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SECTION 01 EXECUTIVE SUMMARY

PARTICIPANTS

1.0 EXECUTIVE SUMMARY
HOK would like to recognize the efforts of all whom contributed to the content herein.

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Susan Smith
A. EXECUTIVE SUMMARY

This Program Statement establishes the infrastructure upgrades, exterior envelope restoration, program of spaces, design requirements and preliminary budget for the 540 McCallie Renovation for the University of Tennessee at Chattanooga (UTC) in Chattanooga, Tennessee.

In collaboration with the UTC planning team, this document defines the infrastructure upgrades, design criteria, Concept Test Fit diagrams for renovation space and establishes the Preliminary Estimate of Construction Cost and a Total Project Budget.

The purpose and use of the Program Statement is:

- Establish the project Vision and Priority Goals for success
- Define the space requirements to meet the needs as defined by the UTC’s Planning Team
- Initiate the procurement of design services; providing the design team, users and management with a document summarizing key functional, operational and spatial requirements for the project in sufficient detail to initiate design work
- Provide project approval and funding authorities with information on which to base capital and operating requirements

PROJECT UNDERSTANDING

The priority for this building is to upgrade or replace the outdated infrastructure, HVAC, Plumbing, Electrical and Fire Protection to meet the UTC’s space program requirements for many years to come. In addition to the building infrastructure, this project will provide much needed upgrades and improvements to the Exterior Envelope including replacement of aged roofing, sealant at paneled wall systems, windows and entry doors. In addition to restoring the vital components of the 540 McCallie Building, the project includes critical renovation space on Levels 2 and 6.

To understand and assess the existing conditions and upgrades proposed, the Planning Team reviewed previous documents including Assessment Reports and Record Drawings.

The Team also conducted a Site Visit to observe existing conditions.

Based on the Renovation and Program requirements, the project will include infrastructure upgrades servicing 173,979 gross square feet (GSF); Exterior Envelope restoration and renovation to provide the following program of spaces:

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Net Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms</td>
<td>10,670</td>
</tr>
<tr>
<td>Class Lab / Studio</td>
<td>2,980</td>
</tr>
<tr>
<td>Study Facilities</td>
<td>480</td>
</tr>
<tr>
<td>Offices</td>
<td>13,200</td>
</tr>
<tr>
<td>General Use</td>
<td>1,050</td>
</tr>
<tr>
<td>Program Total</td>
<td>28,380</td>
</tr>
</tbody>
</table>

PROJECT GOALS

The overall goal for the project is to provide much needed infrastructure improvements and replacement to bring the building up to today’s Academic Building standards. The proposed infrastructure upgrades will result in a safe and efficiently operating facility to serve UTC’s critical education and workplace demands.

During the Kick-Off Work Session UTC’s Planning Team identified their Vision and Goals for the project. The following is a summary of these priority goals:

- Bring the Building up to today’s Higher Education design standards
- Optimize Classroom Utilization.
- Flexibility of space use.

PROGRAMMING PROCESS & KEY OUTCOMES

During the Programming Phase, the Project Planning Team consisting of HOK, UT Facilities Planning and the UTC Planning Teams, completed the following:

- Conducted a Kick-Off Work Session to define the project Vision and Goals and an overview of the project requirements
- Reviewed in detail building infrastructure requirements and space and design criteria for the proposed renovation.

- Reviewed and confirmed the condition of existing building systems related to Mechanical, Electrical, Plumbing and Fire Protection to meet the Academic functional needs.
- Developed Test Fit Concepts for renovation of Levels 2 and 6.
- Conducted a Code Study to determine required and recommended upgrades. This is related to both Life Safety and to plumbing fixture requirements.
- Prepared a Preliminary Estimate of Construction based on design criteria established by the Program and the selected Test Fit Concept.
- Coordinated Construction and other project related cost with the UTC Planning Team to develop the Total Project Budget.

COST ESTIMATE

Based on the program requirements and existing conditions in the 540 McCallie Building, a Preliminary Estimate of Construction was developed. In addition to the Estimate of Construction, the Programming and Planning Team coordinated and assisted with the estimate and budget for all project costs. This will establish the Total Project Budget going forward into the funding process. In summary:

- Estimated Cost of Construction: $30,640,379
- Additional Project Cost: $9,359,621
- TOTAL PROJECT COST: $40,000,000

B. INTRODUCTION/PROJECT OVERVIEW

The University of Tennessee at Chattanooga commissioned HOK to provide a Program Statement and Test Fit for the 540 McCallie Renovation. This report documents the results of the study; including defining the project goals, functions and activities to be accommodated, space needs to meet the functional requirements, building system performance criteria, assessment of the proposed facility, including a Test Fit to meet space requirements.
Based on the upgrades and programming criteria a Preliminary Estimate of Construction Cost was developed to be included with additional Project Cost to determine the Total Project Budget.

