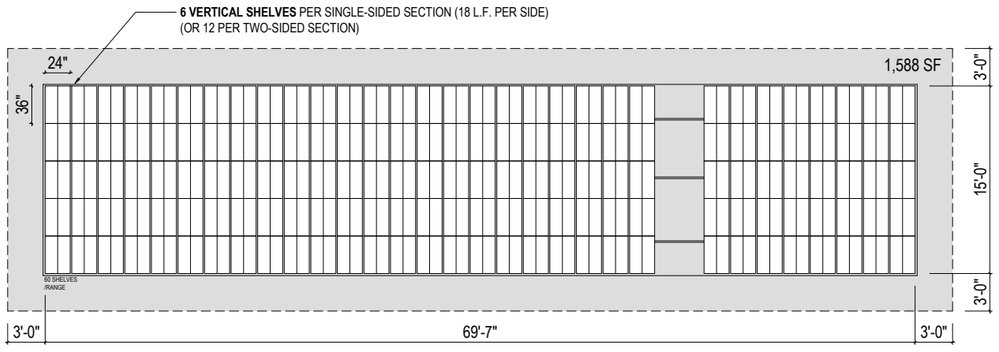
UNIVERSITY ARCHIVES CUBIC FEET STORAGE

TARGET: 1,800 CU. FT.; INCLUDES FILM, CUBIC FOOT BOXES, OVERSIZE CONTAINERS + 20% GROWTH = 50 @ TWO-SIDED SECTIONS
(EXIST'G: 1,511 CU. FT.)



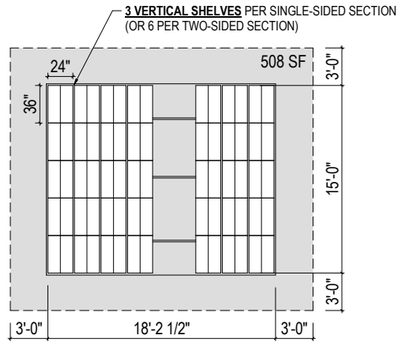
SPECIAL COLLECTIONS FLAT SHELVING

TARGET: 627 @ 36" SHELVES INCLUDES 10% ADJUST. (WORKING CAPACITY) / 20% GROWTH = 45 @ TWO-SIDED SECTIONS
(EXIST'G: 475 @ 36" SHELVES)



SPECIAL COLLECTIONS REGULAR SHELVING

TARGET: 1,848 @ 36" SHELVES; INCLUDES 10% ADJUST. (WORKING CAPACITY) / 20% GROWTH - 154 @ TWO-SIDED SECTIONS
(EXISTING: 1,367 @ 36" SHELVES)



SPECIAL COLLECTIONS TALL SHELVING

TARGET: 198 @ 36" SHELVES INCLUDES 10% ADJUST. (WORKING CAPACITY) / 20% GROWTH = 33 @ TWO-SIDED SHELVES
(EXIST'G: 150 @ 36" SHELVES)

Materials Estimates for Special Collections

Bound materials

Materials in Special Collections are primarily bound materials on paper. Bindings may incorporate leather, vellum, and/or cloth.

- Regular shelving (books under 30 cm tall): around 65,000 items currently on 4,100 linear feet of shelving
- Tall shelving (books 30-40 cm tall): around 3,500 items currently on 450 linear feet of shelving
- XL shelving (bound materials stored flat, more than 40 cm tall or 8 cm thick): around 3,500 items currently on 1,425 linear feet of shelving
- XXL shelving (bound materials that won't fit in XL): 103 (see below for dimensions)

Oversized graphic materials (maps, posters, prints, etc) stored flat in cabinets:

No. of cabinets	Cabinet contents	Room	W (in)	D	H	
1	Venable maps	401B	41	28.5	42.5	
1	Travel posters	410	67	36	40.5	wooden cabinet that needs to be replaced
1	WWI/WWII posters	304 corridor	49.5	39	66.5	cabinet filled over capacity
1	WWI/WWII posters	307	70	55	43.5	cabinet filled over capacity
1	WWI/WWII posters	307	53.5	41.5	16.5	currently stacked on top of larger cabinet
8	Older Gov Docs and misc maps	3 East	42	54	51	
2	Sanborn Maps	303	48	36	56	
1	XXL bound volumes	307	120	32	43	shelving unit filled over capacity; we need a second unit this size

Vault materials

The "vault" designation has been used as a catch-all term for items which are environmentally sensitive, unique, or irreplaceable. Environmentally sensitive materials include works on parchment and photographic materials. These items need to be stored in an especially cool, dry, and stable environment.

- Regular shelving (under 40 cm tall): 156 items
- Flat shelving (over 40 cm tall): 55 items
- Manuscript collections: around 110 cubic feet (various box sizes and shapes, including oversize)

Storage estimates for University Archives, University of Missouri
Prepared by A. Huelsbergen
September 29th, 2020

1. Lewis and Clark Halls -- 1,100 c.f. [capacity ~2,000 c.f.]
2. University of Missouri Library Depositories -- 250 c.f. [available capacity of UMLD1+Expansion for UA is unknown]
3. University of Missouri Records Center -- 11,000 c.f. [available capacity is unknown]

NOTES:

1. University Archives holds records in numerous physical formats, though these formats are not always segregated within individual collections or within the collections as a whole. It is therefore difficult to provide specific amounts of storage space required for the various physical formats/media if environmentally tailored storage spaces were to be identified or built. This data could be gathered but it would take time.
2. A rough estimate for film (photographic negatives, footage, etc.) currently stored in Lewis and Clark Halls would be 500 c.f. (this number is included in the above estimates)
3. The above totals for Lewis and Clark Halls **do include**:
    a. All cubic foot boxes (624)
    b. All 1/6 c.f. boxes (280)
    c. All 1/3 c.f. boxes (601)
    d. All ½ c.f. boxes (17)
    e. ~320 oversized containers (estimated at 0.41 c.f. each)
        i. Sizes range from 5.75"x4.5"x 12" to 25"x36"x2"
4. The above totals for Lewis and Clark Halls **do not include**:
    a. Oversized folders (243; many of these are stored map cabinets/flat files storage units)
    b. Envelopes (199; average size is a standard manila envelope)
    c. Oversized packages (183; varying dimensions)
    d. Microfilm storage unit (stacked with a 23"x43" foot print)

Special Collections rooms

Fourth Floor West

401A: stacks
Approximately 885 shelves: 2,581 linear feet of shelving

- Microfilm theses and dissertations (to be sent offsite as soon as possible, or possibly discarded)
- Rare book collection (stay onsite)

401b: vault and stacks
235 shelves: 640 linear feet

- Vault materials (stay onsite)
- Manuscript collections (stay onsite)

402: Currently Kelli's office (this can change)

403: Currently vacant

404: microfilm

- Microfilm scanners (really should be moved somewhere in Ellis that is easier to find/access for patrons)
- Microfilm newspapers (all available online and can be moved offsite)
- Microfilm periodicals (probably can be moved to UMLD or somewhere else in the building)

405: Currently John and GLA's office

406: Classroom

407: stacks
Approximately 1080 shelves currently; potential for about 1150 without microfiche/film cabinets: 3,100 linear feet currently; 3,500 potential linear feet

- Comic collection (onsite?)
- Rare L (tall upright; keep onsite)
- SPEC MU collection (in the process of transferring out of Special Collections)
- CLOSED collection (move about 2/3 to UMLD; discard duplicates)
- Microfiche materials (move to offsite)
- FILM MISC (move offsite)

408: John Henry's office

409: Indus scanner and photography table

410: storage

- Supplies
- Small amount of flat file storage (keep onsite, but needs to be moved to better conditions)

Third Floor Central

303: materials storage

- Sanborn maps in flat files (mostly digitized and rarely used; could be sent to UMLD if we could work out procedures for recalling large materials)
- Microfilm and micro-opaque (send to offsite)

304: Mostly vacant –supply storage (humidity issues)

307a: stacks
343 shelves: 1000 linear feet

- Closed folio (weed; send half to UMLD)

307b: Old darkroom – freezers

307c: flat file materials storage

- Posters and maps (stay onsite)

307d: stacks

- Elephant folio (stay onsite)

307e: Unprocessed materials (stay onsite)

307f: stacks, storage

- Theatre programs (Low use. Send to UMLD?)
- Unprocessed materials (onsite)

Fourth Floor East

4d21: stacks
546 regular shelves; 566 folio shelves: 1592.5 linear feet of regular shelving; 1235.5 linear feet of folio shelving

- Rare book collection (onsite)
- Rare XL (flat; stay onsite)
- Microfilm collections (need to go offsite, but many have never been catalogued)

SECTION **7**

Existing Conditions

INTRODUCTION

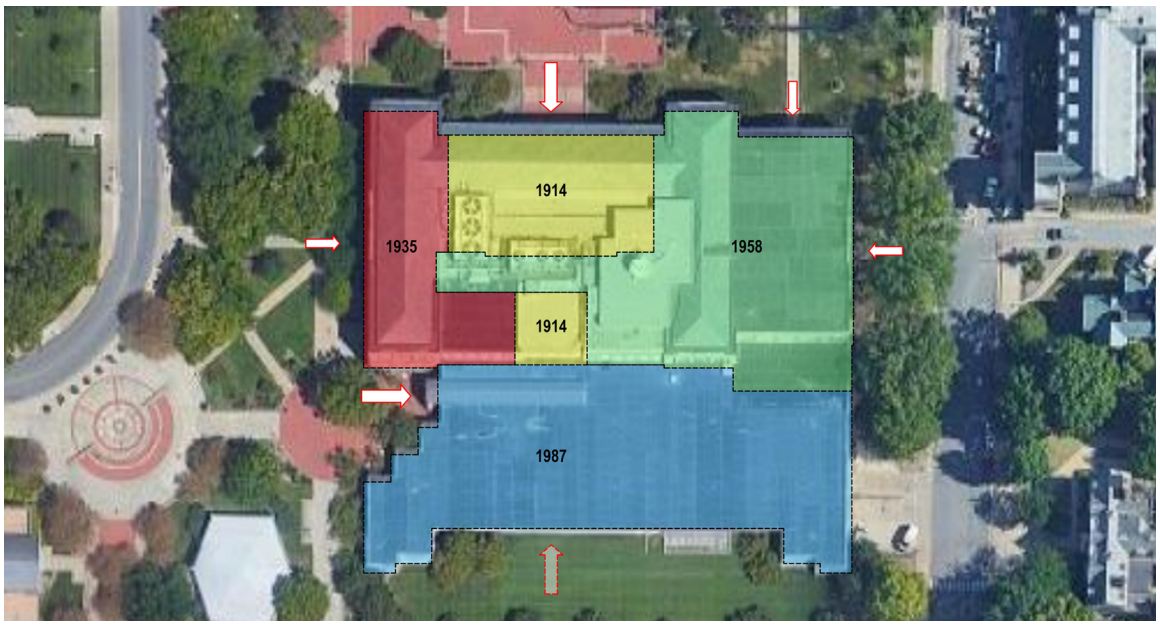
The general condition of Ellis Library has been thoroughly documented in a Facility Condition Assessment report completed by the ISES Corporation in May 2019. The focus of the current existing conditions report is on existing conditions relevant to the feasibility studies underway for the Central Service Desk (First Level) and consolidation of Special Collections, University Archives and Digital Services (location TBD).

The architectural section includes:

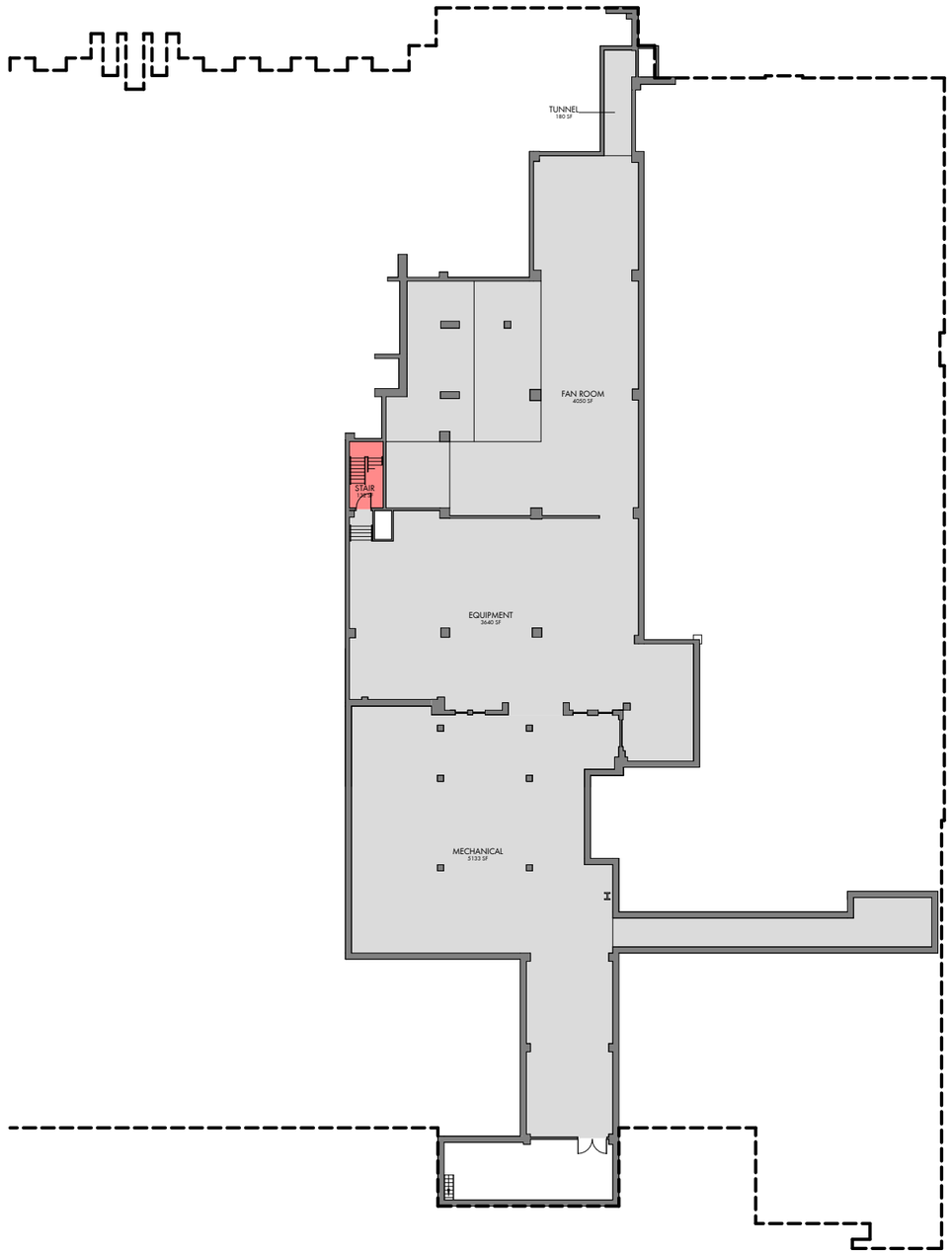
- Existing space use plans and diagrammatic building sections illustrating floor-to-floor heights
- Ground and First Level plan diagrams which identify primary horizontal circulation including building entrances, and locations of vertical circulation, mechanical rooms, and restrooms; the Ground Level also identifies "unassigned" space not controlled by the Library
- Analysis of the west stack which is shown in the master plan to be utilized for Special Collections and University Archives on the lower four floors

The engineering sections are outlined by discipline and include observations related to existing building systems, along with recommendations to address issues relevant for the feasibility studies. Key issues noted include:

- Elevated floor slabs have not been designed to support dynamic and concentrated loads associated with compact shelving systems
- Building is not fully sprinklered and addition of fire protection systems will be required as spaces are renovated
- New building temperature and humidity control systems will be required to achieve collection preservation and storage requirements

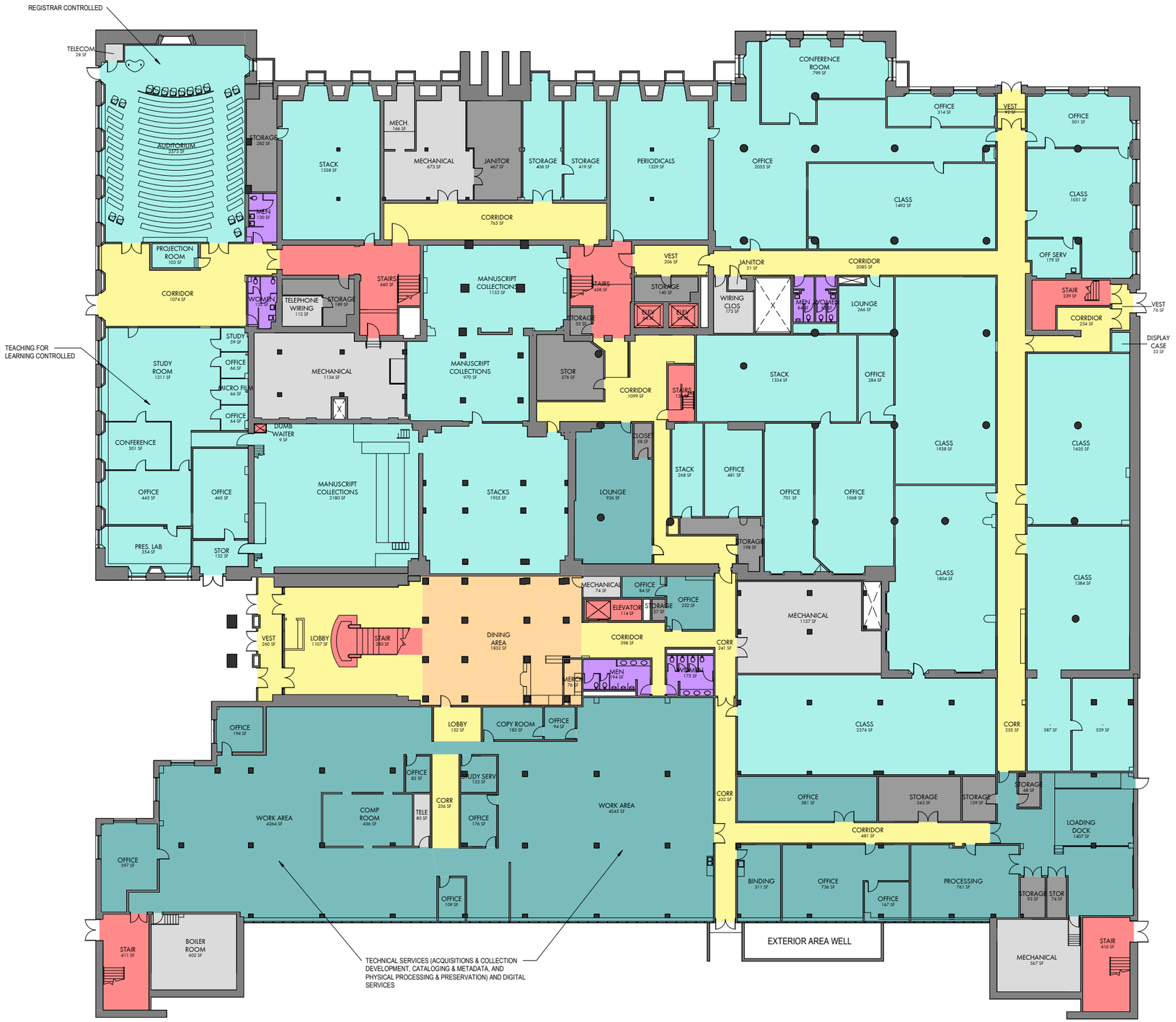


EXISTING SPACE USE PLANS



- CIRCULATION
- COLLECTIONS
- MECHANICAL
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- UNASSIGNED
- VERTICAL CIRCULATION

