

FINAL REPORT 11.21.2019

UIUC PROJECT # U19112

# UIUC SPECIAL COLLECTIONS RESEARCH CENTER: REDEVELOPMENT PLAN PROGRAMMING AND CONCEPTUAL DESIGN STUDY

## PART 2: CONCEPTUAL DESIGN, FINAL SCENARIO

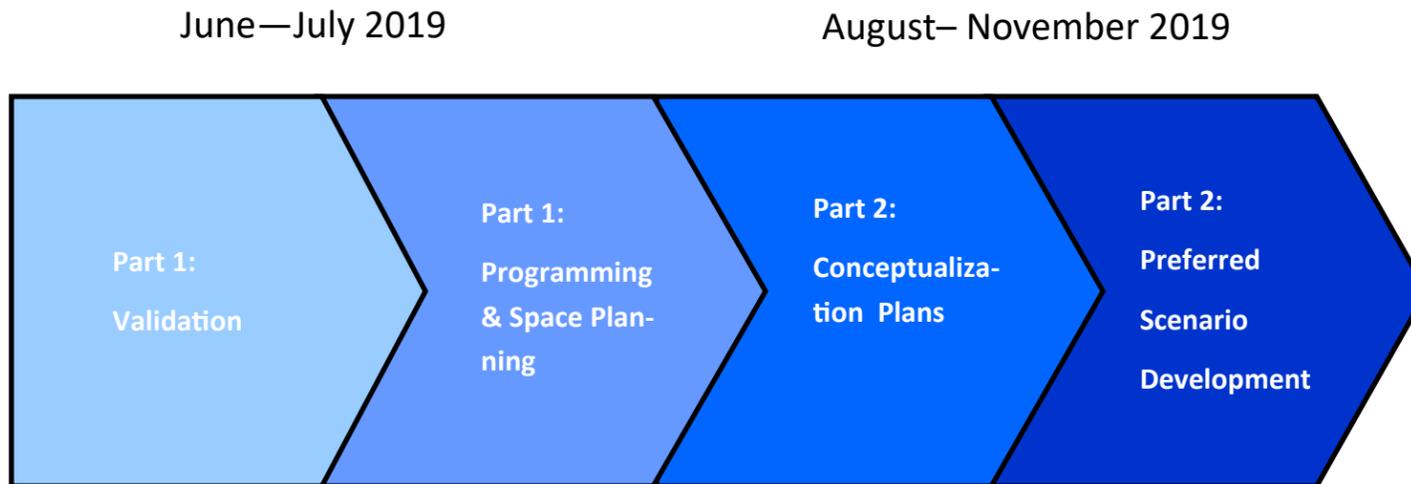




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## PROCESS DIAGRAM



- Review of previous studies
- Review of existing building conditions
- Leadership & Working Group Interviews

- Category-Level Programming
- Adjacency Studies
- Introduction of 2 options
- Blocking and stacking diagrams

- Development of 2 conceptual design scenarios

- Development of one preferred scenario into conceptual plans and sections
- Conceptual MEP evaluation of preferred scenario

# PREFACE

This report is the third submission for the UIUC Library Special Collections Redevelopment Plan Programming and Conceptual Design Study. It follows the Part 1: Programming Report and Part 2: Conceptual Design, 2 Scenarios submissions. Response and discussion of these scenarios have guided the development of one preferred design scenario presented here. This scenario will serve as the basis of programming and space planning in the upcoming Special Collections Redevelopment Plan design project.

While reviewing the materials presented, please note the following:

- Drawings presented in this report are sketches intended for conceptual design use only. All measurements are approximate. Design work beyond the conceptual will fall outside the scope of this report and will require field verification of all measurements and conditions.
- Select furnishings, plumbing fixtures, and temporary partition walls are shown for scale and illustration of how larger programmed spaces may be arranged. They do not represent final design decisions and will be developed and refined in future work.

# BACKGROUND INFORMATION

## Summary of Conclusions from the 2 Scenarios

Review and discussion of the previously submitted design scenarios resulted in a series of conclusions and development of the final scenario presented here. Major conclusions included:

- An overall preference for plans presented in scenario 2. Reasoning included larger vault space and the addition at plaza level. Regarding the plaza addition, the University expressed interest in a structure sized to enclose approximately half of the existing plaza area. Programming for this area is beyond that which was studied in the Part 1 Programming report, and will currently be designated as Exhibit and Events space. The University will determine at a later date how they prefer to use this added space. Suggestions at this time include meeting rooms, offices, and/or seminar room; it is also intended to be a “draw” for entities across campus.
- Security of the loading dock is a high priority for the project to ensure deliveries free from theft and inclement weather. Due to the building’s historic status and aesthetics, a large enclosure blocking view of the east pavilion is not desirable. Therefore, it is recommended that the loading dock be located at the basement level of the building, serviced by a ramped driveway. The dock should be fully enclosed and securable. An option for locating the dock at grade level may also be considered, using the east pavilion for Receiving and Conservation/Quarantine, but should only be considered if the preferred location at basement level is cost prohibitive.
- The Reading Room should be a signature space and so the project team increased its size and placed it in a prominent location—in the area currently occupied by the central courtyard. This space would stretch up into the plaza level and allow retention of existing elements of the courtyard construction, including the quotations carved into the stone at the top of the courtyard opening. As a two-story space, this room may be viewed from the surrounding basement and plaza levels. A glass wall will allow the room to be fully enclosed and secured from other spaces. It is recommended that natural light be allowed to enter the space from the plaza level and roof. The rendering on page 11 shows how a double height structural system and canopy can enclose this space.
- For funding purposes, the design and construction project should be broken up into two or three phases. The first phase focuses on completion of a vault at the sub-basement level. The second phase infills the floor between sub-basement and basement levels and constructs an enclosure over the courtyard at plaza level. Construction of the rest of the addition at plaza level may also be completed in phase two for efficiency or relegated to a separate phase 3 should funding resources require such a division.