The renovation project will provide critically needed space for General Use Classrooms, Office / Workplace for faculty and departments and much needed Student space.

PROGRAMMING PROCESS

The Program defines the following for the overall project and for each functional component:

GOALS: Goals define the mission and intended purpose of the renovation. As defined by the UTC Planning Team, the goals are key objectives that must be met to make the project a success.

FACTS: These are the fixed constraints on the project, including existing building conditions, UTC design and planning standards, Building and Life Safety Codes and Regulations.

CONCEPTS: Concepts are developed around functional relationships and define how project components could work together and relate to other functions. These space relationships were developed to show the general arrangement and type of spaces planned for the renovation. The test fit is not intended to be a design for the space but a study in potential adjacencies and flow between spaces.

NEEDS: This information describes what is required to achieve the defined goals and space requirements (system upgrades, how many spaces, what type and what size).

Based on existing infrastructure and exterior envelope conditions the Planning Team closely reviewed priorities for upgrades with the UTC Facilities and Planning Team. Program requirements for Levels 2 and 6 were developed for review and evaluation by UTC. The Test Fit Concept included in this report is a potential approach. The Test Fits are not the “design”, but an exercise to confirm how to best utilize the proposed Levels 2 and 6. The Test Fit also indicates potential space adjacency and flow for Faculty, Staff and equipment.

The actual design will be developed in the next phase of the project, following approval to move forward by UTC.

The program requirements and Test Fit Concept were used as the basis of developing the Preliminary Estimate of Construction Cost.

Programming requirements outlined in this report will form the basis of design when the project is funded to move forward. The future design effort will include Schematic Design, Design Development and Contract Documents for constructing of the renovation.

RENOVATION SUMMARY

All Levels are planned for infrastructure upgrades including:

- HVAC, Plumbing and Electrical Systems; varies per floor based on recent or current renovation upgrades
- Exterior Envelope upgrades
- Elevators serving all floors, replacement of 3 original and upgrades of 2 added
- Restrooms

The full building is planned for exterior envelope restoration including:

- Sealant and caulking exterior joints
- Window and exterior entry door replacement
- New roof with new and restored roof drainage system

Level 2 and 6 are planned for renovation to include Classrooms, Test Labs and Office / Workplace support.

C. PROJECT SCHEDULE

Project schedule for Design and Construction will be developed during the Request for Proposals selection process for design services.

D. PROJECT BUDGET

The project budget, developed in coordination with the UTC Planning Team, includes preliminary estimate of construction cost and related cost including: design fees, equipment and furniture.
SECTION 02 EXISTING CONDITIONS OVERVIEW

2.0 OVERVIEW

2.1 EXISTING FLOOR PLANS
2.0 EXISTING CONDITIONS

The Chattanooga State Office Building (CSOB) is located at 540 McCallie Ave. It was constructed in two separate phases (1949 and 1973), had one major renovation in 1992, and was used by the State of Tennessee from 1981 till 2014. The facility was then sold to the university when the State relocated their offices. The original 1949 building is a concrete, seven story structure plus a full basement with the entrance facing on McCallie Avenue. The 1973 addition is similar in construction and was attached to the southwest corner of the original building. The combination of the two buildings forms an L shape.

Currently, staff and students utilize the facility as a classroom, office suite, and surge space. The Psychology, Criminal Justice, Political Science, and Information Technology departments and the WUTC Radio Station are already in the building or in the process of moving into the building. Anthropology, History, Geography, Public Service, and Sociology are currently in Brock Hall and scheduled to move to the building. The new program intends to coalesce the Social Sciences departments, currently located in multiple locations across campus, under one roof.