BASEMENT EXISTING SPACE USE
SCALE: NTS



EXISTING SPACE USE

- CIRCULATION
- COLLECTIONS
- INSTRUCTIONAL
- MECHANICAL
- NON-LIBRARY
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- VERTICAL CIRCULATION

GROUND LEVEL EXISTING SPACE USE
SCALE: NTS

EXISTING SPACE USE

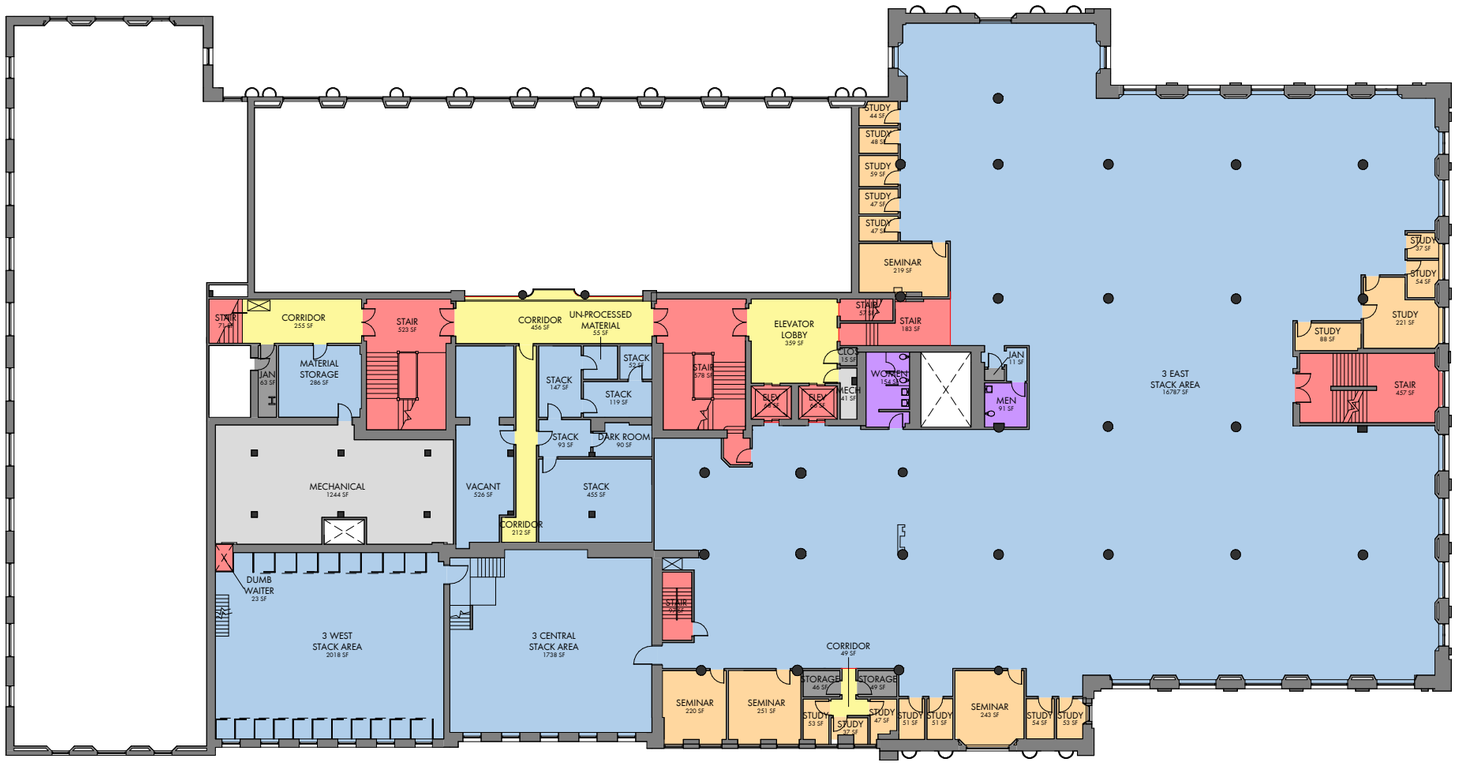
- CIRCULATION
- COLLECTIONS
- INSTRUCTIONAL
- MECHANICAL
- NON-LIBRARY
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- VERTICAL CIRCULATION

LEVEL 1 EXISTING SPACE USE
SCALE: NTS

EXISTING SPACE USE

- CIRCULATION
- COLLECTIONS
- INSTRUCTIONAL
- MECHANICAL
- NON-LIBRARY
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- VERTICAL CIRCULATION

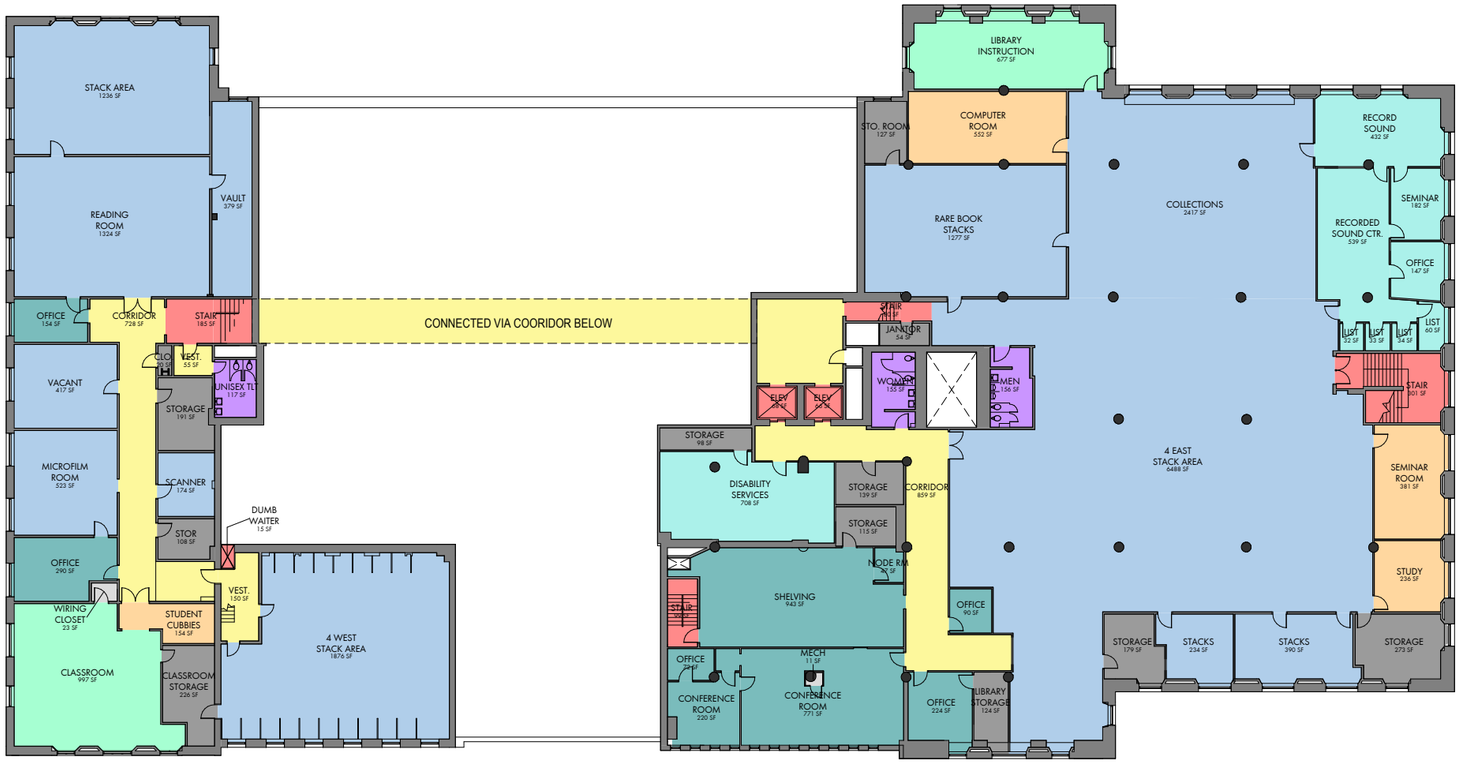
LEVEL 2 EXISTING SPACE USE
SCALE: NTS



- CIRCULATION
- COLLECTIONS
- MECHANICAL
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- UNASSIGNED
- VERTICAL CIRCULATION

LEVEL 3 EXISTING SPACE USE

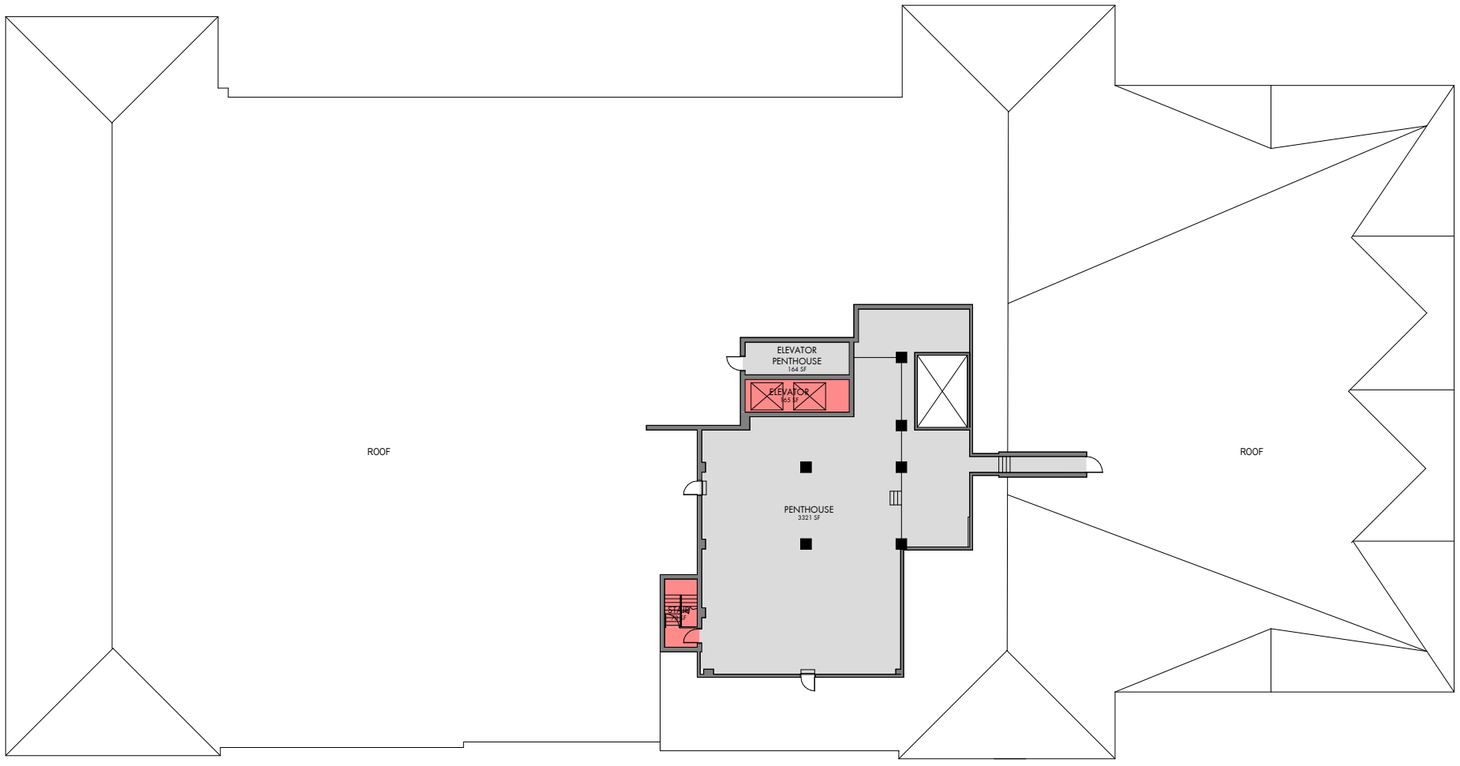
SCALE: NTS



EXISTING SPACE USE

- CIRCULATION
- COLLECTIONS
- INSTRUCTIONAL
- MECHANICAL
- NON-LIBRARY
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- VERTICAL CIRCULATION

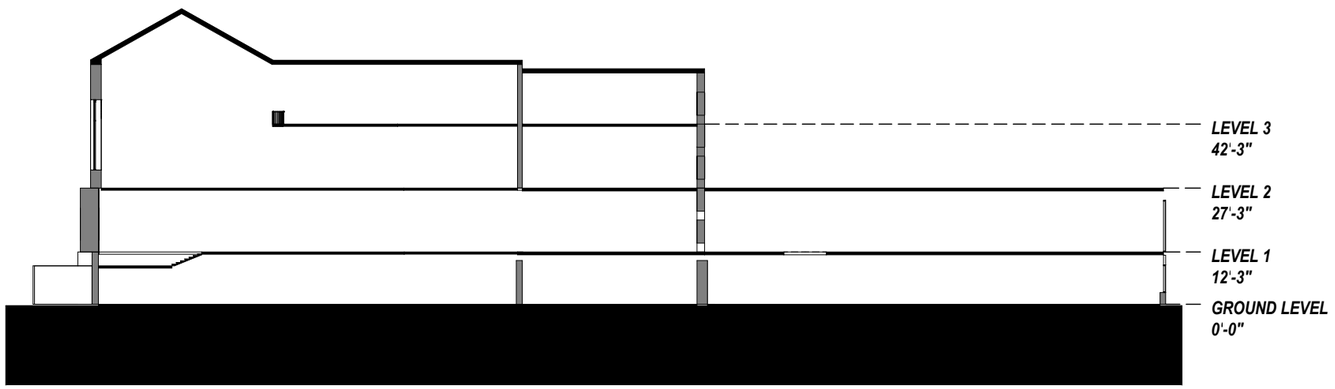
LEVEL 4 EXISTING SPACE USE
SCALE: NTS



EXISTING SPACE USE

- CIRCULATION
- COLLECTIONS
- INSTRUCTIONAL
- MECHANICAL
- NON-LIBRARY
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- VERTICAL CIRCULATION

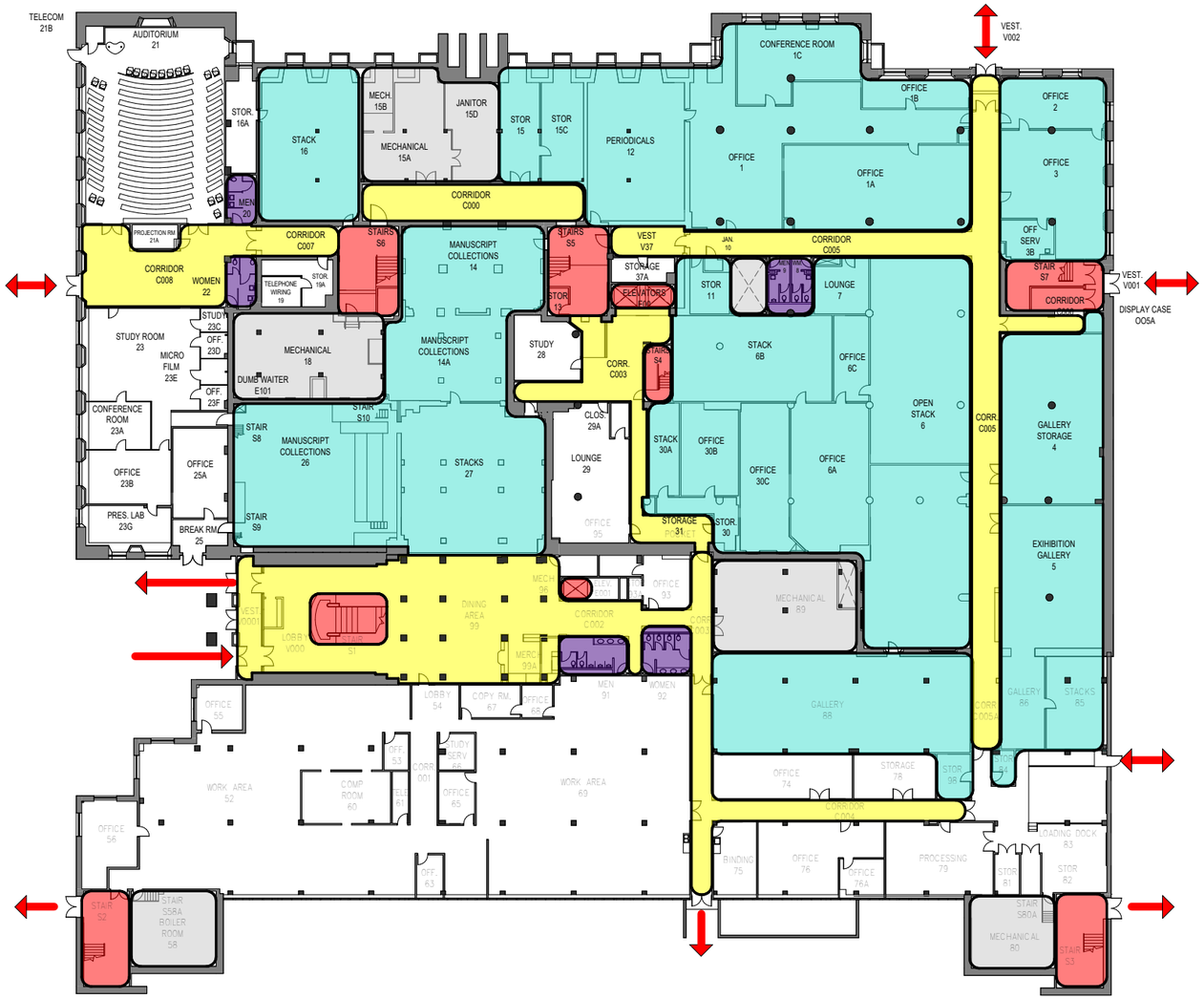
PENTHOUSE EXISTING SPACE USE
SCALE: NTS



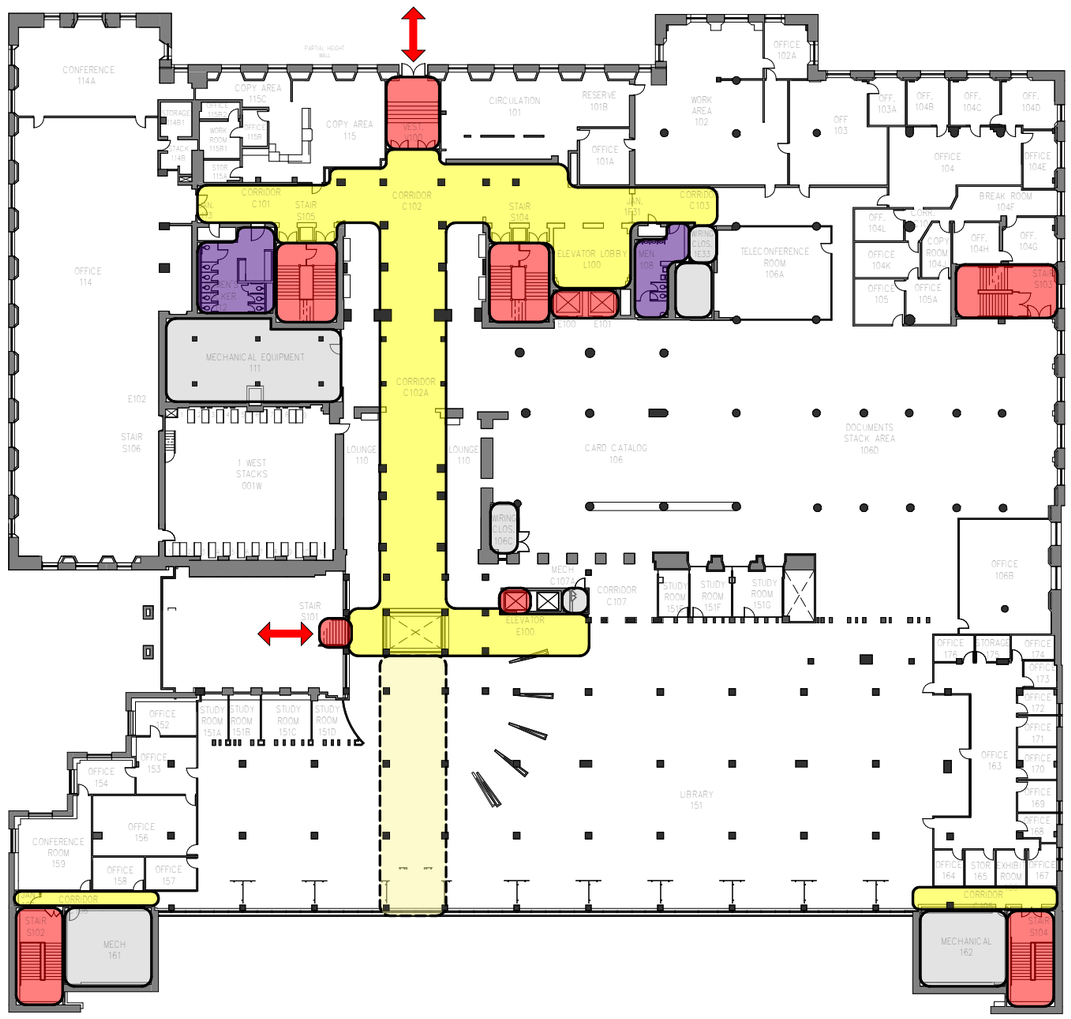
COLONNADE NORTH / SOUTH SECTION LOOKING EAST

STACKS WEST / EAST SECTION LOOKING NORTH

BUILDING LOGIC DIAGRAMS



GROUND LEVEL BUILDING LOGIC DIAGRAM
SCALE: NTS



LEVEL 1 BUILDING LOGIC DIAGRAM
SCALE: NTS

WEST STACK ANALYSIS

One key goal for the current study was to determine if the use proposed in the master plan is feasible—to store collections for Special Collections and University Archives on the lowest four floors in a temperature and humidity-controlled environment suitable for archival preservation.