## Other Items of Note

- The ideal location for ADA parking is along Gregory Drive, but this street is designated with restricted access during certain hours. Any change in restrictions will need to be coordinated further with the University. Alternate locations for ADA parking include the Main Library and Smith Hall parking lots, but at distances significantly further from the Special Collections Research Center.
- The recommended locations for the new electrical generator and dumpsters are shown on the first floor plan, south of the existing plaza walls. For the generator, this location is most efficient for its proximity to electrical equipment within the southwest corner of the building. Both elements should be enclosed by fencing or walls for security and aesthetic concerns.
- Existing elevators within the West Pavilion should be replaced with new.
- Phase 1 includes minimal exhibit space and no areas specifically designated for event space or catering. During this phase, one or more classrooms may be used as event space as needed while light catering may temporarily occupy the Public Lounge.
- During Phase 1, waiting areas for the Reading Room and Classrooms are separate due to constraints presented by the existing building. Handwash and security provisions and protocols will need to be adjusted or doubled for this temporary arrangement. Once the courtyard is infilled during Phase 2, the Reading Room will be relocated closer to the Classrooms and the waiting areas will be combined.
- Staff workspaces placed along the north corridor are of similar size and may be adjusted as desired during schematic design.
- Offices shown in plan are based off of estimates provided during Part 1 Programming and may be adjusted in size and number as needed during schematic design.

### **Plumbing Code**

Basing occupancy numbers and fixture counts on the new building program, additional restroom facilities will be required beyond those existing. A combination of multi-occupancy and single-occupancy gender neutral restrooms are shown in plans. The University has expressed preference for single-occupancy restrooms should there be enough space for such. Updated occupancy and fixture counts should be conducted in schematic design to finalize the number and type of restrooms provided.

### **Life Safety and Security**

Basing occupancy numbers on the new building program, the existing egress stairs which discharge through the east and west pavilions are adequate for required exit capacities. Since two exit routes are required throughout each floor, these exits must be kept accessible to all patrons in case of an emergency. While the egress corridors must be kept unsecured, access to individual spaces such as offices, workspaces, and collections storage, should be secured separately to specifications required for each space. Doors, signage, and staff checkpoints may also be employed to discourage the public from entering into the more secure areas. Once final program and scale of the plaza level addition is determined, occupancy and egress evaluations will need to be recalculated to ensure that exit capacity is met without the addition of another egress stair. If required, such a stair would need to exit at the plaza level, have a 2-hour fire rating, and meet other egress code requirements.

# FINAL SCENARIO: PHASE 1

With the ultimate goal being completion of the project as shown in Phase 2, Phase 1 presents an initial design which will temporarily fulfill the majority of program needs. In this design, a small number of compromises have been made on adjacencies and a few spaces will need to serve multiple purposes during the interim period. The overall parti has been devised for the least possible adjustment of architectural elements between phases.

The intention of Phase 1 is to provide buildout of the facility at Basement and Sub-Basement levels without infilling the courtyard or building at plaza level. Within this project, buildout of the vault is a priority so that materials currently stored at the Main Library may be moved to this location and allow construction to begin at the Main Library. During this phase, a vapor barrier will need to be installed at all exterior walls and floor and at the new partition walls separating the courtyard from the building at the sub-basement level. The majority of walls and doors on Basement and Sub-Basement levels are constructed in Phase 1. Few will require demolition or further adjustment in Phase 2. New MEP/FP equipment sized and specified for the final design in Phase 2 should also be installed during this Phase 1. See MEP Analysis for additional information.

Programmatically, Phase 1 includes elements at Sub-Basement and Basement levels that will eventually be moved elsewhere in Phase 2. The Sub-Basement is primarily vault space with areas for Project Processing, Processing Storage, and Pre-exhibit Lab and Supply temporarily located here. The Basement level serves all other staff, user, and public spaces. Due to constraints of the existing building and program, some spaces are assigned a dual purpose during this phase. Exhibit space is limited, but placed adjacent to the classrooms which may be opened up and serve as event space as needed during this period. Because the Reading Room and Classrooms are placed on opposing sides of the courtyard, two separate waiting areas are suggested to serve these functions during this time. Staff spaces will largely remain in their phase 1 locations.

Changes to the site during Phase 1 include construction of a loading dock and driveway (serving the Basement level), installation of a new generator and architectural enclosure (location suggested in plan), new dumpster location (location suggested in plan), and new ADA parking spots (location is suggested in plan but must be coordinated with the upcoming Gregory Drive project).





## FINAL SCENARIO: PHASE 2

Phase 2 presents the completion of this project, including infill of the courtyard and construction of an addition at the plaza level. Other architectural elements will remain largely as they were in Phase 1 with a few program spaces relocating and requiring demo/construction of partition walls and doors. While it would be most efficient to infill the courtyard and construct the plaza level addition in tandem, these tasks may be separated in two phases, making the plaza-level addition Phase 3. For the purposes of this report, we will assume that they will be constructed together.