The stack structure is comprised of thin concrete floor slabs supported by closely spaced vertical posts which in turn support bookshelves and collection material loading directly to the foundation. The stack floor-to-floor dimension is roughly 7'-6", which yields approximately 7'-3" clear height (code minimum is 7'-0" for occupied spaces). Existing wall construction is unit masonry, and structural support has been installed to stabilize walls and prevent further movement due to known foundation issues in this part of the building.

In considering options for the west stacks, other uses were considered that would require modifications to reinforce or reconfigure the existing structural system to accommodate heavier loads and/or increase floor-to-floor height. These modifications were determined to be infeasible and/or cost prohibitive if implemented on a floor-by-floor basis. The most viable strategy for adapting this part of the building for other uses would be to demolish the west stacks entirely and rebuild with new structural frame and floor slabs from the foundations up, as was done for the original tier stack immediately to the east.

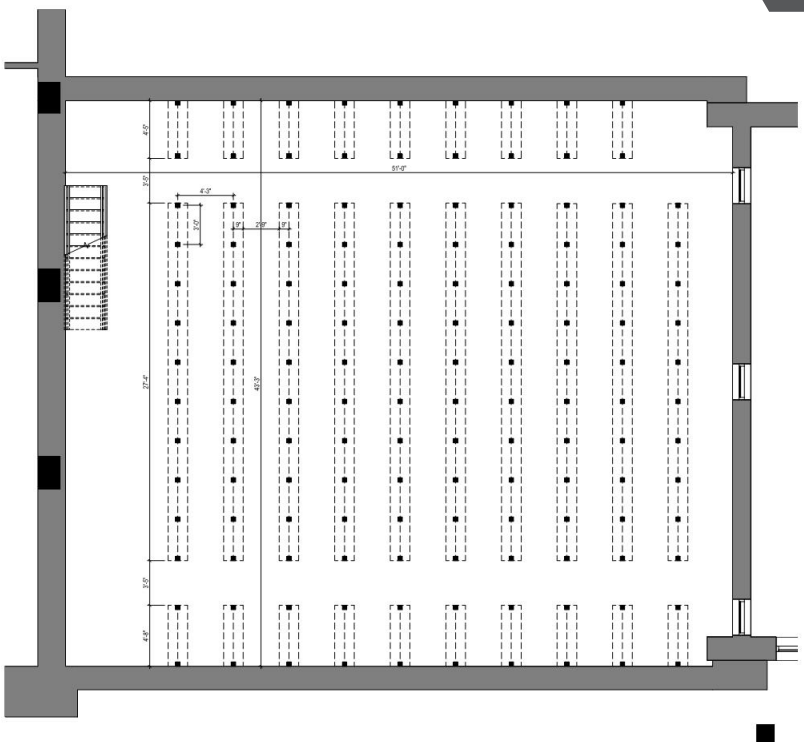
In terms of adapting the existing structure for suitable collections storage, temperature and humidity control were noted as the biggest challenge due to the relatively poor envelope, and the lack of clear height for overhead air distribution. Despite these limitations, we do believe it's feasible to seal and insulate the existing perimeter walls, and to create full height mechanical chases/plenums at the narrow stack sections on either side of the cross aisles, avoiding the need for overhead ductwork entirely. This strategy would supply ducted high volume / low velocity conditioned air near the ceiling from one side of the room through VAV boxes, and return high volume / low velocity air near the floor at the other side of the room. See diagram attached illustrating the proposed solution.

In terms of storage capacity, the central area of the stack (10 ranges with 9 @ 36" wide shelving sections each) would be utilized for collections, and the stack sections along with perimeter would be reserved for HVAC distribution as described above. We've concluded that one additional floor (or 5 stack levels total) is needed to accommodate the majority of the shelved materials in the collections. In addition, separate collections storage space is needed for the following collection materials:

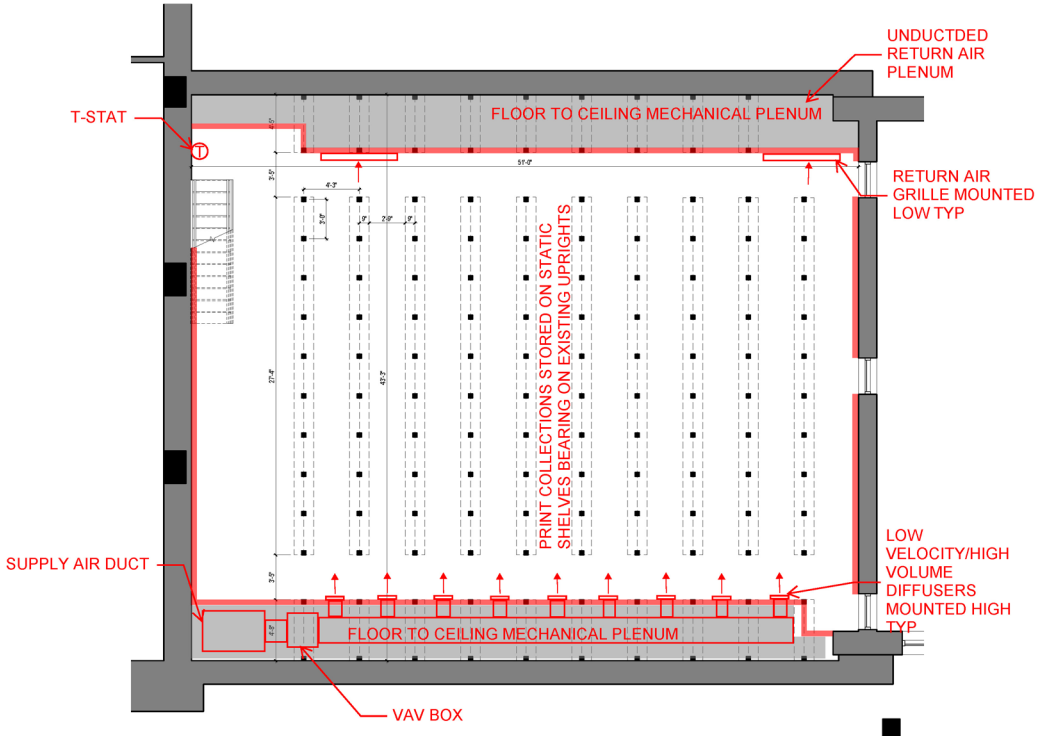
- Vault materials
- Special Collections Oversize Graphic Material (flat files, etc.)
- University Archives map cases, flat files and microfilm storage

Fire protection options for the space are still being evaluated. Wet-pipe, dry-pipe, and pre-action sprinkler systems would need to consider minimum sprinkler head clearances that may impact how high collections can be stored. Clean agent and hypoxic strategies could minimize or eliminate the need for sprinkler pipe distribution and would eliminate the possibility of water damage in the space, but these systems are more expensive to install and would need to be designed to work with the high air volume / low velocity HVAC strategy described above. Each of these options will be investigated further as part of the feasibility study.

In summary, we believe the most appropriate use of the existing west stack is for collections storage, and that a suitable archival collection storage environment can be achieved in this space utilizing the strategy described above. As such, the planning strategies developed as part of the current feasibility study will continue to show the west stacks utilized for print collection storage.



TYPICAL WEST STACK TIER



WEST STACK TIER MECHANICAL DIAGRAM

MEPT/FP BUILDING SYSTEMS ASSESSMENT

The mechanical, plumbing, fire protection, electrical and low voltage (MEPT/FP) systems were assessed on October 7, 2020 for general useful life, maintainability, and suitability for their use in the renovation of the building. This report outlines general description of these systems and their ability to be adopted to the new function while complying with the applicable University of Missouri (UM) codes and requirements. Additionally, this report outlines observed system and/or equipment level deficiencies as well as opportunities for betterment to promote student and staff safety, greater efficiencies, easier maintenance, and lower cost of building operation.

Facility Description

The library is located on the campus of the University of Missouri in Columbia, MO and serves as the main library. It was built in 1915 and has undergone several additions and renovations throughout.

Applicable Codes & Standards

Modification to this facility will be expected to meet or exceed the following codes and standards adopted by UM System:

- Americans with Disabilities Act (ADA)
- ASHRAE 90.1-2016
- ASHRAE Standard 62.1-2016
- ASHRAE Standard 55-2016
- 2018 International Building Code
- 2018 International Mechanical Code
- 2018 International Mechanical Code
- 2018 International Existing Building Code
- 2018 International Fuel Gas Code
- 2018 International Fire Code
- UM amendments to the International Codes
- National Fire Alarm Code – NFPA 72, 2016
- Installation of Fire Sprinkler Systems – NFPA 13, 2016
- Life Safety Code – NFPA 101, 2012 Edition
- National Electrical Code – NFPA 70, 2017
- Standard for the Installation of Air-Conditioning and Ventilating Systems – NFPA 90A, 2018
- Safety Code for Elevators and Escalators – ASME A17.1 (per state of Missouri)
- Illuminating Engineering Society of North America (IESNA) and applicable RP and DG publications
- Underwriters Laboratories, Inc (UL)

MECHANICAL SYSTEMS

Several different mechanical systems have been employed in the existing building throughout its renovation and addition history. This narrative provides a summary of the existing mechanical systems. The information contained in this document will be used during the current renovation design process.

Air Handling Units

Campus supplied steam and chilled water serve several multizone air handlers (AHU) that are beyond their design lifecycles. The original library units are 1958 American Standard which have been patched and upgraded with new components such as cooling and heating coils, motors, and variable speed drives to improve operation without replacing. The 1980's south addition units are 1986 Carrier with new frequency drives and motors installed in 2007. In early 2000's, as part of the energy initiative, the downstream supply air distribution ductwork was converted to a variable air volume (VAV) system. Building ventilation is facilitated by timeworn exhaust fans with steam heating coils. The auditorium air handler was replaced in 2012 and is in good working order.

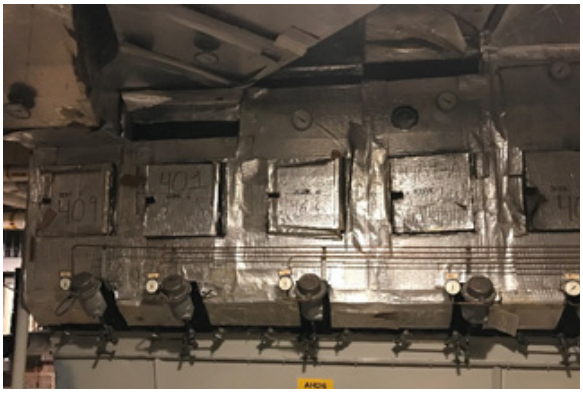


FIGURE 1 – TYPICAL AHU SERVING ORIGINAL LIBRARY

Supplemental Heating

The east perimeter areas are heated by steam via fin-tube radiators installed in 1958. The central and west perimeter areas are heated by cast-iron radiators. Additional heating is provided by steam unit heaters. All units have exceeded their service lives.

FIGURE 2 – TYPICAL RADIATOR

Building Exhaust

Building and restroom exhaust is provided by utility exhaust fans.

Building Automation System

All HVAC systems in the building are connected and controlled by a central BAS system.

Observed Concerns

The pipe insulation has probable asbestos content and needs to be abated. The chilled water variable speed pumps have exceeded their design lifecycles. The radiant heaters and associated piping are well past their useful life. Portable dehumidification units are used in Special Collections due to the existing air distribution system limitations.

FIGURE 3 – PORTABLE DEHUMIDIFIERS

Recommendations

These recommendations should be evaluated and updated to appropriately align with the renovation scope.

- Any air handling units impacted by the renovation be replaced with central VAV systems that will take advantage of energy savings opportunities.
- Air handling unit(s) impacted by the renovation will be designed to meet Image Permanence Institute for archival prints collections temperature and humidity guidelines. Refer to IPI report for Archival Environment Recommendations.
- Any areas impacted by the renovation be provided with a singular BACnet (or equivalent) building automation system to communicate at a centralized head-end and could be monitored by campus facilities personnel.
- Any steam radiators impacted by the renovation be replaced with perimeter linear diffusers served by air handling units zoned to provide heat as needed.

- Auditorium air handler AH-10 remain in service.
- Energy recovery be evaluated to take advantage of energy savings opportunities.
- Any condensate return components impacted by the renovation be replaced with new versions of the existing equipment.
- Second chilled water pump be replaced with a new version of the existing equipment.

PLUMBING SYSTEMS

Domestic water and sewer services are provided by the campus. Roof drainage is internally piped to the campus storm drain system. The main library domestic water and sanitary are at least as old as the 1958 addition with subsequent modifications and portions may be older. The water piping is a mixture of copper and galvanized steel and has scale and lead solder with ample degradation throughout the system. The restroom fixtures are predominately 1958 vintage and are operating beyond their useful lives. Plumbing systems in the 1980's south addition consist of copper piping for potable water and cast-iron, no hub with copper run-outs for sanitary waste and stormwater piping.

Recommendations

These recommendations should be evaluated and updated to appropriately align with the renovation scope.

- At a minimum, piping risers and piping within renovated spaces be replaced.
- All plumbing fixtures within the scope of renovation be replaced
- The stormwater sump pump serving the 1980s south addition be replaced

FIRE SUPPRESSION SYSTEMS

The existing fire suppression system only appears to cover areas of the library that have been updated.

System Description

Fire protection provided by wet-pipe fire suppression systems have been installed in renovated areas of the library.

Recommendations

These recommendations should be evaluated and updated to appropriately align with the renovation scope.

- Perform a fire flow test for the building to determine static and residual water pressures. This will be used to determine the feasibility of retaining the existing fire service for the entire building. Also, this will determine the need of a fire pump to maintain proper flow and pressure to the most remote zones.
- Should a fire pump be required, this pump will need to be located within a fire rated room enclosure with proper working clearance around the pump and electrical service for the pump.
- A new dry pipe or pre-action fire protection system to be installed in the collections vault.
- Wet pipe fire sprinkler system to be installed in all other renovated areas not currently protected.

ELECTRICAL SYSTEMS

The existing electrical infrastructure of the facility was built to serve the library and its utility plant. The system has been renovated several times to keep up with the evolution of the library with major renovation in 1958. Due to the updates and renovations in the system, different level of useful remaining life exists in the system component. This section describes the existing systems, their suitability for reuse and observable concerns that would be expected to be corrected during any major renovation.

Normal Power Distribution

Facility is served by secondary unit substations located in the basement utility plant. These substations supply 480V and 208V services and appear to be installed in 1958. They were operating warm and beyond their useful lives. These substations receive medium voltage supplies at 13.2 kV and significantly increase the arc flash as well fire hazard in the facility. This can be mitigated by replacing the services with exterior pad mounted transformers supplying interior switchboards with remote switches.

FIGURE 4 – SECONDARY UNIT SUBSTATIONS; 13.8 KV POWER LINES TERMINATES INTO EACH SUBSTATION AND ARE STEPPED DOWN TO PROVIDE 208Y/120 AND 480Y/277V SERVICES

Both 480V and 208V systems are distributed throughout the facility via numerous distribution and branch panelboards. Most of these are collocated within the

mechanical rooms. Some panels are located in other non-utility spaces such as stacks, hallways, breakroom, etc. Panelboards in stacks are located along the stair well. This location is unsafe for operation and maintenance. Most of the panels throughout the facility are legacy panels by GE or Square-D, several of which are missing parts and show significant deterioration. The replacement circuit breakers may not be readily available for these. At a minimum, all original panels within the renovation area should be replaced.

TYPICAL BRANCH PANELS: FIGURE 5 – LEGACY GE BRANCH PANEL; FIGURE 6 – NEWER SQUARE D BRANCH PANEL

FIGURE 7 – PANEL ALONG STAIRS IN STACKS AREA.

The facility lacks dedicated electrical rooms. Collocating electrical infrastructure with other utilities creates potential for obstruction of the dedicated spaces required for safe operation of the panels. Several panels have pipes directly above them. Some panels have drip pans installed to divert water away from the panels.

FIGURE 8 – PANELS COLLOCATED IN MECHANICAL ROOM: DISTRIBUTION PANEL'S DEDICATED SPACE ABOVE OBSTRUCTED BY DUCT WORK

The facility mostly utilizes EMT conduit which is appropriate for the application. Receptacles and similar wiring devices have been added throughout the facility to meet the evolving needs of the respective spaces. Renovated spaces should be provided with receptacles that are properly identified and planned for the programmed space and future flexibility. Study spaces can benefit from having a combination USB charger receptacle.

Emergency Power Distribution

The existing facility does not currently have an emergency power distribution supplied by a central source such as a stand-by generator. The egress lighting is via stand-alone battery powered emergency lights. The renovated facility can have all the legally required emergency systems such as egress lighting, fire alarm system etc. supplied by appropriately sized batteries. Refer to interior lighting section for additional description of emergency lighting. If the facility experiences prolonged power outages and spaces such as special collections cannot sustain such outages, onsite alternate power should be considered. Provision to connect a temporary generator if one can be readily available can also be considered in lieu of a permanent one-site generator.

Renewable Energy

The existing building does not have any renewable energy sources. The large lower flat roofs that stay mostly unshaded are suitable for roof mounted photovoltaic (PV) system. These roofs can potentially generate 360 MWh energy annually via 275 kW system.