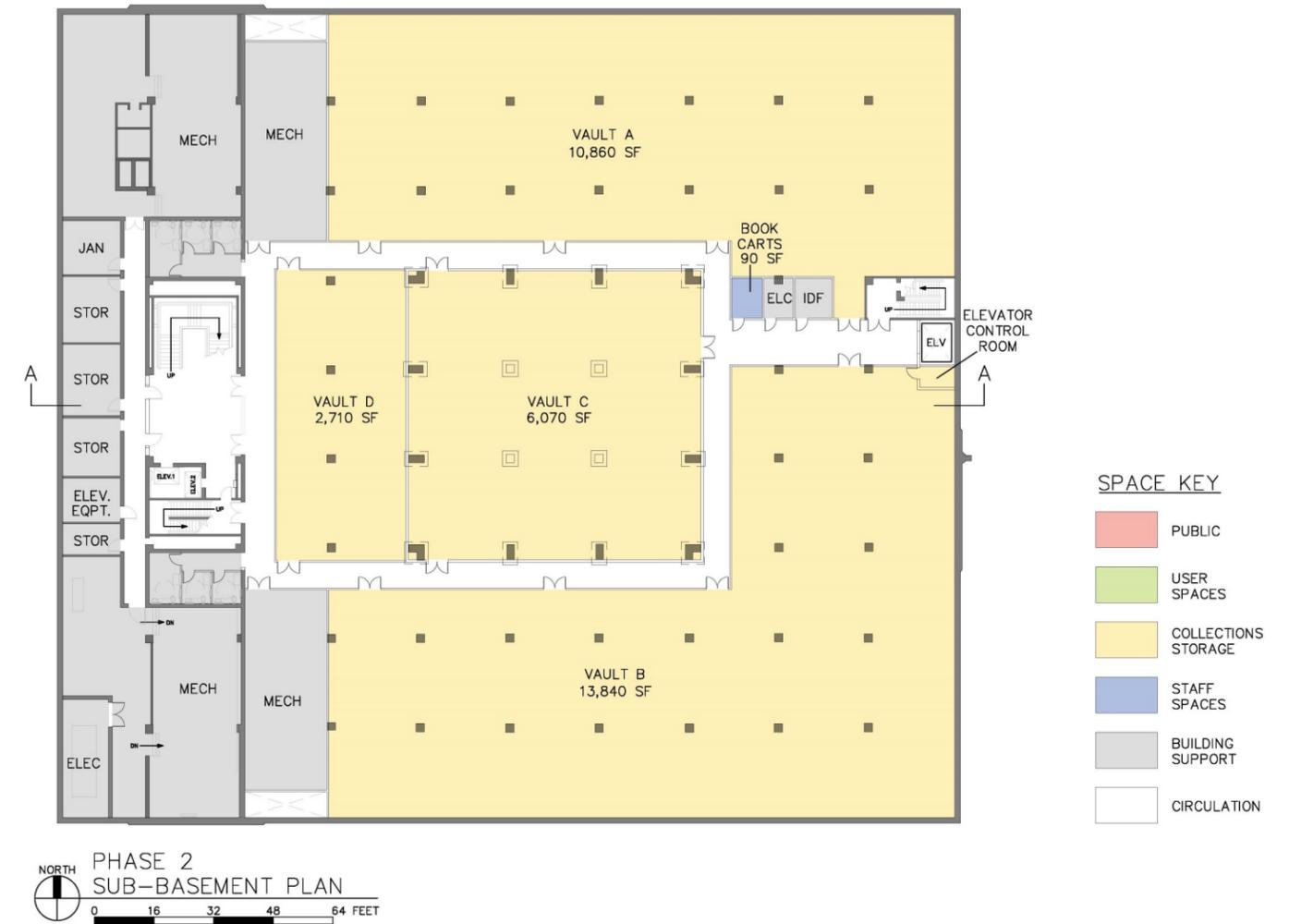
Infill of the courtyard will allow for additional vault space at the Sub-Basement level. Construction will include demo of the original courtyard walls and floor, construction of a new slab, new footing and structure for the reading room roof, adjustment / demo of partition walls in Vault D, and protection and augmentation of partition walls at Vaults A and B during construction.

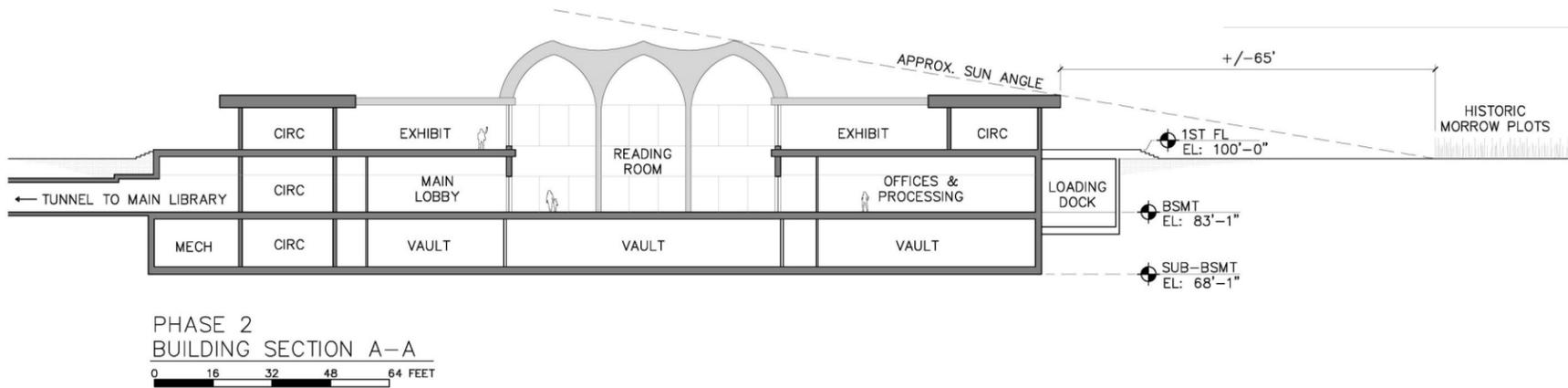
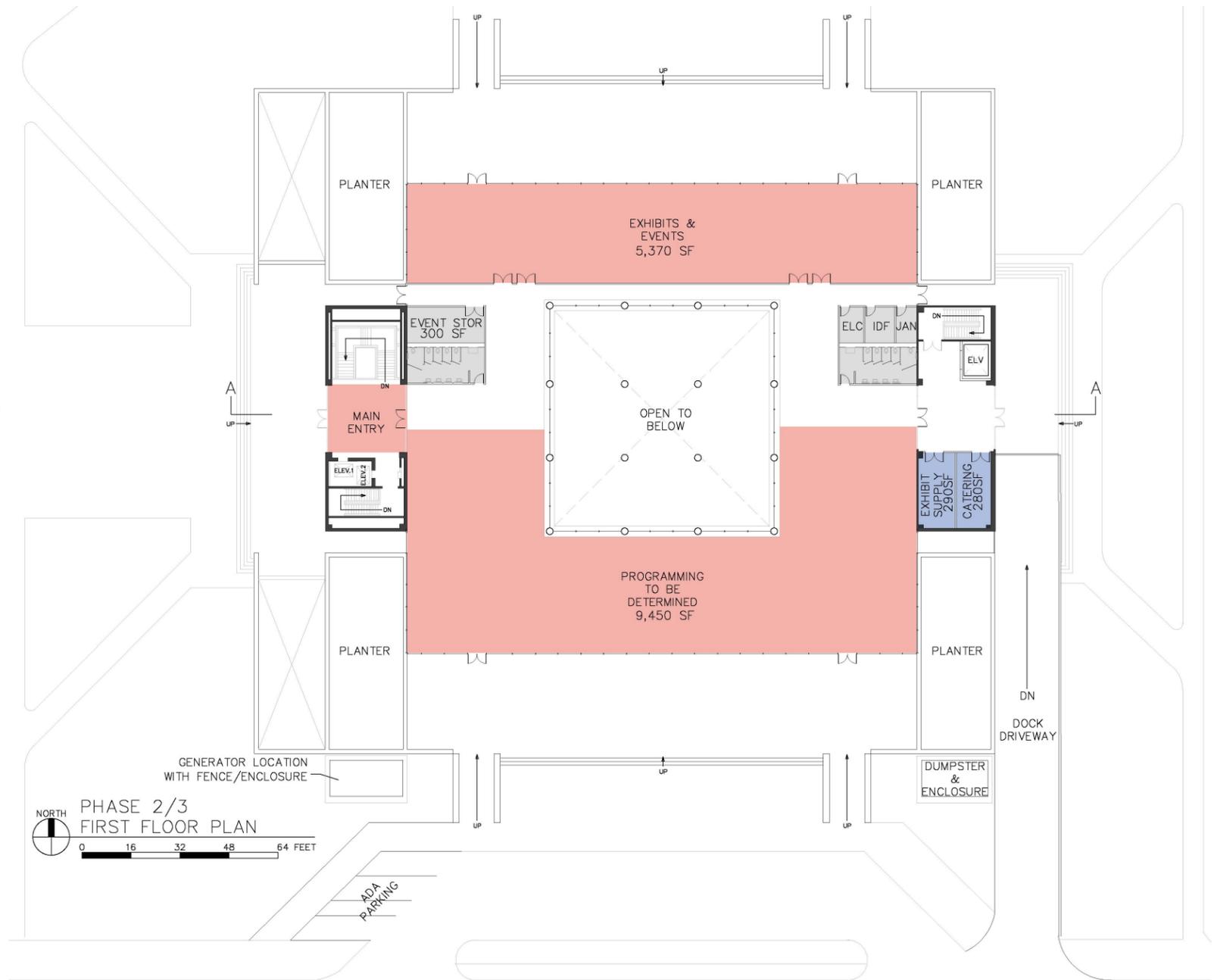
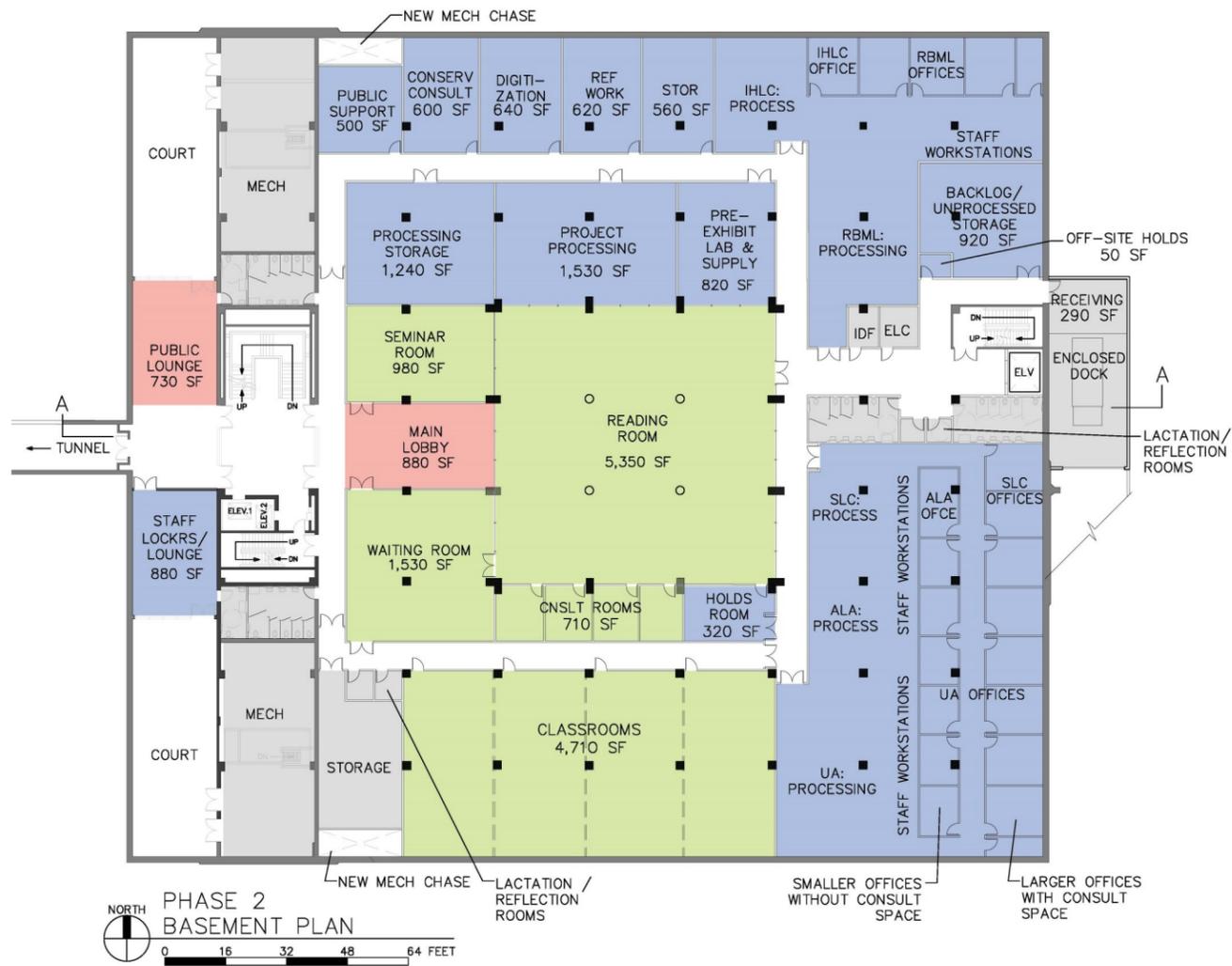
Courtyard infill will also allow relocation of the Reading Room into a larger and more prominent location in plan and section. This space will be two stories, reaching upward into the plaza level. It should be surrounded by glass partition walls to allow views to this space from surrounding rooms but separate it for security and audio concerns. The two-level space should retain character-defining elements of the existing courtyard including overall configuration of the storefront walls, colonnade, and stonework containing quotations at the top of the courtyard wall. Historically significant markers currently located within the courtyard may be placed elsewhere on site, within the Reading Room, or within the plaza-level addition.