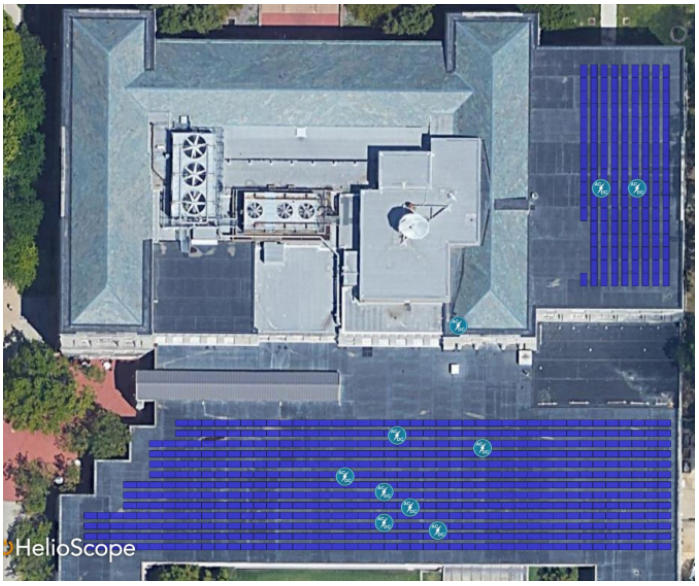
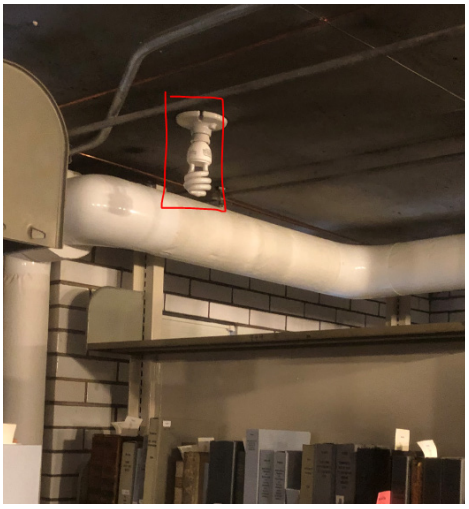


FIGURE 9 – POTENTIAL PV SYSTEM; 275 KW SYSTEM ITERATED USING 400W PV MODULES

Interior Lighting

The lighting system in the facility is a mixture of screw-in bulbs, circular and tubular fluorescent lamps, and tubular LED lamps. This is leading to varying quality of inefficient lighting and a cumbersome maintenance stock. Renovation should have all LED lighting with CRI and CCT selected for the application.



LIGHT FIXTURES IN STACKS:

FIGURE 10 – CIRCULAR FLUORESCENT LAMP; FIGURE 11 – SCREW IN COMPACT FLUORESCENT

GENERAL INTERIOR LIGHTING: FIGURE 12 – SURFACE MOUNTED TROFFER IN HALLWAY;

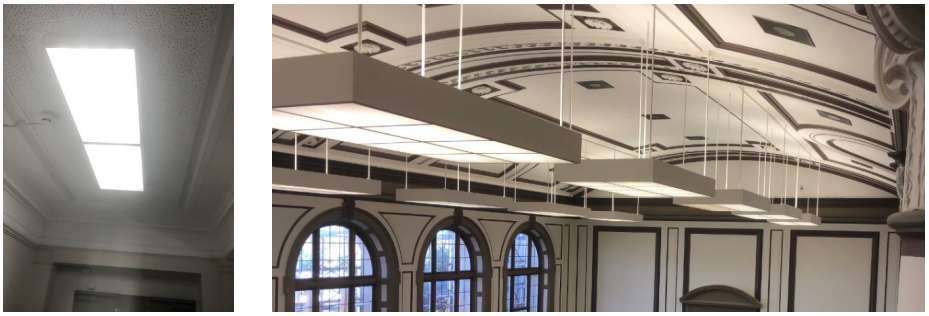


FIGURE 13 – GENERAL LIGHTING IN STUDY AREA

Egress lighting is provided by standalone emergency lighting units with twin heads. While these are appropriate for narrow spaces such as corridors, they do not provide suitable egress lighting in larger open spaces. Several areas in the library have tall spaces where maintaining and testing battery backups on egress lighting is not only challenging, the performance of the system is also poor because only a fraction of light output is sustained by the local batteries. A central inverter for egress lighting with at least 90 minutes run time should be considered for taller spaces whereas battery backups integral to light fixtures illumination. University's preference is to use wall mounted emergency lights as much as possible.

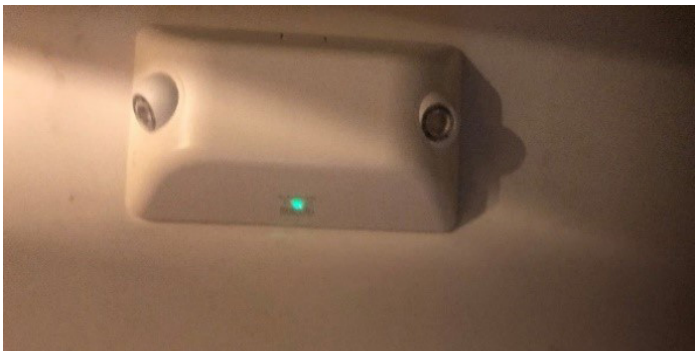


FIGURE 14 – EMERGENCY LIGHTING UNIT

TYPICAL STANDALONE EMERGENCY LIGHTING UNIT USED FOR ILLUMINATION OF EGRESS

Exterior Lighting

The existing site lighting consists of several building mounted lights and post top lights. One dual head pole mounted light, several building mounted wall packs and in-grade fixtures. If all exterior fixtures are operational, they seem to be appropriately located to adequately illuminate the walkways and building entrances. As Site changes are not anticipated, existing site lighting can be maintained.

FIGURE 15 – TYPICAL POST TOP LIGHT; FIGURE 16 – EXTERIOR WALL SCONCES

Fire Alarm

The facility has FCI 7200 series Fire Alarm Control panel. It is a microprocessor based analog system serving horn strobes and smoke detectors throughout the building. A public facility of this nature should have a voice evacuation system which is also required by the university design criteria. A Class A system that has a fail-safe wiring topology should be considered for the new system.

FIGURE 17 – FIRE ALARM CONTROL PANEL
FIRE ALARM CONTROL PANEL WITH CLEARANCE PARTIALLY OBSTRUCTED BY DRINKING FOUNTAIN

Lightning Protection System

The existing facility does not have a Lightning Protection System. A lightning protection risk assessment performed as prescribed in NFPA 780 Standards for Installation of Lightning Protection Systems recommends that this facility to be protected by a lightning protection system due to its large footprint, relative location, contents, and occupancy. NFPA 780 compliant lightning protection system should be evaluated for this facility. The existing structure/façade presents a challenge to have vertical down conductors as they can adversely impact the aesthetics of the façade.

Observed Concerns

- Unit substations in the basement are beyond useful life and pose a significant arc-flash and fire hazard because of the much higher voltage being brought into the building
- Distribution panels and branch panels are collocated in mechanical rooms where the dedicated space above for several is obstructed
- Most of the distribution and branch panels appear to be antiquated and show missing parts, corrosion, and overall degradation.
- Panelboards in stacks are located along the stair well. This location is unsafe for operation and maintenance
- Interior lighting is inefficient and inconsistent. Stacks are underlit and do not have the appropriate lighting that provides vertical illumination.
- Lighting control is mostly manual and does not meet the current energy codes
- Fire Alarm system is antiquated and lack voice announce capability.
- The facility does not have a lightning protection system

Recommendations

The existing electrical infrastructure is tailored for the library several decades ago and most of the distribution equipment are at or near the end of their useful life. In addition to correction of the observed concerns listed in the previous section, below are some recommendations. These should be evaluated and updated to appropriately align with the renovation scope.

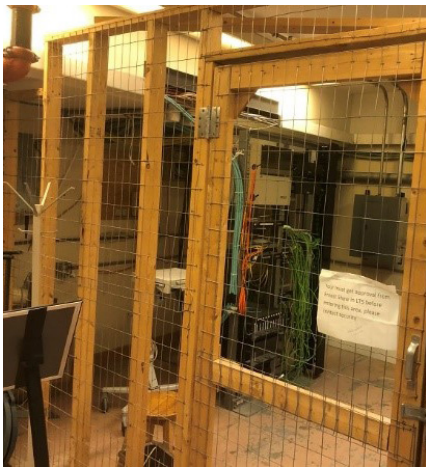
- Removing the substations and replacing them with exterior pad mounted transformer should be considered. If existing services are replaced, the new electrical service should have separate, stand-alone enclosure for main circuit breaker to mitigate arc flash hazard.
- At a minimum, distribution panels and branch panels within the renovation area should be replaced.
- Dedicated Electrical rooms should be planned for the renovated spaces.
- Receptacle layout that allows more flexibility.
- All existing interior and exterior lighting should be upgraded with new, energy efficient LED lights including new lighting control system.
- A central lighting inverter with 90-minute run time should be considered for egress lighting in limited spaces where wall packs are unable to provide adequate egress lighting.
- New fire alarm system should be provided—some options to be considered in the new fire alarm system include voice evacuation, weather announcements and active shooter notification.
- A lightning protection system should also be considered.
- Roof mounted Photovoltaic (PV) System may be considered to make the building more resilient and sustainable

LOW VOLTAGE SYSTEMS

By and large, the low-voltage equipment is located in "found space" and the campus IT teams have done a commendable job working with an old built that was not building with telecommunications in mind. Going forward and with any renovation work, moving equipment from the existing locations to "real" telecommunications rooms of proper size and ideally stacked between floors would greatly increase the usability and functionality of the system.

Telecommunications

The existing building service entrance was not visible at the time of this report. This simply means either the service entrance is piped directly into the building, or it was hidden by scaffolding around outside of building. As for the interior entrance, it is assumed it comes into Room 19 in the basement in a locked cage. Unfortunately access to this cage was limited.



EXTERIOR WORK ON BUILDING BEING DONE AND ASSUMED TERMINATION POINT OF INCOMING SERVICES: FIGURE 18 - INCOMING SERVICES (EXTERIOR); FIGURE 19 - INCOMING SERVICES (INTERIOR)

It appears that one main Telecom Room (TR) is serving the building. It is located on the ground floor in Room 19. It is constructed with standard construction lumber framing and large gauge wire mesh walls stapled to the outside of the frame. The TR entrance door is locked but is hinged on the unsecured side of the door. The data racking consists of two 2-post, 19-inch floor racks with tapped rails. There is no separation between the two racks. It is not believed that the racks are secured to the floor. There is one vertical wire manager on the far end of the second rack. There are two separate fiber distribution panels, one for 62.5-micron multimode fiber, and the other for 50-micron multimode fiber. The room appears large enough for additional data rack expansion. The main TR is generally clean, but not well organized from a cable management perspective.

There is a second TR on the ground floor in room 11. This TR houses one 19" data rack with tapped rails. This data rack has some underutilized horizontal cable management and no vertical cable management. The rack is bolted to the floor, but there is not any ladder rack or other type of cable support between the wall and the rack. There are fiber optic feed cables (both 50- and 62.5-micron MM) within the room. There is a door access control panel and power supply mounted on the wall behind the rack. There are telecom tie cables terminated on the backboard, which is behind and offset from the rack. There is room to expand the rack layout, however, installing additional racks side by side with the current rack would make it difficult to work on the telecom cabling and create access issues to the access control panels. The horizontal cabling leaving the room is supported against the wall via D-rings but is only supported via zip-tie to a conduit when turning away from the back wall. This TR appears generally clean but is not well organized from a cable management perspective.

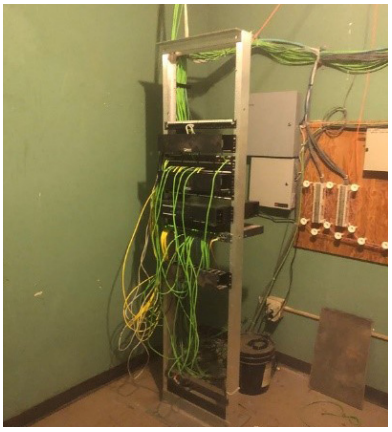


FIGURE 21 - ROOM 11 TR RACK (INTERIOR OF ROOM 11 ON GROUND FLOOR)

FIGURE 22 - ROOM 11 HORIZONTAL CABLING SHOWS HORIZONTAL CABLING SUPPORT LEAVING

Floor 1 has 3 TRs. Room 106C houses the highest capacity of cable terminations. It contains three 19" 2 post data racks with tapped rails. There is vertical cable management between the racks, but none installed on the outside rails of the rack ends. There is also horizontal management in all three racks. A 12" ladder rack spans the width of the room, in line with the data racks. There also appears to be ladder rack extending down from the ceiling behind the racks on the back wall. The cables are zip tied to guide the rack within their decent down the back of the racks and into the patch panels. Wire management seems to be much cleaner overall; the exterior two racks are a bit less organized than the center rack. While there is physically room to place additional racks to the left of the existing racks, doing so would leave the backside of the rack in accessible and block access to the back of the existing racks. There is also a paging amplifier and analog telephone mounted on a small plywood backboard. This TR houses fiber feed cables in 50- and 62.5-micron cables in the rack and on the plywood, respectively. The floor of the room is a little cluttered but overall, the room is clean.

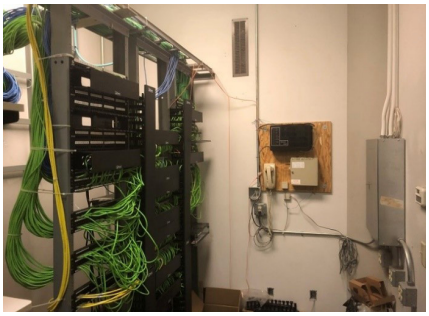


FIGURE 23 - ROOM 106C DATA RACKS SHOW THE INTERIOR OF ROOM 106C

FIGURE 24 - ROOM 106C LADDER RACK SHOWS HORIZONTAL CABLING WITHIN LADDER RACK IN ROOM 106C

Room 1E33 is a TR that houses two 19" data racks with tapped rails. The cables are fed from above, and are zip tied to a vertically mounted ladder rack that is attached to the back wall behind the racks. The ladder rack does not extend from the wall to the data racks. There is no vertical or horizontal cable management and there is no separation between the two data racks. Lack of cable management results in the patch cabling to be extremely disorganized. There is a telephone wall field mounted on one wall with several 66-style punch down blocks. There is also an in-wall box that houses cabling, whose usage is unknown. There is also a paging amplifier and access control panel & power supply housed in this room. The room has some clutter, but overall seems to be kept fairly clean.

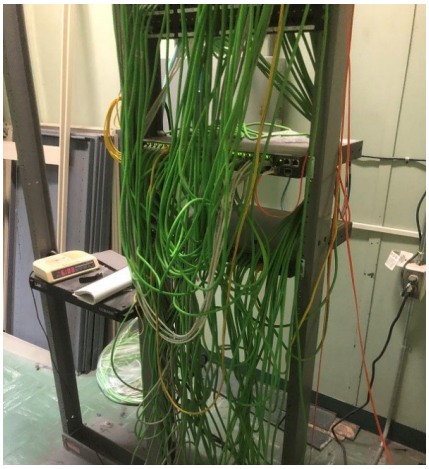


FIGURE 25 - ROOM 1E33 DATA RACKS (INTERIOR OF ROOM 1E33)

FIGURE 26 - ROOM 1E33 LADDER RACK (INTERIOR OF ROOM 1E33)

There are additional TR rooms scattered throughout the building. In Room B1, there is an enclosed cabinet that appears to serve as some type of fiber hub. This may or may not be part of the main network. More investigation may need to take place before commenting further. Room 58 has a plywood backboard that is the home for some 66-style punch down blocks and a door access panel & power supply. There are also random junction boxes with different types of communications cable in them. These boxes seem to typically serve the purpose of a splice point to service different

types of systems ranging from paging, to analog phones/lines, to low-voltage circuits, possibly for door access control panel connectivity. It is highly likely that not all of these boxes were located during the walkthrough, and it is also possible that not all telecom rooms were logged.

FIGURE 27 - ROOM B1 FIBER HUB CABINET

FIGURE 28 - ROOM 58 TELECOM BACKBOARD

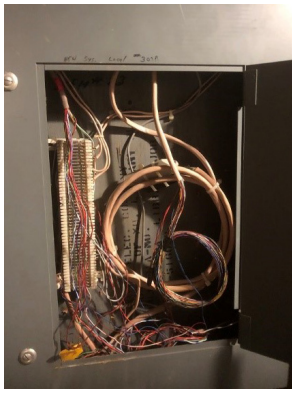


FIGURE 29 - ROOM 303A TELEPHONE J-BOX

6.3 Electronic Security

The Electronic Security system for this building appears to consist of Access Control, Cameras, and possibly intrusion, although the intrusion could not be verified. There were 3 keypads designating Northwest, South and East. These appeared to GE Interlogix components, but it is unclear as to whether these served an intrusion system or were some type of interface for the Access Control system. Various GE Interlogix Manuals for ACURT2/ACURT4 systems were found, but main security panel does not seem to have been verified. This is further complicated due to some old GE boxes having been repurposed for the use of Johnson Control access control system components. This needs to be investigated further to determine all access control components, manufacturers and locations. Supporting documents from the 2017 install of access control components might help clear this up if available. Intrusion control panel location, system capacity, and system specifications should be identified, assuming they exist, before determining additional recommendations. The camera system appears to be a hybrid solution of an analog camera system and an IP based NVR system, both manufactured by Exacq.

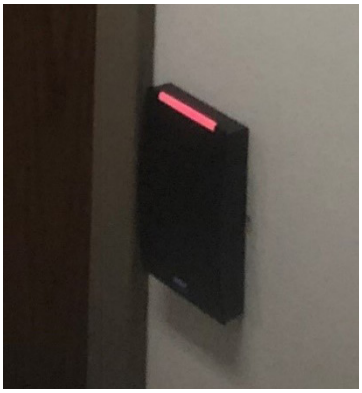
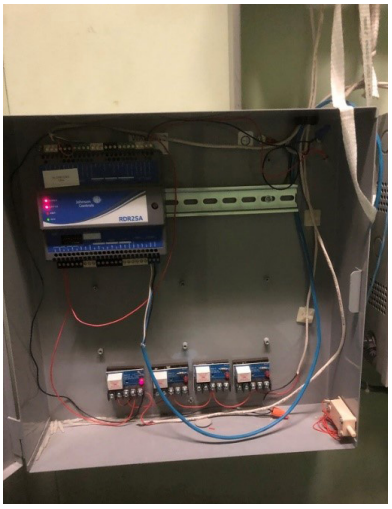


FIGURE 30 - CARD READER

SHOWS TYPICAL CONDITION OF EXISTING CARD READERS

The interior access controlled doors are secured by HID iCLASS proximity readers and electronic door strikes. The door access control boards appear to be Johnson Controls control panels, and the door strikes are powered by Altronix power supplies



TYPICAL ACCESS CONTROL DOOR CONTROL BOARD AND LOCK POWER SUPPLY: FIGURE 31 – JCI RDR2SA DOOR CONTROL BOARD; FIGURE 32 - ALTRONIX AL300 POWER SUPPLY

The wall controls are manufactured by GE. The system headend equipment was not located but it is assumed that these are part of an intrusion detection system. It is not in any way associated with the campus card access system.

FIGURE 33 – GE INTERLOGIX KEYPADS

SHOWS WALL MOUNT INTRUSION OR ACCESS CONTROL KEYPADS LOCATED IN ROOM 111

The video surveillance system consists of two separate DVR/NVR systems, both located on custom built shelving in the Security Office. One system is an analog system using BNC style coaxial connections, and the other system is an IP based system utilizing the ethernet connection to the data network to communicate with IP based cameras. The location for these systems, while encouraging air flow, is cluttered and potentially poses several security and safety issues.

FIGURE 34 - EXACQ CAMERA SYSTEMS SHOWS LOCATION OF VIDEO SURVEILLANCE SYSTEMS

Audiovisual

The library appears to have a significant number of paging speakers and amplifiers. Many of these speakers are old and appear dated. The paging system is a Bogen paging system consisting of many TPU amplifiers placed throughout the building in the TRs. It is not known whether the system is a 25 Volt or 70 Volt system, but the TPU series Bogen amplifiers support both 25- and 70-volt speakers. It is unknown what the audio source for the paging system is, or where it is located. It is also unknown if it is fully operational, its typical use or how often it gets used. Further research is suggested before recommendations can be made, but the amplifiers seemed to be powered so it is assumed the system is in a working state. Paging systems like this are durable and expandable, so reusability is highly likely.

SHOWS EXAMPLES OF EXISTING SPEAKER HORNS AND AMPLIFIERS:

FIGURE 35- PAGING SPEAKER; FIGURE 36 - BOGEN TPU AMPLIFIER

Observed Concerns

- Main TR is subject to unauthorized access using wire cutters to cut through the walls, a screwdriver to remove hinges, or simple scaling of the wall to climb over the top of the it.
- None of the telecom rooms appear to have any type of cooling or humidity control.
- Typical structured cabling is secured using zip-ties, which can cause signal degradation due to overzealous installation and cinching.
- Cable support in many areas is against standards. There are several areas where cables are tied to electrical conduits or water pipes. Some cables are not supported every 5 feet and are just drooping across long distances.
- Most telecom rooms have poor or no cable management.
- Most telecom rooms appear disorganized regarding patching between patch panels and network switches.
- Most telecom rooms are lacking ladder rack for cable routing and added support.
- Both rooms have poor cable organization and are lacking intentional incoming/ outgoing pathways (slots, sleeves, conduits).

- Surveillance system contains mix of analog and IP cameras. Analog cameras are typically lacking in video quality and can be detrimental when using recorded video for security purposes.
- Fiber optic cables and patch cables are routed without protection or being secured in some cases.
- Telecom rooms do not appear to have proper bonding or busbars.

Recommendations

These recommendations should be evaluated and updated to appropriately align with the renovation scope.

EXISTING TELECOM ROOMS

- Secure each telecom room with their own walls, entry door, and apply access control to each one. Telecom rooms should not share space with other purposed rooms whenever possible
- Install mini-split cooling units or vent for HVAC with temperature controls for each telecom room. Properly cooled telecom rooms maximize efficiency and extend lifespan of low voltage control systems. Humidity control is important with this consideration as well
- Install new ladder tray between at least one wall and the data rack in each telecom room
- Install new vertical management with covers between racks and on the end of each row. Install new horizontal management with covers between each panel and switch. Move racks to accommodate, if necessary AND feasible
- Install a new telecommunications main ground busbar (TMGB) and bond all racks and ladder tray
- Provide new 48-port 2RU patch panels for all copper cabling, rated for category 6 at minimum. Category 6A panels are recommended and should be considered.
- Install new anti-static flooring and acoustical tile ceiling in telecom rooms with 4” sleeves through the tile to ceiling space for cable routing.
- Relocate or install all new head-ends for electronic security, audio/visual, and other systems in this space. A centralized, temperature & humidity-controlled space is ideal for these systems
- Provide additional power distribution units (PDUs) and battery back-ups, sized to allow for minimum of 15 minutes runtime for all equipment housed in these spaces
- Provide all new color-coded copper and fiber patch cords, and neatly organize all cabling in the space
- Provide 4” conduits to floor below for routing cabling to that level
- Re-evaluate current telecom room locations and consider moving to new space to accommodate new proposed construction. Ensure all new data cabling that would be installed for new spaces can be accommodated withing T-568 standard of 100 meters (~300 feet)

HORIZONTAL CABLING

- Install all new horizontal copper cabling, minimum category 6. Category 6A cable is recommended and should be considered
- Provide minimum of 2 category cables to each administration office, workstation, and classroom. It is recommended to install two data locations in each office or classroom with two outlets at each location
- Install new 12" wire-mesh basket tray down main hallways of the building, and from those hallways to each of the telecom rooms. These should be installed above drop ceiling but at accessible heights

BACKBONE CABLING

- Install minimum of 12-strands OM4 interlocking armored fiber, terminated with LC connectors, between any new telecom room and a centralized telecom room. 24-strands is recommended and should be considered. Current 50 micron fiber should be reused where possible

WIRELESS NETWORK

- Perform a pre-site heat map survey prior to renovation to get a baseline coverage of each floor to determine current user experience
- Perform pre-install predictive wireless survey for anticipated coverage before any design changes are implemented
- Perform post install wireless signal survey to ensure coverage needs are met.
- Provide a new wireless network and access points to cover the entire interior of the facility
- Consider providing wireless coverage for the immediate exterior of the facility

ELECTRONIC SECURITY

- Install new access control system, with card access for all exterior doors, administration areas, telecom rooms and any other areas that should have desired card access
- Install new video surveillance system that provides coverage for all exterior doors, interior corridors, and common spaces—a security viewing station should be provided for security personnel
- Upgrade any analog, coaxial cabled surveillance cameras with IP based high resolution cameras
- Provide intrusion system for all exterior doors, roof accesses and secured areas with valuable contents to protect form unauthorized access after normal operating hours

AUDIO/VISUAL

- Repurpose current system or install new paging system to cover the entire facility—either way, it is suggested to centralize the paging system amplifiers
- Install all new 70 Volt paging speakers in all areas that require coverage
- Install A/V connections and displays in all work/study areas where multimedia access is desired. Considerations for network connectivity, display connections and audio/video controls should be made based on intended use of each room.

PRELIMINARY STRUCTURAL SYSTEMS ASSESSMENT

- The existing building complex includes the original library structure built in 1914 and significant building additions in 1935, 1958 and 1987.
- The building structure is cast-in-place concrete and is in generally good repair. The original building and additions through 1958 had interior concrete beams between columns and one-way slabs. Perimeter brick masonry walls support the slab and beams, providing lateral stability to the building.
- The south 1987 building addition is a two-way concrete slab structure with drop panels (thickened floor slab) at the concrete columns. Lateral stability is provided by concrete shear walls in the south mechanical rooms.
- The roof framing included steel trusses in the earlier building phases while the roof of the 1987 addition is concrete flat slab and was planned as a future second floor. Sheet S1 of 1987 structural drawings indicates that the building was designed as a five-story building for future expansion.
- A sub-basement mechanical level extends from the 1958 addition on the north below the ground floor to a south exterior areaway in the 1987 addition.
- The exterior of the building is clad in limestone, except for a portion of the south face of the 1987 addition which is a more modern glass wall system. Currently, the north and western exterior walls have full height scaffolding and the exterior is being renovated.
- The 1958 building addition demolished a portion of the original building and filled in an exterior space with additional floor levels to be used for mechanical rooms that remain today.
- Design live loads for the building are not provided on the original drawings but would have been in accordance with the building codes in force at the time of construction. The required live loads would range from 60 psf in the reading rooms, 100 psf in the first-floor corridors and stairs, 80 psf in the upper level corridors in acc towers. Further investigation and evaluation of the floor capacity could be required if higher loads are anticipated in a space for a future program.
- The original 1914 library stacks were demolished and a two-way concrete slab structure at heights matching the library floors was placed at the time of the 1987 addition. Historical information indicates that the original cast iron

shelving structure was provided by Snead and Company of Louisville, Kentucky.

- The original 1935 west stacks remain today and were also likely provided by Snead and Company, but it is not the earlier cast iron system. The library stack posts appear to be made of thinner steel sheet materials and are doubled up on the lowest level. The stack floors and roof slabs for this area are supported directly by the closely spaced vertical posts. The posts are 7'-6" tall and stacked on top of each other. The joint between posts is cast into the concrete slab pour and lateral ties the system together between the exterior walls.
- The proprietary posts are design to support the sheet metal bookshelves and carry the heavy book loads directly to foundations placed at the lowest level. Historical information indicates that the stack floor systems were designed for a 40 psf live load appropriate for the people accessing the stacks.
- Modification of the proprietary library stacks is difficult due to the changes in the building code and would require significant reinforcement. Like the original stacks, the floors and roof could be demolished and be rebuilt as part of a building program to accommodate heavier loads and more accessible spaces. In our opinion this is likely to be expensive but less so than trying to reinforce or reconfigure the existing system into a different configuration.
- Structural Engineering Associates of Kansas City has been retained over many years to monitor, report, and analyze ongoing building movements and settlements in the western 1935 portion of the structure. They have recommended that the area be underpinned to prevent further movement. They have also reported and recommended repairs to the west stacks and the auditorium on the lowest level in the 1935 addition.
- An existing opening in the 1987 first floor at the top of the stairs may be infilled as part of the new program. The current opening has concrete beams on four sides. Adding a steel angle and placing a concrete slab on steel deck could likely be accomplished with minimal cost.

SECTION **8**

Appendix

SECOND LEVEL SPECIAL COLLECTIONS, UNIVERSITY ARCHIVES, AND DIGITAL SERVICES SUITE (LOOKING SOUTHWEST)

VIEW LOOKING TOWARD SPECIAL COLLECTIONS READING ROOM FROM LOBBY / EXHIBIT SPACE

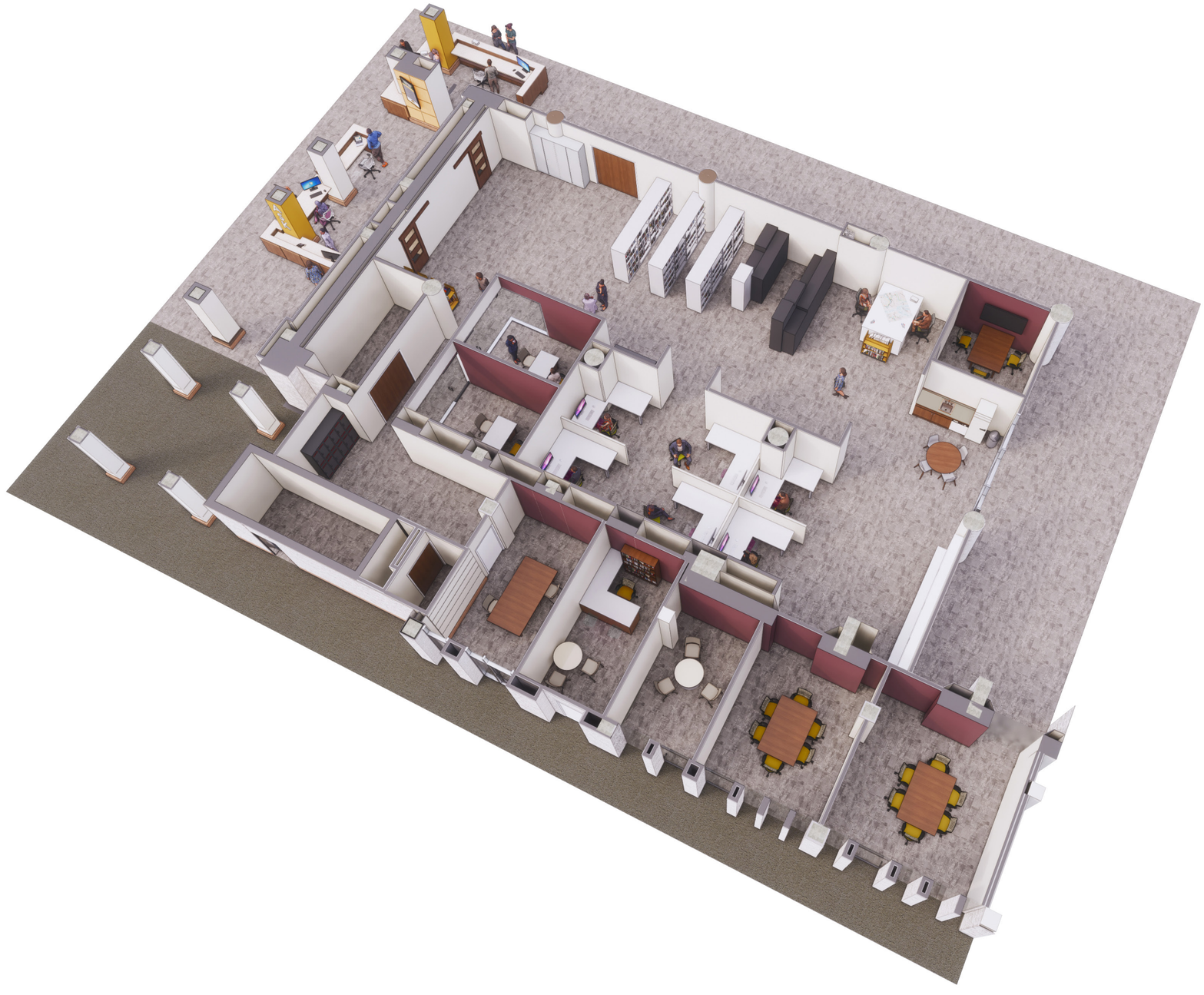
VIEW OF SPECIAL COLLECTIONS READING ROOM FROM STUDENT STUDY SPACE

VIEW OF SPECIAL COLLECTIONS READING ROOM LOOKING SOUTH TOWARD RECEPTION DESK

VIEW OF SPECIAL COLLECTIONS READING ROOM LOOKING NORTH TOWARD PATRON SEATING

VIEW OF INSTRUCTIONAL ROOM LOOKING EAST TOWARD TEACHING WALL

VIEW OF PROCESSING SPACE LOOKING SOUTHEAST WITH STAFF OFFICES BEYOND



VIEW OF CENTRALIZED SERVICE DESK INCLUDING SECURE STAFF WORK AREA LOOKING NORTHWEST

VIEW OF CENTRALIZED SERVICE DESK LOOKING SOUTH

VIEW OF CENTRALIZED SERVICE DESK LOOKING NORTHEAST

ALTERNATIVE CONCEPTS INTRODUCTION

The following documents alternatives explored for two proposed strategic renovations that were identified in the 2019 Master Plan for Ellis Library:

- Consolidation of Special Collections, University Archives and Digital Services
- Centralized Service Desk

The feasibility studies include an evaluation of the master plan recommendations for both areas, along with investigation of existing building conditions in order to develop concepts that respond to the Library's vision and goals and existing building system needs and constraints. The preferred concepts were identified in Workshop #3 following a rigorous planning process that began by confirming the project vision and goals, then defining projected space needs for each function, then exploring alternative planning scenarios within the larger context of Ellis Library, and finally developing concept alternatives illustrating how the program could be configured within the designated area.

SPECIAL COLLECTIONS, UNIVERSITY ARCHIVES AND DIGITAL SERVICES CONSOLIDATION

Alternative concepts exploring multiple locations for Special Collections, University Archives and Digital Services were studied, including:

- Ground Level – within the 1987 South Addition, accessed from the Library's West Entry
- Split scheme - utilizing Ground Level (1987 Addition) for collections and staff space and First Level (southeast corner) for public space, visible from the top of the West Entry stair
- First Level – in the northwest corner as originally recommended in the Master Plan including utilization of multiple levels of the west stack for collections
- Second Level – in the east and south wings of the Library, utilizing the entire floor except for the large historic reading rooms

The Ground Level options were noted as having the following deficiencies:

- Potential conflict with future south addition as shown in the master plan, which is planned to extend the main north/south axis through the building and create a new south entrance
- Concern that the Museum's use of spaces vacated by the State Historical Society of Missouri could limit long-term flexibility for Special Collections, University Archives, & Digital Services
- Concern over lack of dedicated pathways for movement of materials between the suite and collections space

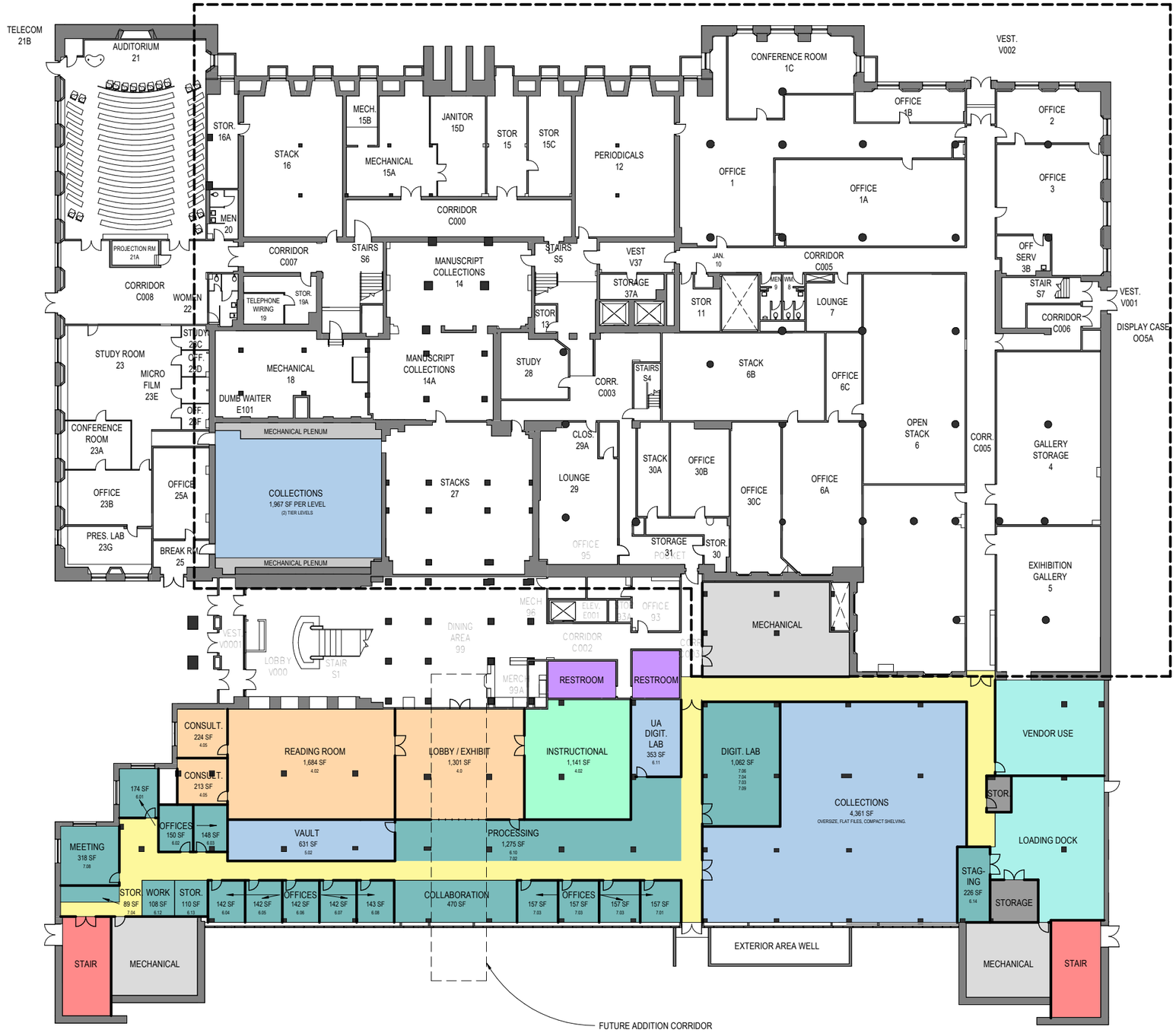
The First Level options were noted as having the following deficiencies:

- Insufficient floor space to accommodate all three groups within one contiguous area
- Need for a second exit at the south end of Room 114
- Lack of proximate space for the portion of the collections that cannot be stored on fixed shelving in the west stack, (i.e., oversized materials in flat cabinets)
- Concern over long-term flexibility of the space to meet the needs of the three groups
- Acknowledgment that student space should be prioritized on First Level

The preferred concept locates Special Collections, University Archives, and Digital Services in a single suite on the Second Level of the Library, utilizing contiguous space within the 1958, 1914 (primarily Central Stack) and 1935 (West Stack) buildings. This location provides several key advantages: good visibility and access; adjacency to and compatibility with the historic reading rooms; opportunities for dedicated event and exhibit space; and contiguous space for secure movement of material including elevator access.