Relocation of the Reading Room will allow Processing Storage, Project Processing, and the Pre-Exhibit Lab and Supply to move from the Sub-Basement to Basement level. The Waiting Room will move south to serve both the Reading Room and Classrooms. The Holds Room will also be relocated so that it is directly adjacent to the Reading Room. At the Sub-Basement, the courtyard and spaces previously occupied by staff areas will be used for additional vault space. Infill of the courtyard will require full architectural and structural buildout including installation of a vapor barrier for this space.

Adjustments to MEP systems and completion of installation of ducts and services to the courtyard infill and plaza-level addition will also need to be conducted in this phase. See MEP Analysis for additional information.

New structural elements and the new above-grade building envelope may be designed to speak to the aesthetics of history and tradition and/or act as a more modern architectural showpiece. The building section and rendering presented here suggest an abstraction of both possibilities. Further design possibilities to be examined in upcoming schematic and design development projects.





# PROGRAMMED AREAS PER PHASE

Space	Programmed Area (NSF)	Phase 1 (GSF)	Phase 2 (GSF)	Notes
<b>Reception</b>				
Entry				
Main Lobby	865 - 1,065	880	880	Includes Reception Desk (65nsf)
Exhibit and Event				
Exhibit / Event Space	2,720 - 2,900	1,050	5,370	Includes: Dedicated Exhibit Cases (100-150nsf), Integrated Exhibit Cases (120-150nsf). Program for additional space at plaza level is to be determined by the University and may include additional open exhibit space.
Catering	85 - 150	0	280	For Phase 1, Public Lounge may be used for temporary Catering space.
<b>User Spaces</b>				
Reading Room Entry / Waiting	540 - 615	980	980	Includes Service Desk (65nsf), Lockers (75-100nsf), Waiting Area (400-450nsf), and Handwash Area.
Reading Room	1,400 - 2,000+	3,080	5,350	Increased in space per University request.
Consultation Rooms / Small Group Workspace	150 - 450	520	710	Additional Consult Room added for Phase 2 due to building geometry, but may be used for storage or other program.
Classrooms	4,000	4,710	4,710	During Phase 1, one or more classrooms may be used as temporary event space.
Seminar Room	500 - 750	970	980	
<b>Collections Storage</b>				
Vault	13, 100	24,700	33,480	
<b>Staff Spaces</b>				
Offices / Staff & Student Workstations	4,140 - 4,390	4,270	4,270	Enlarged office with consult space (12) = 2,400nsf. Staff office with no consult space (7) = 840nsf. Assuming 6 Staff Workstations = 400nsf. Assuming 10-15 Student Workstations = 500-750nsf. All organized by department/division.
Pre-Exhibit Lab	550 - 800	910	820	Work space 150-200nsf, Supply Room 400-600nsf
Reference Working Area	300 - 400	620	620	
Conservation Work / Consult Area	200 - 300	600	600	
Digitization Area	500 - 600	640	640	
Public Support Space	150	500	500	Area may be decreased for additional MEP shaft space.
Staff Lounge / Lockers / Kitchenette	295 - 410	880	880	
Processing Areas				
Backlog / Unprocessed Storage	1,000	920	920	
Distinct/ Unit Processing Spaces	3,000 - 4,000	4,000	4,000	
Project / Flexible Processing Space	650 - 1,300	890	1,530	
Holds Room (for Reading Room)	250	560	320	
Holding Area for Off-site Collections	50	50	50	
Processing Workstation / Receiving Desk	85	290	290	Includes Loading Dock area.
Book Cart Storage Area	60 - 80	90	90	
Processing Storage	1,000	880	1,240	

Note: Due to existing building geometry, egress routing, and initial programming, a number of spaces are assigned areas above the Net Square Feet (NSF) programmed. Net Square Feet (NSF) of programmatic areas include usable space available for furnishings, equipment, and personnel. It does not include unusable space such as structural columns, shafts, or finished surfaces. As the design develops during schematic design, such unusable space will be added in plan, decreasing the numbers listed currently in Gross Square Feet (GSF). Where more significant overages are listed, such as in staff spaces, extra space may be used for programmatic expansion.