The suite is organized with public functions on the north side of the floor plate, due east of and connected to the Grand Reading Room and the main east / west circulation zone on the floor. The lobby / exhibit space will be visible to those arriving via the main elevator or stairs in the center of Ellis Library. Beyond day to day use of the public areas, the space is intended to support special events hosted by the Library that could draw in the broader community.

SPECIAL COLLECTIONS, UNIVERSITY ARCHIVES AND DIGITAL SERVICES CONSOLIDATION



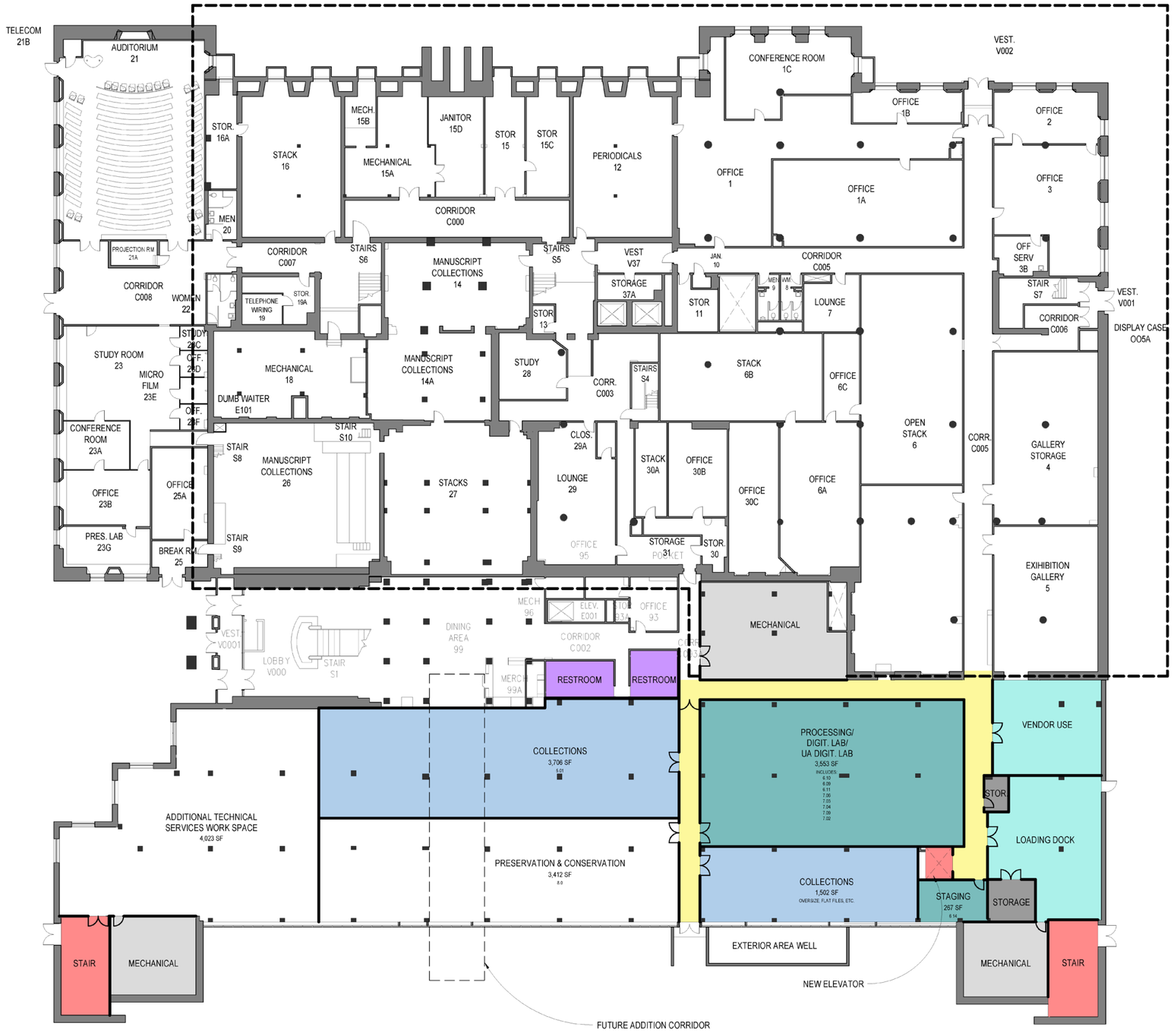
1. OPTION DISPLACES TECHNICAL SERVICES GROUP CURRENTLY ON GROUND LEVEL.
2. COLLECTIONS SPACE WITHIN SC/UA/DS SUITE ACCOMMODATES LARGE PORTION OF COLLECTIONS WITH SHELVED MATERIAL IN COMPACT SHELVING. WEST STACK IS UTILIZED FOR BALANCE OF COLLECTIONS, ESTIMATED TO BE 1-2 STACK LEVELS

- CIRCULATION
- COLLECTIONS
- INSTRUCTION
- MECHANICAL
- NON-LIBRARY
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- VERTICAL CIRCULATION

CONCEPT 1 - GROUND LEVEL
SCALE: NTS

- CIRCULATION
- COLLECTIONS
- INSTRUCTION
- MECHANICAL
- NON-LIBRARY
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- VERTICAL CIRCULATION

CONCEPT 2 - FIRST LEVEL
SCALE: NTS



1. COLLECTIONS SPACE SHOWN WITHIN SC/UA/DS SUITE CAN ACCOMMODATE ENTIRE SC/UA COLLECTION WITH SHELVED MATERIAL IN COMPACT SHELVING.

- CIRCULATION
- COLLECTIONS
- INSTRUCTION
- MECHANICAL
- NON-LIBRARY
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- VERTICAL CIRCULATION

CONCEPT 2 - GROUND LEVEL
SCALE: NTS

1. COLLECTIONS SPACE WITHIN SC/UA/DS SUITE ACCOMDATES PORTION OF COLLECTION. WEST STACK IS UTILIZED FOR BALANCE OF COLLECTION (ESTIMATING TO BE 3 1/2 STACK LEVELS)
2. OPTION 3.2 DOES NOT INCLUDE WORK / STORAGE ROOM WHICH NEEDS FURTHER STUDY TO RESOLVE.
3. REQUIRES MEN'S RESTROOM SOUTH OF ELEVATOR TO BE DEMOLISHED.

- CIRCULATION
- COLLECTIONS
- INSTRUCTION
- MECHANICAL
- NON-LIBRARY
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- VERTICAL CIRCULATION

CONCEPT 3.1 - SECOND LEVEL
SCALE: NTS

1. COLLECTIONS SPACE WITHIN SC/UA/DS SUITE ACCOMDATES PORTION OF COLLECTION. WEST STACK IS UTILIZED FOR BALANCE OF COLLECTION (ESTIMATING TO BE 3 1/2 STACK LEVELS)
2. OPTION 3.2 DOES NOT INCLUDE WORK / STORAGE ROOM WHICH NEEDS FURTHER STUDY TO RESOLVE.
3. REQUIRES MEN'S RESTROOM SOUTH OF ELEVATOR TO BE DEMOLISHED.

- CIRCULATION
- COLLECTIONS
- INSTRUCTION
- MECHANICAL
- NON-LIBRARY
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- VERTICAL CIRCULATION

CONCEPT 3.2 - SECOND LEVEL
SCALE: NTS

1. COLLECTIONS SPACE IS NOT RESOLVED - OPTION DOES NOT INCLUDE VAULT OR SPACE FOR OVERSIZE GRAPHIC MATERIALS / MAP CABINETS
2. WEST STACK IS UTILIZED FOR SHELVED MATERIALS (ESTIMATED TO BE 5 1/2 STACK LEVELS).

- CIRCULATION
- COLLECTIONS
- INSTRUCTION
- MECHANICAL
- NON-LIBRARY
- RESTROOM
- STAFF
- STORAGE
- STUDENT
- VERTICAL CIRCULATION

CONCEPT 4 - FIRST LEVEL
SCALE: NTS

CENTRALIZED SERVICE DESK

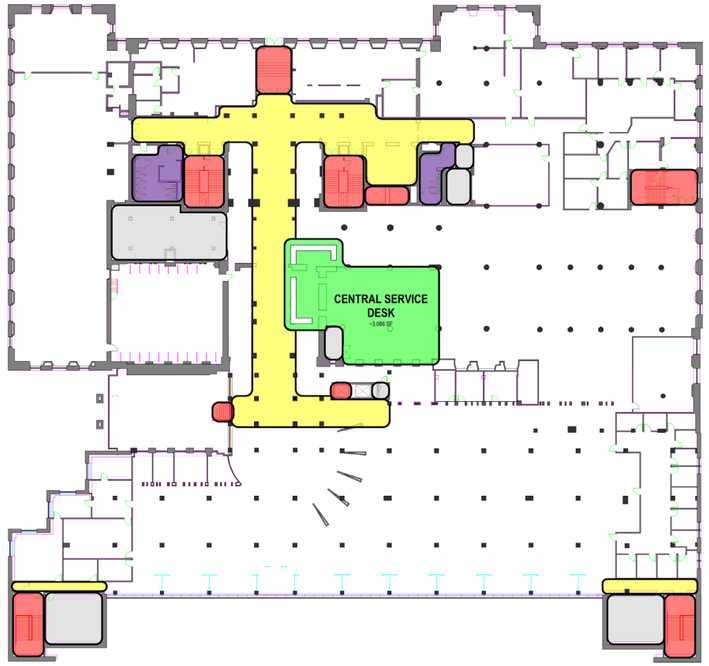
Alternative concepts exploring multiple locations on the First Level for the Centralized Service Desk were studied, including:

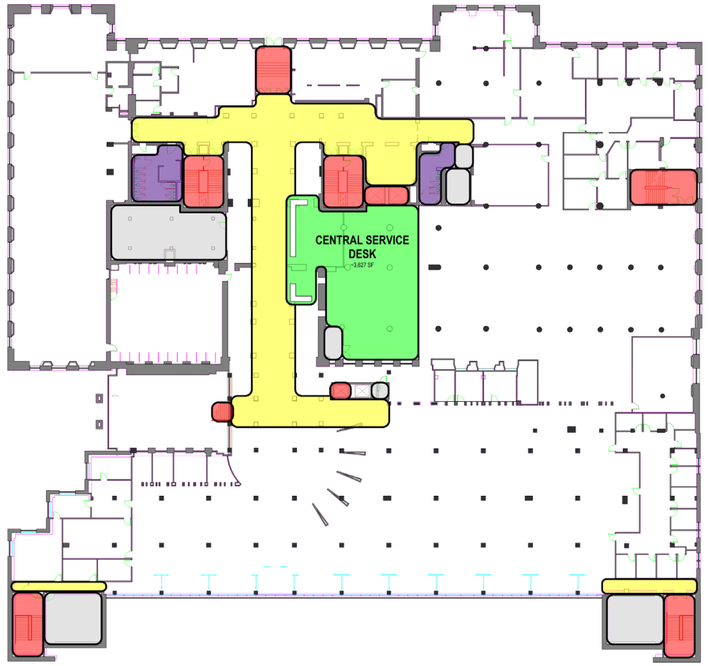
- Central placement of the desk with an extension to the north for improved visibility from the north entrance
- Central placement of the desk, but pushed even further north to dock against the south side of the main elevator bank
- Placement of the desk due south of the west entrance in the 1987 addition, projecting into the north/south building axis/circulation zone
- Placement of the desk as a freestanding element, south of the west entrance in the 1987 addition and along the north/south building axis/circulation zone

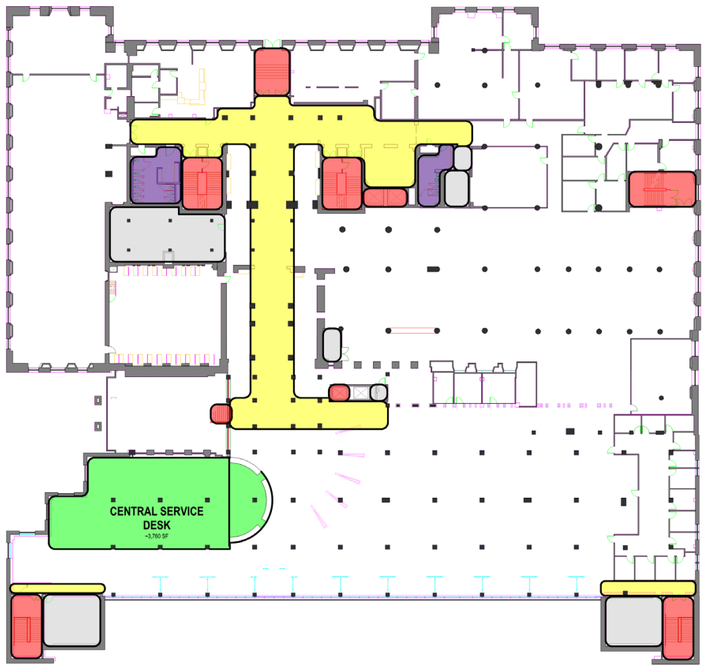
The preferred concept for the Combined Service Desk positions the desk in a central location along the building's primary north/south axis within the historic colonnade, similar to the location shown in the master plan. The primary advantages of this location include:

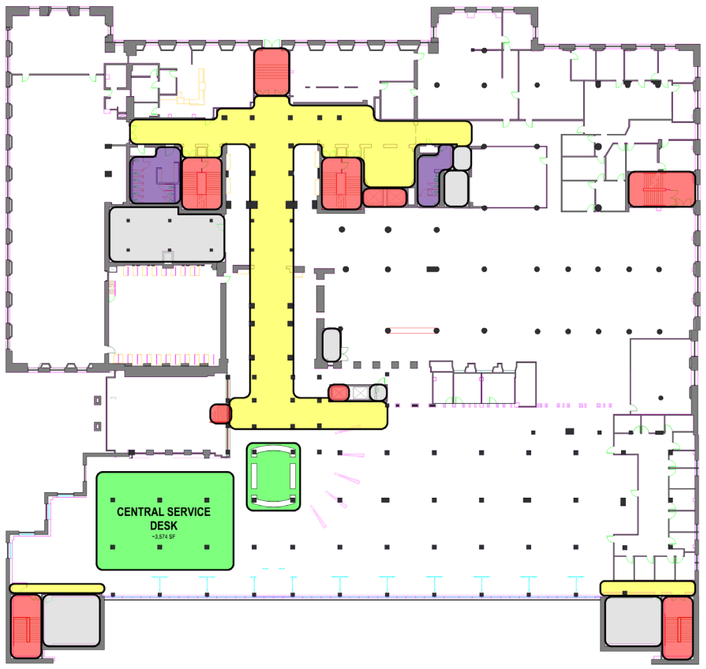
- Strong visibility from the building's north and west entrances for improved wayfinding
- Central location provides staff easy access to the rest of the floor
- Maintains traffic flow throughout the floor
- Close proximity to the main elevators for movement of materials to and from upper floors
- Makes good use of an inherently awkward part of the Library
- Keeps the existing Nutter Learning Commons intact for student study
- Does not interfere with a future south addition or south entrance

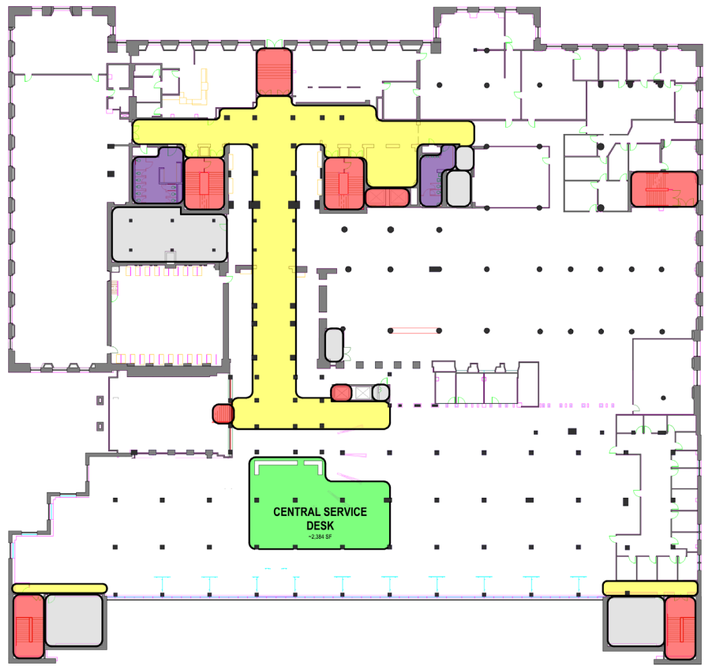
ALTERNATIVE CONCEPTS – CENTRALIZED SERVICE DESK











MASTER PLAN MEPT DESIGN NARRATIVE

Basis of Design

1.0 GENERAL

Modification to this facility will be expected to meet or exceed the following codes and standards adopted by UM System:

- Americans with Disabilities Act (ADA)
- ASHRAE 90.1-2016
- ASHRAE Standard 62.1-2016
- ASHRAE Standard 55-2016
- 2018 International Building Code
- 2018 International Mechanical Code
- 2018 International Mechanical Code
- 2018 International Existing Building Code
- 2018 International Fuel Gas Code
- 2018 International Fire Code
- UM amendments to the International Codes
- National Fire Alarm Code – NFPA 72, 2016
- Installation of Fire Sprinkler Systems – NFPA 13, 2016
- Life Safety Code – NFPA 101, 2012 Edition
- National Electrical Code – NFPA 70, 2017
- Standard for the Installation of Air-Conditioning and Ventilating Systems – NFPA 90A, 2018
- Safety Code for Elevators and Escalators – ASME A17.1 (per state of Missouri)
- Illuminating Engineering Society of North America (IESNA) and applicable RP and DG publications
- Underwriters Laboratories, Inc (UL)

2.0 MECHANICAL SYSTEMS

2.1 Primary Design Assumptions

2.1.1 Climactic Design Conditions:

ASHRAE 0.4% cooling and 99.6% heating design conditions for Columbia, Missouri.

Site elevation is 758 feet above sea level.

Summer 95 F DB / 76 F WB

Winter 1 F

2.1.2 Space Environmental Requirements:

ASHRAE Standard 55 is used for selecting set points for occupied spaces.

Occupied Space Set Point: Summer 75 F Winter 72 F

Unoccupied Space Set Point: Summer 85 F Winter 62 F

Mechanical and Electrical Space Set Point: Summer 105 F Winter 60 F

Vault Set Point: Refer to IPI report for Archival Environmental Recommendations

Collections Space Set Point: Refer to IPI report for Archival Environmental Recommendations

2.2 Narratives

All air handling units in the building, except for the auditorium unit, are beyond their design lifecycles. The building steam distribution system is in poor condition and in need of repair. Condensate return components to be replaced with new versions of the existing equipment. One of the chilled water pumps has exceed its design lifecycle. The stormwater sump pump serving the south addition has exceed its design lifecycle. Energy recovery to be evaluated during design phase to take advantage of energy savings opportunities. New equipment to be integrated with the existing BAS system.

2.2.1 Variable Air Volume Units

Single duct VAV or fan powered VAV zone to be provided to serve like spaces with similar exterior exposures. Each terminal unit will be provided with hot water heat.

2.2.2 Air Handling Units

Dedicated indoor modular air handling units. Units to have variable airflow, and CO2 demand control ventilation. Heating and cooling to be provided by campus supplied steam and chilled water.

2.2.3 Ductwork

Line supply and return ducts within 10’ of air handling units (AHUs) with 1” duct liner. Wrap all other supply ducts above ceilings with 1-1/2” duct wrap. Supply ducts exposed in spaces they serve will not be insulated. Return and exhaust ducts beyond 10’ of the equipment they are connected to will not be insulated. Line transfer ducts with 1” duct liner. Transfer duct configuration will be 5’ section of duct with capped ends and openings on top of each end equal to the internal dimensions of the transfer duct.

2.3 Building Automation System

The building Automation System (BAS) to monitor major equipment and allow adjustment of system set points. Interface with the BAS to be available at a dedicated workstation in the library and remotely through the internet.

Each zone to have a temperature sensor that will automatically switch between heating and cooling. The sensors to have adjustment that allows the user to change the space set point up or down by 3 degrees. Sensors will not display room temperature or set point.

Mechanical equipment to operate under their factory mounted controls and integrate with existing BAS system. The factory controls to have a BACnet card to allow the BAS to remotely monitor set points and alarms on each piece of equipment.

The BAS will trend all points in the system and store 18 months of data. The user to be able to create graphs and tables of any combination of trended points through the central workstation or remotely through the internet.

3.0 PLUMBING SYSTEMS

3.1 General

This narrative provides a brief summary of the proposed plumbing systems. The information contained in this document will be used during the design process.

3.2 Domestic Water

Domestic water service is provided by the campus. New flush valve water closets will require additional flow requiring an evaluation of the existing domestic water supply. A packaged variable drive duplex domestic water booster pump to be provided if the incoming domestic water pressure is too low to provide 20 psi at the most remote plumbing fixture. Water pressure will be verified during the design development phase of the project.

Domestic cold-water piping shall be Type L copper and will be insulated with fiberglass insulation with a vapor barrier service jacket. Insulation shall be ½" thick for piping sizes 1-1/4" and below and 1" thick for piping sizes 1-1/2" and above. Pipe joining method will be solder with cast copper fittings for pipe 2" and below, mechanical for pipes 2-1/2" and above.

Shut-off valves will be provided at the base of each riser, in all branch lines and for each gang of fixtures for maintenance.

3.3 Domestic Hot Water

A hot water recirculation loop to serve washing fixtures throughout. An ASSE 1017 listed thermostatic mixing valve, set at 120°F, to be provided. A recirculation pump to be located in the main mechanical room.

Domestic hot water piping shall be Type L copper and will be insulated with fiberglass insulation with a vapor barrier service jacket. Insulation shall be 1" thick for piping sizes 1-1/4" and below and 1-1/2" thick for piping sizes 1-1/2" and above. Pipe joining method will be solder with cast copper fittings for pipe 2" and below, mechanical for pipes 2-1/2" and above.

3.4 Waste and Vent Systems

Sewer services are provided by the campus. Sanitary drain lines sloped for gravity flow extend throughout the building, above and below slab, to serve plumbing fixtures, floor drains and mechanical equipment. Sanitary and vent stacks located at each level for collecting sanitary and vent discharge from the plumbing fixtures. Vent stacks are extended through the roof areas at various locations. Floor and wall cleanouts located throughout for rodding purposes.

Above grade sanitary sewer and vent systems to be installed in service weight cast iron no-hub piping and sized appropriately for the connected loads.

Floor drains and indirect waste receptors to be in mechanical equipment rooms and in other locations throughout the building where needed to allow for the convenient drainage of the fixtures and equipment being served. Trap primer valves to be provided and piped to all floor drains and floor sinks in dry areas.

3.5 Plumbing Fixtures

Manufacturers of plumbing fixtures, faucets, and trim to be subject to approval by the Owner and will be standard commercial grade water-saving type and designed to meet the Americans with Disabilities Act (ADA) guidelines where required or indicated. All new plumbing fixtures to be a low-flow water conservation type to minimize water consumption. Water closets and urinals to be

equipped with battery operated automatic sensor type flushometer valves. Other fixtures (janitor sinks, water coolers, etc.) to be located in the building as indicated by the architectural plans.

4.0 FIRE PROTECTION SYSTEMS

4.1 General

Fire protection systems to be designed around a performance specification for deferred submittal by the Fire Protection Engineer and/or Contractor. Limited information will be placed on the contract drawings to facilitate bidding. The drawings will indicate the location of the fire protection backflow preventer and indicator valve. Any areas of special construction will be highlighted for coordination. Static and residual pressures will be obtained and shown on the drawings.

4.2 System Description

An evaluation of the current water flow and pressures will be required to determine if a fire pump will be needed. A fire pump to be provided should the incoming water pressure be too low to provide adequate pressure for the most remote fire sprinkler zone.

Fire sprinkler systems to be designed and installed with a wet-pipe system per NFPA 13 for Light or Ordinary Hazard classification areas as required or a dry pipe / pre-action system as required.

5.0 ELECTRICAL SYSTEMS

5.1 General

The proposed electrical systems for the renovation of this building attempts to balance occupant usage requirements with other factors such as budgets, first costs and operating costs. Electrical systems will be installed and or augment the base building systems to meet requirements of local and national codes and regulations as well as sound engineering practices. Work will consist of furnishing all labor, equipment, supplies, and materials, unless otherwise specified, necessary for the installation of a complete electrical system(s) as required by the system description, specifications, and drawings. The work shall include the completion of electrical work not mentioned or shown which is necessary for the successful operation of all electrical systems.

5.2 Primary Electrical Service

Building electrical service will be provided via am exterior, pad mounted transformer mounted on a pre-cast pad. This transformer will provide a 480/277V, 3-phase, 4-wire service for the library. pad-mounted transformer, a pre-cast pad, primary cabling, and primary terminations. The transformer is anticipated to be located outside on grade near the existing sectionalizers. The metering location for the service will be coordinate with the University. The demand load for the building is anticipated to be 2400 kVA (2888 A).

5.3 Normal Power Distribution

The main service entrance for the building will be 480/277V, 3-phase, 4-wire. The main switchboard "MSB" will be rated 4000A, 100kAIC, 277/480V, 3-phase, 4-wire and will be protected by a 4000A ground fault protected main circuit breaker. All distribution circuit breakers will be provided with long time, short time, and instantaneous trip settings for device coordination. The MSB will have an externally mounted microprocessor-based customer metering and monitoring package. Spare circuit breakers and additional bussed space will be provided. Conductors will be terminated with two-hole compression lugs. Initial infrared scanning will be required to establish a base line for the distribution equipment. The MSB will have copper bus bars. MSB will be freestanding type and installed on a raised concrete housekeeping pad in an air-conditioned main electrical room in the sub-basement. A Surge Protection Device (SDP) will be connected to the MSB by way of a circuit breaker disconnect.

The main electrical room will also have distribution panels for lighting, mechanical equipment and one to serve server dry type distribution panels located throughout the library. A preliminary one-line diagram showing distribution and branch panels throughout the building is included in the appendix.

Energy star compliant dry type transformers will be used throughout the facility. Transformer windings shall be copper.

All panelboards and sub-distribution panels will have copper bus bars. All distribution and branch panel circuit breakers will be bolt-in molded case type. 20% spare breakers/breaker spaces will be provided in all panelboard.

All conductors will be copper and will be pulled in conduit with steel fittings. Metal clad cable will be utilized only for under counter luminaires. All circuiting will be routed in conduit. Minimum conduit size shall be ¾". All above grade feeders and branch circuits will consist of THHN/THWN copper conductors in GRC or EMT conduit. All below grade feeders and branch circuits will consist of XHHW in PVC. Wire sizes for branch circuit power and lighting will be a minimum of #12 AWG. Separate neutral and ground conductors will be provided for each circuit. Conduits will be labeled every 10' on center with color coded labels corresponding to the electrical branch the conduit belongs to. All receptacles and switches will

have a phenolic label indicating which circuit is feeding that device. All panelboards, transformers, disconnect switches, etc. will be labeled using an engraved nameplate.

Short circuit analysis, protective device coordination studies, and arc flash hazard studies will be provided by the electrical contractor. Devices will be coordinated down to 0.1 seconds. All protective devices will be properly coordinated to provide selective tripping. Arc Flash analysis will yield proper labels for all electrical apparatus indicating available arc flash energy and proper PPE for working in and around energized electrical equipment.

5.4 Emergency Power Distribution

A permanent generator/emergency power distribution system is not anticipated for the building. The building currently does not have one. Emergency egress lighting will be provided to achieve a minimum of one footcandle along all paths of egress. Exit signs and egress lighting will be provided by self-testing battery packs located in the luminaires. For high bay spaces where local battery backups are difficult to maintain and where they do not provide adequate egress lighting, central inverter will be provided.

Provision to connect a temporary generator to supply HVAC in the special collections space will be provided. The generator tap box suitable to connect up to 250 KW generator will be provided on the building exterior. This tap box will supply a manual transfer switch located in the sub-basement.

5.5 Grounding

A grounding electrode system will be installed that will meet the requirements for a grounding system as outlined in the National Electric Code. A main ground bus bar located in the main electrical room will be bonded to the main switchboard frame and ground bus using a ground conductor sized in accordance with the NEC. The grounding system shall consist of a “UFER” ground installed in or below the building foundation, a grounding connection to the cold-water pipe at the service entrance, a grounding connection to the building steel, and a grounding connection to driven ground rods. Secondary ground bars will be provided in all electrical and communication rooms.

5.6 Internal Lighting and Controls

Electric Lighting systems, lighting control strategies, and daylight control strategies will be used. The use of building space requires and interior lighting system that provides adequate lighting levels as well as provides for good visibility and comfortable surroundings. Lighting levels for each space will be designed to conform to the Illuminance Selection Tables appearing in the Illuminating Engineering Society (IES) Lighting Handbook. Specific influences of glare, task complexity, surface reflectance characteristics, ceiling brightness and user age will be considered when specifying lighting. Local codes will take precedence when they dictate the use of alternative procedures or require minimum lighting levels for specific areas. All lighting designs will be in keeping with the energy codes adopted by the university.

All interior lighting is required to be on lighting controls per ASHRAE 90.1. Occupancy or Vacancy sensors will be installed in spaces where automatic shutoff of electric lighting is appropriate. Sensor time-out will be adjustable from 15 to 30 minutes. Automatic dimming/reduction of electric lighting associated with daylight harvesting will be implemented in public spaces receiving adequate daylight. Multi-level lighting level control will be provided in spaces as deemed appropriate to allow the level of electric lighting and energy consumption to be reduced to best suit the comfort level of the building occupants. Continuous dimming control of electric lighting will be provided where appropriate. Electric lighting in public spaces that operate on a workday schedule will be controlled by a networked lighting control system. Override switch capability will be provided for all common spaces controlled by the networked lighting control system.

All interior lighting will be LED type with color temperature and color rendering index selected to suit the application. In general, most spaces will have 4000K color temperature with minimum 82 CRI. The following luminaire types are anticipated to be provided in the individual spaces.

5.6.1 Interior Lighting Scheme Description

Space Type	Footcandle Level	Level Measured AFF	Lighting Scheme Description
Common Spaces	10	0'-0"	Direct-Indirect Volumetric, Recessed or Suspended
Corridor	5	0'-0"	Direct-Indirect Volumetric, Recessed or Suspended
Vestibules	15	0'-0"	Direct-Indirect Volumetric, Recessed or Suspended
Stairwells	10	0'-0"	Wall Mounted
Public Restrooms	15	2'-6"	Recessed downlights, vanity lights and linear recessed slots
Private Restrooms	15	2'-6"	Recessed downlights and Vanity lights
Storage / Utility Rooms	10	0'-0"	Utility Strip lights
IT Rooms	50	2'-6"	Utility Strip lights
Staff Lounge	10	2'-6"	Direct-Indirect Volumetric, Recessed
Offices	30	2'-6"	Direct-Indirect Volumetric, Recessed
Conference Rooms	30	2'-6"	Direct-Indirect Volumetric, Recessed
Copy Rooms	30	2'-6"	Recessed Troffers
Library General	30	2'-6"	Direct-Indirect Volumetric, Recessed or Suspended
Library Reading/Study	50	0'-0"	Direct-Indirect Volumetric, Recessed or Suspended
General Classrooms	40	2'-6"	Direct-Indirect Volumetric, Recessed
Flexible Learning Areas	30	2'-6"	Direct-Indirect Volumetric, Recessed
Food Sales Areas	20	2'-6"	Recessed Troffers
Restoration Labs	50	2'-6"	Direct-Indirect Volumetric, Recessed

5.7 Exterior Lighting and Controls

New Exterior lighting are not anticipated. All exterior lighting will be re-supplied from new branch panel in ground floor.

5.8 Fire Alarm with Voice Evacuation

A new fire alarm system is anticipated to be installed as part of a stand-along improvement project. The following describes the anticipated system.

The fire alarm system used in this building will be a stand-alone, distributed, microprocessor-based 24VDC, electrically supervised, addressable "intelligent" fire alarm system. The system will be UL 864, 9th Edition listed and labeled. The system will include all control equipment, power supplies, signal initiating and indicating devices, conduit, wire, fittings, and all other accessories necessary for a fully functional fire alarm system. Remote power supply cabinets and terminal cabinets will be required in various areas throughout the building. The system will be capable of monitoring the sensitivity and calibration of each detection device and reporting alarms by an alpha-numeric display. The system will be capable of interfacing with the Building Automation System. Each detection device and manual pull station will be addressable and report to the control panel as an individual device. A graphic zone map, zone annunciator, and an LCD Character display will be located in the building.

Devices will be located as follows:

- Double action manual pull stations: At each exit door on the first floor, at each stairwell exit on the upper floors, and when required to meet the travel distance limitations per NFPA.
- Smoke Detectors: In all public spaces, electrical and communication rooms, the elevator machine room and elevator shaft, elevator lobbies, the top of stairwells and in storage spaces. Smoke detectors will also be provided at smoke separation doors.
- Rate of Rise Detectors: In mechanical spaces.
- Duct Detectors: In all supply and return ducts required by code. Sequence of operation shall be coordinated with the mechanical engineer for fan shut down and fire/smoke damper operation.
- Flow and Tamper switches: Located in one stairwell at every level. Addressable interface modules will be used to connect the sprinkler flow and tamper devices to the system.

The speakers and strobes will be located in all areas required to comply with codes and ADA documents including private offices. A weatherproof horn/strobe will be located outside above the fire department connection.

A fire alarm module will be provided at doors along egress routes, stairwells, and exit doors to interface the security system with the fire alarm system. Upon fire alarm, all secured doors with electric locks and panic hardware located in egress routes, stairwells and exit doors will unlock via the fire alarm system module.

Thermal and smoke detection devices for elevator recall and shutdown will be located in elevator shafts and equipment rooms. These detectors will initiate an elevator recall required by local authorities having jurisdiction. Elevator recall will also be accomplished via smoke detection in the elevator lobbies. Shunt trip circuit breakers will remove power from the elevator equipment upon thermal detector activation and prior to sprinkler water flow. The ground floor will be the main recall level for the elevator(s).

Power supplies will be sized for a minimum of 2 hours of stand-by operation in addition to 15 minutes of full system operation in alarm mode. Calculations will be based upon final build-out device quantities.

5.9 Auxiliary Building Systems

5.9.1 Lighting Protection

The building will be provided with a Class 1 copper lightning protection system consisting of a ground loop, grounding rods, down-lead conduits, and air terminals. The system will be provided with a UL Master Label and be compliant with NFPA 780. The lightning protection system shall be bonded to the main electrical room ground bar.

5.9.2 Uninterruptable Power System

No provisions for a UPS system are anticipated at this time. Communications systems, security system, etc. are anticipated to be provided with stand-alone UPS systems if required with in the communications spaces.

5.9.3 Low Voltage Systems

Power will be provided to all low voltage system distribution head end equipment. Conduit and boxes will be roughed-in and conduit stubbed into accessible ceiling spaces for low voltage cabling to Technology Systems described in the respective section.

6.0 TECHNOLOGY SYSTEMS

6.1 RESPONSIBILITY MATRIX

CFCI - Contractor Furnish, Contractor Install	OFCI - Owner Furnish, Contractor Install
CFOI - Contractor Furnish, Owner Install	OFOI - Owner Furnish, Owner Install

SCOPE DESCRIPTION	CFCI	OFCI	CFOI	OFOI	NO SCOPE
INFRASTRUCTURE AND STRUCTURED CABLING					
BACK BOXES, CONDUIT, AND PATHWAY FOR ALL LOW-VOLTAGE SYSTEMS	X				
CABLE TERMINATIONS/PUNCHDOWNS AT DROPS AND PATCHBAY	X				
WORK AREA OUTLETS / FACEPLATES	X				
TELECOM GROUNDING	X				
CABLE TRAYS / J-HOOKS	X				
AUDIOVISUAL					
AUDIOVISUAL CABLING (HDMI, VGA, ETC.)	X				
AUDIOVISUAL EQUIPMENT (LOUDSPEAKERS, AMPLIFIERS, MICROPHONES, ETC.)	X				
PUBLIC ADDRESS SYSTEM					X
MASS NOTIFICATION SYSTEM					X
ELECTRONIC SECURITY					
ELECTRONIC SECURITY CABLING	X				
ACCESS CONTROL	X				
ENTRY INTERCOM	X				
INTRUSION DETECTION (MOTION DETECTOR)					X
SECURITY CAMERAS (CCTV)	X				
LOCKDOWN / LOCKOUT					X
ACTIVE NETWORK ELECTRONICS					
CLOCKS				X	
WIRELESS ACCESS POINTS		X			
PHONES				X	
COMPUTERS / SERVERS				X	
NETWORK SWITCHES				X	

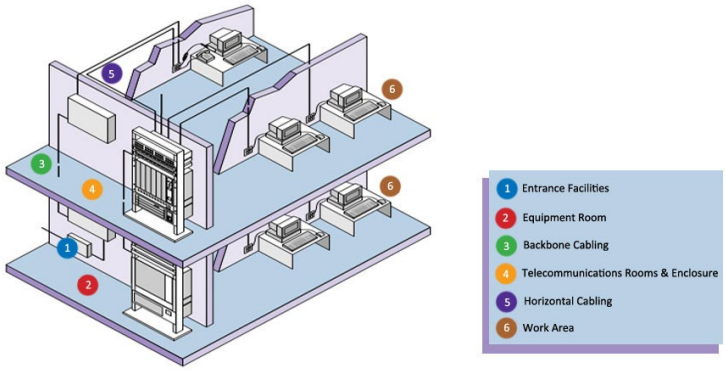
6.2 Incoming Service / Outside Plant

Incoming service will be fed through two (2) 3" PVC conduits coming into the Equipment Room. Service provider will supply cabling and demarcation location, brining cabling to Owner supplied network equipment.

6.3 Telecommunications

6.3.1 Structured Cabling Overview

With a building of this size, it is helpful to break our data infrastructure and cabling into different chunks for discussion. Equipment Rooms (ER aka MDF) feed Telecom Rooms (TR aka IDF) via backbone cabling. Horizontal cabling is what goes out to the final data drops (work area outlet).



6.3.2 Equipment Room

Telecommunications equipment will be separated between physical network distribution equipment and server / computer equipment. The bulk of the distribution equipment will be located near the demark at the Main Telecom Room, with additional switch equipment in each of the Telecom Rooms. The IT Equipment room will house the bulk of the server / computer equipment. Ideally, subsequent Telecom Rooms would be stacked one above another, in a location on each floor that will allow all horizontal cabling to be installed within industry standards for length.

6.3.3 Backbone Cabling

6-strands of OM4 cabling will be installed from each Telecom Room to the next nearest closet, and connections from the Main Telecom Room to the Telecom Rooms will be made by patching through the closets in-between.

6.3.4 Horizontal Cabling

Cable, punch-downs / terminations, racks with cable management and horizontal supports shall be installed under the Contract. All wall boxes shall be 4-11/16” square x 2-1/8” deep, with minimum 1” conduit to accessible ceiling / corridor. Horizontal support will be provided through cable tray from the Telecom Rooms through corridors for main distribution pathway and J-hooks every 4-5 feet for cabling as it leaves the cable tray to the work area outlet. All data and telephone work area outlets shall be fed by cat 6A cable.

Phones are assumed to be voice-over-IP, so will be shown as standard data work area outlets, going back to common patch panels shared with the data cabling.