Conceptual rendering of Reading Room.

# APPENDIX

MEP ANALYSIS

UIUC REVIEW COMMENTS (to be compiled for final issuance)



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## UNIVERSITY OF ILLINOIS

University of Illinois Undergraduate Library

IMEG #19001981.00

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**Mechanical/Electrical Master Plan Update  
for  
University of Illinois Undergraduate Library  
Champaign, Illinois**

**IMEG #1900198191.00  
November 21, 2019**

**A. Introduction**

1. The following is a master plan update for mechanical, electrical and plumbing systems at the Undergraduate Library.
2. The goals for the master plan were to work with the University of Illinois and JLK Architects to refresh the 2009 Master Plan for a complete renovation of the Undergraduate Library. This plan included:
  - a. Recommending one final system option for proposed new and renovated spaces.
  - b. Recommending space temperature/humidity requirements.
  - c. Systems should follow University of Illinois Standards.
  - d. Systems should provide a 25-year+ life expectancy.
3. The existing Undergraduate Building contains many systems well beyond their useful life and lack capacity for expansion and provide poor control of the spaces, particularly for the new proposed usage. Many components are in locations that prohibit appropriate maintenance and repair.
4. The systems discussed in this master plan are not intended to limit project designers and dictate systems and concepts moving forward. The systems chosen are conceptual in nature for the purpose of developing updated phasing plans, project budgets, load estimates, and approximate equipment and room sizes.
5. Final equipment, room sizes, exact duct and piping routing, and chases will be the responsibility of the project designers.
6. The approximate loads given are an estimate based on envelope and equipment assumptions for the purposes of estimating equipment sizes.
7. The development of this plan understands there are other systems concepts available to designers. Technology advances may also provide additional opportunities to project designers. The project designers may propose system alternates and discuss feasibility with the University as individual projects develop.

**B. Systems Summary**

**1. Overview**

**a. Existing Systems:**

- 1) Ventilation: Four multi-zone units installed in the basement and two smaller units located above the ceiling. These systems will be removed and not be replicated.
- 2) Controls: The pneumatic control system will be completely removed and replaced.
- 3) Heating Water: The existing steam to hot water heating system will be removed and replaced.
- 4) Chilled Water: The chilled water systems serving existing equipment will be removed and replaced.
- 5) Domestic Water: The existing steam-to-hot water heater and distribution system will be removed and replaced.

**b. General:**

- 1) Maintenance should generally be limited to mechanical rooms located in the basement for large equipment. The Collections spaces will require equipment in the zone to maintain specific space conditions. Refer to Collections Systems narrative.
- 2) Energy recovery will be used as follows:
  - a) Chilled beam air handling unit (as required by code)
  - b) Dedicated outdoor air for ventilation
- 3) Any proposed systems, including proposed manufacturers, will comply with all UIUC standards for all disciplines.

**c. Electrical**

- 1) New primary distribution system for the complex will be provided.
- 2) All new electrical services, panels, receptacles, wiring, etc. for the buildings will be provided.
- 3) All lighting in the buildings will be replaced.
- 4) Historically deemed light fixtures should be refurbished or replaced by historically accurate replicas.
- 5) The fire alarm will be upgraded to the new Pyrotronics XLSV panel and a radio repeater provided in the Special Collections fire alarm system. All devices should be replaced.
- 6) New emergency generator for the Special Collections will be provided.



2. Building Utilities

a. Steam

- 1) An 8" steam and 2-1/2" pumped condensate enters the building at the northwest mechanical room.
- 2) This single building steam source and one facility steam-to-hot water generation plant will be used for the entire facility.
- 3) Extend a new steam and pumped condensate main from the entrance point to all new heat exchangers and hot water generation equipment.
- 4) A new condensate return station located in the north mechanical room will return condensate to the campus system.

b. Chilled Water

- 1) 6" chilled water mains that enter on the southwest side will serve the current Undergraduate Library, including Phase 2 spaces. Final capacities will need to be evaluated to determine if main size provided is adequate for proposed systems.
- 2) Chilled water will be extended to all new proposed units in the mechanical rooms and terminal equipment within the facility from its current entrance point at the southwest.

c. Domestic Water

- 1) Currently, there are two 6" domestic water services entering the building: one within the northwest mechanical room and the second in the southwest mechanical room.
- 2) They appear to be of adequate size for the proposed usage. For the new configuration, the north service will remain to serve the domestic water needs of the facility. The south service will be dedicated to the fire protection service.
- 3) These two current domestic water services will need to be evaluated during design to confirm the main size is adequate for proposed systems.

d. Sanitary

- 1) A 6" sanitary exits the building at the southwest and will be utilized for the new proposed layout.

e. Storm

- 1) A 6" storm exits the building at the northwest corner and connects to a 12" main north of the Undergraduate Library. This will remain.
- 2) There are (12) 4" storm mains exiting the building at the south connecting to a 12" main south of the Undergraduate Library.
- 3) Any new storm outlets will be routed to one of these existing exit points.

- 4) Note: If Phase 2 Courtyard Infill is completed, the existing storm main sizes will have to be evaluated to account for the new roof area being created.

3. HVAC Systems

a. Mechanical - Chilled Beam Air Handling Unit (CB-AHU)

- 1) A CB-AHU will be in the northwest mechanical room and will provide ventilation for the general office, and support spaces not served by the Collections System defined below on both sub-basement and basement levels
  - a) Desired space conditions:
    - a. Cooling - 75°F; heating - 72°F
    - b. All support spaces served by the chilled beam unit do not require specific lower temperature and space humidity control as defined for the Collections spaces and sub-basement.
  - b) Exterior zones will contain hot water panel radiation for public spaces and standard wall-mounted radiation for office spaces served from the central system defined below.
  - c) An approximately 20,000 CFM chilled beam air handling unit will contain the following components:
    - a. MERV 8 (30%) pre-filters
    - b. MERV 13 (65%) filters
    - c. Enthalpy energy recovery wheel
    - d. Hot water hot water preheat coil
    - e. Chilled water coil(s)
      - (a) Two coils in series to obtain the proper design conditions.
    - f. Hot water reheat coil
    - g. Final filters
    - h. Supply and return fan(s) sized for full economizer.
  - d) Zone Controls
    - a. Space heating and cooling will be provided by a terminal air box with reheat coil for each zone in conjunction with an independent active chilled beam cooling zone.
    - b. Each individual active chilled beam zone will contain a space temperature sensor, humidity sensor, and carbon dioxide sensor.
- 2) Chilled Beam Ventilation Distribution
  - a) Supply duct mains to each active chilled beam will be routed in new chases to the basement and in the ceiling spaces of the sub-basement zones



- b) This only applies to offices, general usage, and back-of-house spaces not defined as Collections System spaces below.
- 3) Steam and Condensate
  - a) No steam or condensate scope. Refer to the Utilities section of the narrative and phasing plan.
- 4) Chilled Water
  - a) Chilled water will be extended from entry point to the unit located in the mechanical rooms. Refer to the Utilities section of the narrative.
- 5) Chilled Beam Water/Distribution
  - a) A chilled beam loop with redundant chilled beam loop pumps will also be in the northwest mechanical room.
  - b) Chilled beam water will be extended from the mechanical room location to each chilled beam location.
- 6) Heating/Reheat Water and Distribution
  - a) Provided by one central system located in the north mechanical room in the sub-basement of the Undergraduate Library
  - b) Two individual steam-to-water heat exchangers for both heating water and reheat water, including duplex heating water pumps for each system, will provide heating/reheat water for the air handling unit coils, terminal equipment, reheat coils, and panel radiation.
- 7) Building Control
  - a) A new DDC building automation system (BAS) should be installed for the entire facility to replace the current pneumatic control system.
  - b) The system should be compatible with the entire Library facility, including the Main Library, for each phase of work completed.
  - c) Only UIUC-approved manufacturers and associated installing contractors will be utilized.
- 8) Humidification
  - a) Humidification is not required for zones served by the chilled beam unit.
- b. Mechanical - Collections System(s)
  - 1) Strict space conditions for temperature and humidity control will be required for the Collections zones.
    - a) Per Owner requirements, a single space condition will be maintained between 50° F and 55° F +/- 3° and 40% RH +/- 3%. Note: With an individual computer room unit in each zone as defined below, the user can easily vary the space conditions to meet slight variations of supply and humidity based on the function of the space. Specifics for each space will be finalized during facility design.

- b) The spaces requiring these conditions are as follows:
  - a. Vault (all)
  - b. Backlog Unprocessed Storage (basement)
  - c. Processing Spaces and associated storage
  - d. Classrooms
  - e. Conservation Consult
  - f. Reading Room
  - g. Digitization
  - h. Consult rooms
  - i. Exhibition/event (First Floor)
- 2) A complete new vapor barrier will be added for both levels of the facility to assist in maintaining the space conditions noted. Refer to the architectural narrative for specific details.
- 3) Ventilation Air
  - a) Collections and associated spaces ventilation air will be provided by a dedicated outdoor air unit (DOAS) located in the southwest basement mechanical room.
  - b) The unit's sole purpose is treating the code-required ventilation air for the Collections' zones.
  - c) An approximately 25,000 CFM custom DOAS unit will contain the following components:
    - a. MERV 8 (30%) pre-filters
    - b. MERV 13 (65%) bag filters
    - c. Total enthalpy energy recovery wheel
    - d. Pre-heat coil
    - e. Chilled water coil
    - f. Supply fan
    - g. Sensible energy recovery wheel.
    - h. MERV 8 (30%) pre-filters
    - i. Exhaust fan
- 4) Distribution System
  - a) DOAS outdoor air and exhaust air will be fully ducted to the existing west courtyards with the code-required separation of each louver.
  - b) Each Collections zone defined in 7b.1.b above will have a supply and exhaust duct routed to and from DOAS to the space.
  - c) Each ventilation zone will have a terminal air box and reheat coil routed directly to an individual computer room unit (CRAC) and not the space.
    - a. The primary purpose of the TAB is to serve as ventilation for the zone, with reheat capability.



- d) During an outage, it will serve as a partially redundant heat and cooling source for the zone in the event the CRAC unit is down. Refer to the Space Conditioning section below.
- 5) Individual Space Conditioning
  - a) Each Collections and associated spaces defined in 7.b.1.b above will have a Liebert (or Engineer-approved equivalent) computer room air conditioning (CRAC) unit to closely control space temperature and humidity. This offers the best control for these types of spaces.
  - b) Chilled water and heating water will be routed to each CRAC for space conditioning.
  - c) Humidification to the space will be provided by an infrared humidifier within the CRAC.
  - d) Large spaces with no ceilings will be served with a floor-mounted CRAC. Spaces with ceilings will be a ceiling-mounted CRAC.
  - e) Each will be strategically positioned in the spaces for best performance, maintenance, and to minimize piping within the spaces.
  - f) The functionality is the same for both types to condition the space. Each zone will be provided with a space temperature and humidity sensor to monitor the space conditions for precise unit control.
- c. Electrical/IT/CER Rooms
  - 1) These spaces will have a 1-ton cooling only, chilled water, wall-mounted fan coil unit mounted above the door for space conditioning.
- d. The large electrical and emergency electrical will have two 2-ton cooling only units per room. Each will have its own space thermostat.
- e. Fire Protection
  - 1) Refer to Utilities section above.
  - 2) A light hazard wet system will be provided for the following:
    - a) General office
    - b) Stairwell
    - c) Main entries
    - d) Mechanical/electrical
    - e) IDF/technology spaces
    - f) Staff locker
    - g) General public spaces (all)
    - h) Storage spaces
  - 3) An Ordinary Group 1 hazard, dry pipe pre-action system using nitrogen will be provided for all Collections, Rare Book, and associated book handling spaces defined in Collections Systems description 7.b.1.b above.