6.3.5 Public Announcement Intercom System

All loudspeaker cabling will run back to the Equipment Room where a rack mounted Bogen amplifier is housed. Loudspeakers will be located roughly every 40’ along Corridor and will be 70V high-impedance type. Analog volume controllers will be located at each classroom, which will have one loudspeaker per room.

6.4 Security Systems

6.4.1 Video Surveillance System

New video surveillance (cameras) system to be installed. Cameras will be located at Lobby, stairwell, elevator, Collections, Interview and Storage Rooms. All cameras are planned to be fixed (not pan, tilt, zoom), ceiling mounted dome-style body.

6.4.2 Access Control System

New access control (card reader) system to be installed. Access control devices will be located at all Telecom, Electrical, Mechanical, Collections and Storage rooms. Controllers with the power supplies for the card readers will be located at the nearest Equipment or Telecom Room,

6.4.3 Intrusion System

An intrusion system will be installed including motion detection devices. Motion detection will be located at the entry lobbies.

6.4.4 Alarm Monitoring Systems

No separate alarm monitoring system is anticipated. Any outside alerting will be combined with the fire alarm system.

6.4.5 Lock-Down / Lock-Out

No infrastructure for lockdown or lockout systems for active shooter or other critical event is anticipated.

6.5 Other Technology Systems

6.5.1 Audiovisual Systems

Audiovisual systems will be included at all Conference, Briefing, and War rooms. A flat panel display sized for the most distant viewer to be able to read and a single input location at a floor box. Audio, video, and web-conferencing systems are planned for the instruction room on the 2nd floor.

6.5.2 Classroom Sound Enhancement System

Each classroom pod area in the addition will have a classroom sound enhancement system with a single wireless microphone and the ability to connect laptop audio for sound reinforcement. These classroom audio systems are not typically supported by DPS IT, so a simple, low-to-no maintenance solution is critical. Several manufacturers will be open in the bid, including Atlas Sound and Front Row.

6.5.3 Clocks

New American Time and Signal wireless clocks (SiteSync IQ) will be installed at each classroom. It is anticipated that the existing headend has capacity and coverage to support the addition.

6.5.4 Bidirectional Amplification System (BDA)

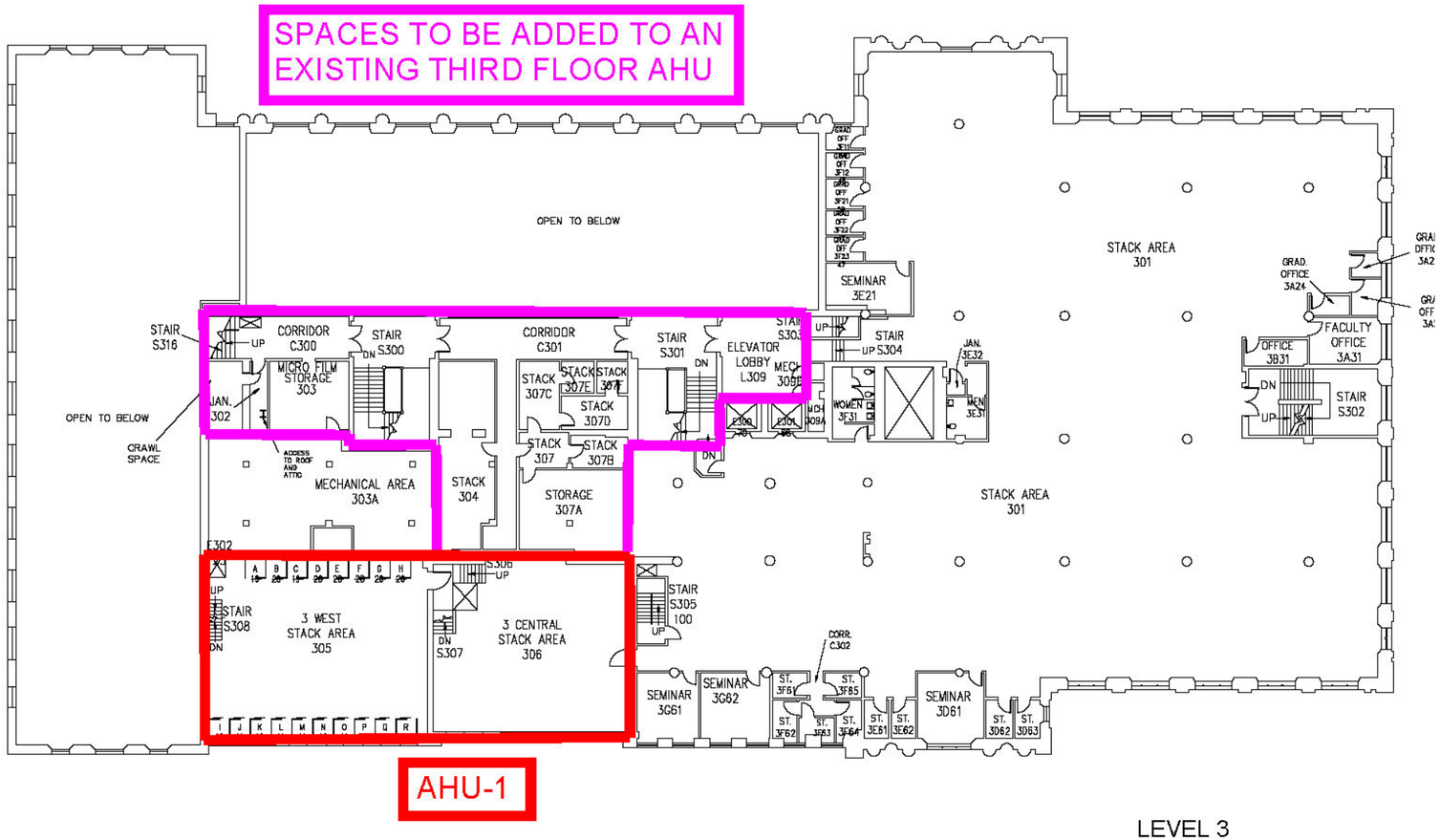
No building cellular / first responder repeater system is anticipated because the building size doesn't necessitate the repeater network.

6.5.5 Active Network Devices

It is anticipated that the owner will provide, install, and configure all network switches, routers, firewalls, wireless access points, servers, UPSs, PDUs, and similar devices.

AHU ZONING PLANS

AHU ZONING PLAN


SPACES TO BE ADDED TO AN EXISTING THIRD FLOOR AHU
OPEN TO BELOW
STACK AREA 301
SEMINAR 3E21
STAIR S316
CORRIDOR C300
STAIR S300
MICRO FILM STORAGE 303
JAN. 302
OPEN TO BELOW
CRAWL SPACE
ACCESS TO ROOF AND ATTIC
MECHANICAL AREA 303A
STACK 304
CORRIDOR C301
STACK 307C
STACK 307E
STACK 307F
STACK 307D
STACK 307
STACK 307B
STORAGE 307A
STAIR S301
ELEVATOR LOBBY L309
MECH 309E
STAIR S303
STAIR S304
JAN. 3E32
WOMEN 3F31
MEN 3E31
GRAD. OFFICE 3A24
FACULTY OFFICE 3A31
OFFICE 3B31
STAIR S302
STACK AREA 301
E302
STAIR S308
3 WEST STACK AREA 305
S306
S307
3 CENTRAL STACK AREA 306
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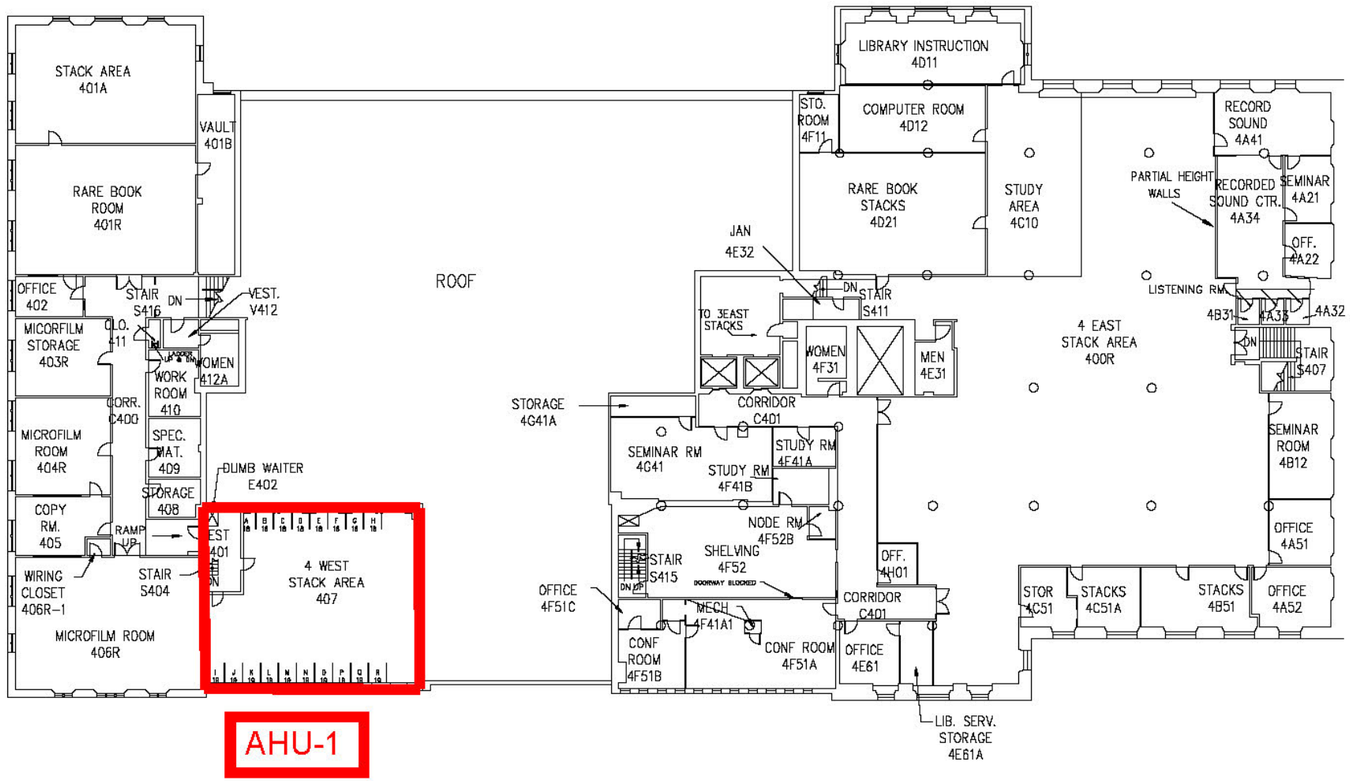
SEMINAR 3G61
SEMINAR 3G62
CORR. C302
SEMINAR 3D61
AHU-1

LEVEL 3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DUMB WAITER
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RAMP
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CLOSET
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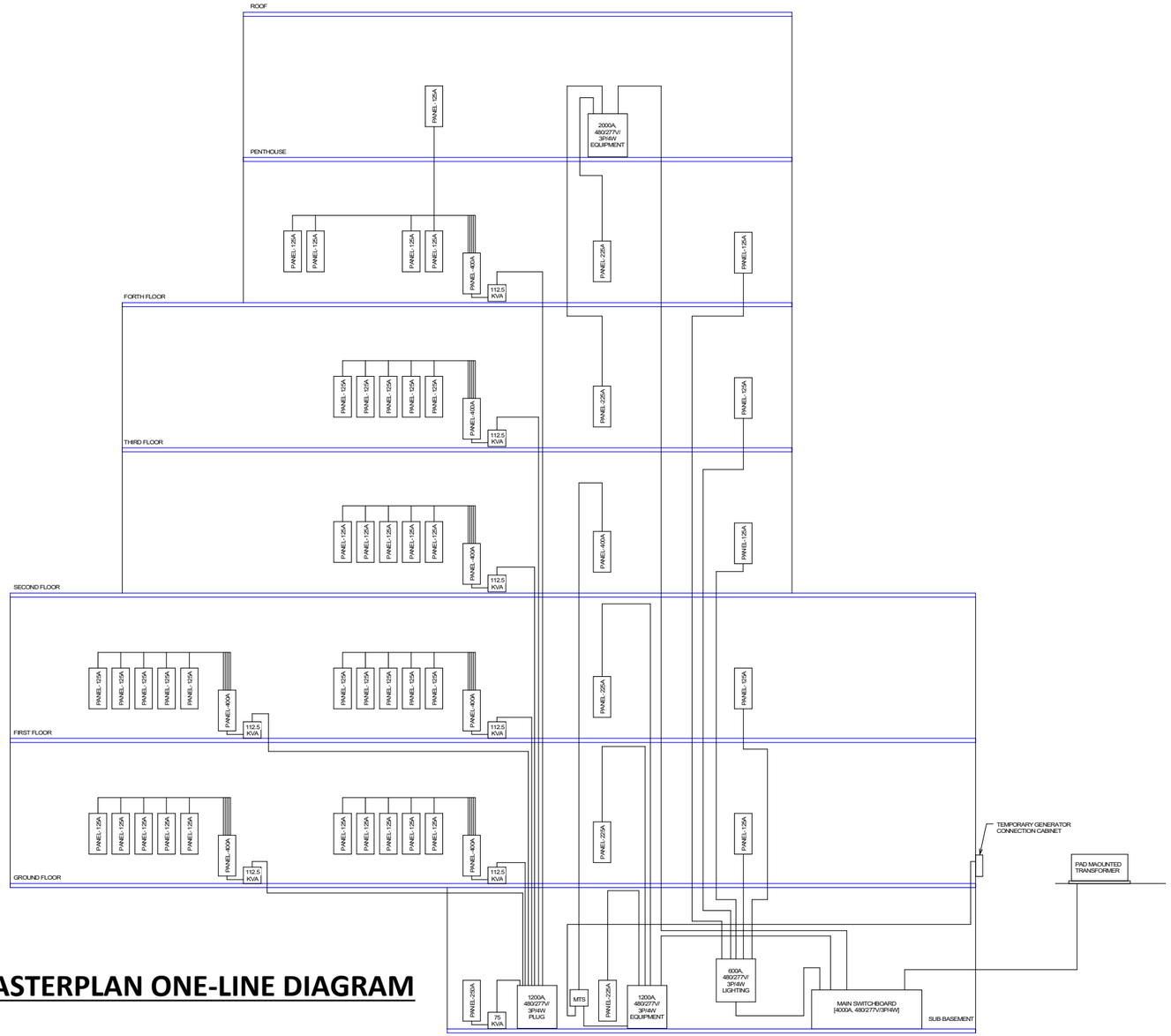
4 WEST
STACK AREA
407
MICROFILM ROOM
406R
AHU-1
ROOF
LIBRARY INSTRUCTION
4D11
STO.
ROOM
4F11
COMPUTER ROOM
4D12
RARE BOOK
STACKS
4D21
STUDY
AREA
4C10
JAN
4E32
TO 3EAST
STACKS
STAIR
S411
WOMEN
4F31
MEN
4E31
CORRIDOR
C401
STORAGE
4G41A
SEMINAR RM
4G41
STUDY RM
4F41A
STUDY RM
4F41B
NODE RM
4F52B
SHELVING
4F52
DOORWAY BLOCKED
STAIR
S415
OFFICE
4F51C
MECH
4F41A1
CONF
ROOM
4F51B
CONF ROOM
4F51A
OFF.
4H01
CORRIDOR
C401
OFFICE
4E61
LIB. SERV.
STORAGE
4E61A
4 EAST
STACK AREA
400R
PARTIAL HEIGHT
WALLS
RECORD
SOUND
4A41
RECORDED
SOUND CTR.
4A34
SEMINAR
4A21
OFF.
4A22
LISTENING RM.
4B31
4A35
4A32
DN
STAIR
S407
SEMINAR
ROOM
4B12
OFFICE
4A51
STOR
4C51
STACKS
4C51A
STACKS
4B51
OFFICE
4A52

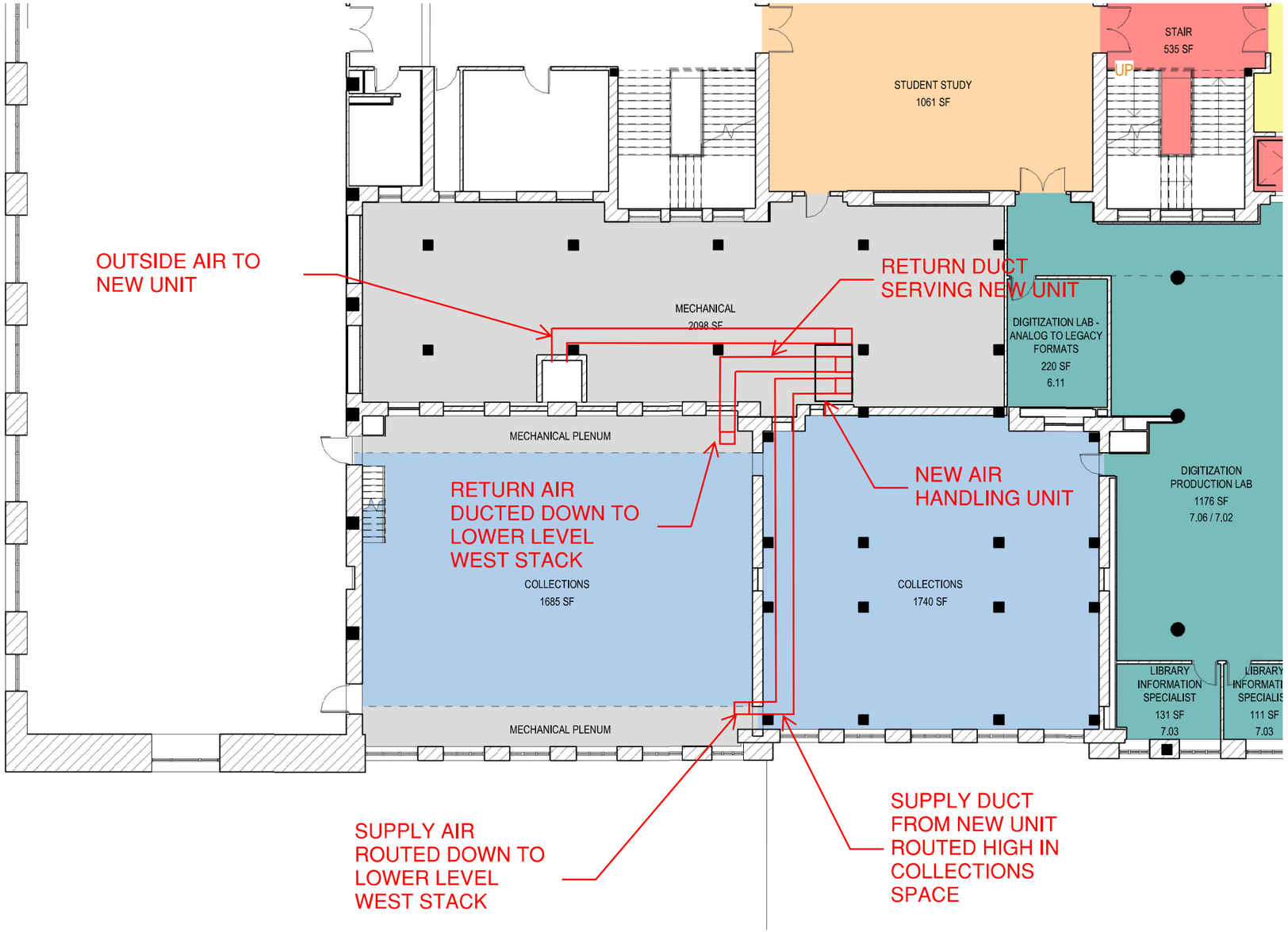
LEVEL 4



MASTERPLAN ONE-LINE DIAGRAM

ELLIS LIBRARY - MU

DUCT ROUTING DIAGRAM



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