- f. Plumbing
  - 1) The design intent should have one central domestic water heating plant in the north mechanical room. Mixing will occur at the fixtures and not contain a central mixing valve.
  - 2) All existing plumbing piping, equipment, and fixtures will be replaced. Any new restroom groups will be served from the same central systems defined above.
  - 3) Low flow fixtures should be used throughout the facility for new and renovated spaces.
  - 4) A new sanitary waste system will be installed for all new restroom locations that tie into the existing sanitary system.
  - 5) Storm piping will be modified as necessary for the new layout. Drip pans must be provided on piping in all Collections areas.
  - 6) A new primary/secondary storm system will be installed for the enclosed portion of the courtyard in Phase 2.
- g. Electrical
  - 1) Primary Power
    - a) For Phase 1 of this project, a new appropriately sized 13.2 KV feeder will come from a new 15KV draw-out circuit breaker in the Business and Instructional Facility distribution center.
    - b) New appropriately size 15KV cables will be run from the Business and Instructional Facility distribution center to the new double-ended substation.
  - 2) Building Power
    - a) A new appropriately sized double-ended unit substation will take the 13.8 KV 3-phase primary service down to a 277/480V 3-phase, 4-wire service for the building.
    - b) The substation will be sized to be half loaded, so if one substation goes down, the other substation can pick up the entire load for the existing and new additions to the building.
      - a. All bussing and transformer coils will be copper.
      - b. Fans will be installed in the transformers for cooling.
      - c. The secondary main switches and the secondary tie switch will be Kirk keyed interlocked.
      - d. Metering will be per UIUC Standards.
    - c) This substation will provide service to all mechanical, major library equipment loads requiring 480V 3-phase service. It will also be sized to handle the mechanical load for the renovated portion of the Library.
    - d) Lighting will be at 277V.



- e) The distribution of electrical power will be done so the mechanical, lighting, and general receptacle loads are separately metered.
  - f) Power for receptacles will be obtained from a 480V to 120/208V, 3-phase, 4-wire appropriately sized transformer that will provide service to an appropriately sized distribution panel, which, in turn, will provide service to 42 circuit 200 amp branch panelboards. These panelboards will provide power to all receptacles and other loads requiring 120 or 208V single power or 208V 3-phase power.
  - g) Per University standards, variable frequency drives will be used for air handling equipment and pumps as required.
  - h) Classroom A/V systems will have their own panelboards with surge protection.
  - i) All wiring will be in conduit.
  - j) All wiring will be copper.
  - k) All panel bussing will be copper.
  - l) All receptacles will be specification grade hard use type.
  - m) Surge protection devices will be installed at the unit substation and the 120/208V distribution panel.
  - n) Surge protection will also be provided for the fire alarm panels.
- 3) Emergency Power
- a) A new 277/ 480V, 3-phase diesel standby generator will be installed near the southwest corner of the building and just to the south of the area well or planter box. The new generator will be sized to handle the entire renovated and new spaces for the Special Collections building.
  - b) The distribution system will be divided into two transfer switches: one for the life safety branch and one for the equipment branch. Each transfer switch will be appropriately sized for each branch. They will be a four-pole type transfer switch.
  - c) The life safety branch will provide power for egress lighting, elevator, and the fire alarm system.
  - d) The equipment branch will provide power to a heating water pump, sump pumps, security system, air handling units, CRAC units, exhaust fans, humidifiers, and sewage ejector pumps.
- 4) Lighting
- a) For the most part, building lighting will be LED light fixtures.
  - b) Foot candle levels will be per IES Standards, except per SAA Guidelines in Special Collections grade level, and meet ASHRAE 90.1 watts per square foot requirements.
  - c) Direct/indirect lighting will be used in the shelving and reading areas. They will be controlled by a combination of time clocks or occupancy

- sensors where it makes sense. Near the windows, daylight harvesting will occur using daylight sensors.
  - d) Direct lighting will be used in restrooms, offices, storage rooms, and work spaces and will be LED type.
  - e) Dual technology occupancy sensors will be used to control lighting in the restrooms, offices, storage rooms, and work spaces.
  - f) Ultrasonic sensors will be used to control corridor lighting.
  - g) Lighting controls to meet current energy code requirements.
- 5) Systems
- a) Fire Alarm
    - a. A new Pyrotronics XLSV panel will be installed.
    - b. Fire alarm initiation devices will be laid out to meet code minimum requirements for a sprinkled building and University Standards.
    - c. A radio repeater system will be added to the fire alarm system and through the building.
    - d. Notification will be done by a voice system and visual lights laid out to meet ADA and code requirements.
    - e. All fire alarm wiring will be in red color conduit.
  - b) Lightning Protection
    - a. A new lightning protection system will be provided for the building per NFPA Article 780 and be UL master labeled for phase 2 and 3. Otherwise, the existing lightning protection system will remain.

C. Phasing

1. Mechanical/Electrical

- a. A mechanical/electrical plant equipment including utilities and air handling units will be installed as part of Phase 1. The distribution system and terminal equipment will be installed as part of Phase 2 zones.
- b. In Phase 2 or when the new load center for the main library comes on line, new 13.2KV feeders from this load center will be installed in new and existing ductline to the Special Collections double-ended substation. To keep downtime to a minimum, half the substation will be cut over at a time. Remove the existing 15 KV cabling back to the Business and Instructional Facility 15KV distribution center and mark it spare.
- c. Refer to Architectural phasing plans for details.



- d. While phasing for both Library buildings holistically is not specifically part of the IMEG scope, IMEG has assumed the Undergraduate Library facility will be updated prior to the Main Library to allow for the sequence to work properly with the updated Main Library Master Plan Refresh.

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