The building will require major investment in the shell and systems upgrade. Maintenance has been patching and repairing as needed for some time but the majority of the building’s outer shell (walls and roof) needs repairs or replacing. The roof is in very poor condition, way past its useful life and showing signs of deterioration and past leak history. Interior finishes upgrades on the first floor has been accomplished but the upper floors are dated and deteriorated. Most of the mechanical systems are original equipment far past their useful life and in need of replacement. The cooling tower support frame is badly deteriorated and in need of immediate remediation. In general, the plumbing systems are adequate to serve the facilities, with equipment and fixtures to be updated as needed. Most of the electrical service equipment and systems were updated in the 1992 addition and have reached the end of their useful life cycle.
Basement level utilized by the Information Technology Department and for storage and receiving.
Aside from the auditorium, Level 1 was fully renovated five years ago and primarily consist of classrooms.
Second level consists primarily of office space for the College of Arts & Sciences faculty and department heads.
The Psychology Department is located on the third level. The current consists of labs and office space for graduate assistants, faculty and department heads.
The fourth level is currently utilized as office, storage and surge space. Office walls mostly constructed with demountable partitions.
Fifth level is currently utilized as office, storage and surge space.
Sixth level is currently utilized as office, storage and surge space.
Level 7 is at the penthouse roof. WUTC radio station is located on this level. The remaining interior space is utilized as storage and surge space.
SECTION 03 PROGRAM CRITERIA

3.0 - OVERVIEW

3.1 - PROGRAM AREA SUMMARY
3.0 - OVERVIEW

A. PROGRAM OVERVIEW

The State Office Building located at 540 McCallie Ave. was constructed in two separate phases (1949 and 1973), had one major renovation in 1992, and was used by the State of Tennessee from 1981 till 2014. The facility was then sold to the university when the State relocated their offices. The original 1949 building is a concrete, seven story structure plus a full basement with the entrance facing on McCallie Avenue. The 1973 addition is similar in construction and was attached to the southwest corner of the original building.

This project will renovate and upgrade primarily the infrastructure components of this facility including the building envelope, plumbing systems, mechanical systems, electrical systems, fire protection systems, vertical transportation systems, and IT systems.

The programmatic activities for the project focused on Floors 2 and 6 fit up, leaving most of the other floors intact except as listed in the scope of renovation in this document. The program adds up to 28,380 net square feet, with the majority of spaces being in the classroom or office categories.

Level 2 renovation will primarily consist of classrooms and follow the precedent set by the newly renovated Level 1 in terms of purpose, fit and finishes. Level 6 will house the Dean’s Suites for Arts and Sciences programs and include various workspace space arrayed flexibly without strict departmental boundaries so that offices in either group can shrink or grow. Additionally, there will be some behavior assessment and observation labs. Student and faculty/staff collaboration areas will also be included in the program.

B. PROGRAM SPACES

The primary programmatic components are as follow:

ACTIVE LEARNING

These classrooms were programmed for 30, 40, 60 and 70 person occupancy.

The benefit of active learning is that it helps students draw connections to real life. In turn, this gives them a better understanding of their place in the world and facilitates important skills such as analysis, evaluation, and collaboration. Active learning may also improve student attention while fostering meaningful discussions and divergent learning, in which there is more than one correct answer to a question, and will feature flexible, movable, stackable furniture and the appropriate type and numbers of display surface for instructors and students to project their laptops around the room, and include sound projection. Wifi and power is critical for student laptops and smart phones.

BEHAVIOR ASSESSMENT & OBSERVATION LAB

There are some behavior assessment and observation labs in the program that will be supported by faculty monitoring rooms and storage areas to support the labs.

WORKPLACE ENVIRONMENT

The Tennessee Higher Education Commission Space allocation Guidelines were used to establish the program for administration and faculty offices in the program.

A shared model of distribution of offices has been devised so that faculty and staff numbers may ebb or grow with minimal disruption. Shared, central resources will generate efficiency and facilitate a vibrant work culture as well.

Enclosed offices with glazed fronts may be designed where needed to provide an open, collegial atmosphere and allow transmission of daylight across spaces.

Ample meeting rooms of various sizes, hoteling areas, touchdown spaces will provide landing spots for visitors and allow for ad-hoc collaboration at various scales.

PROGRAM PLANS

The following plans depict scope and extent of architectural renovations to be performed on each floor. Please refer to Chapter 4 - Building Systems Narratives for full extent of work to be performed from building mechanical, electrical, plumbing, fireproofing and exterior and interior systems changes.
<table>
<thead>
<tr>
<th>Code</th>
<th>Space ID</th>
<th>Space Name</th>
<th>No. of Units/Occupants</th>
<th>Quantity of Spaces</th>
<th>Program NSF</th>
<th>Total NSF</th>
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<td>A.0</td>
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<td>Public &amp; Amenity</td>
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<td>410</td>
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<td>5 to 7</td>
<td>4</td>
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<td>610</td>
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<td>500</td>
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<td>A.3</td>
<td>Student lounge/ break area</td>
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<td>1</td>
<td>300</td>
<td>300</td>
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<tr>
<td>610</td>
<td>A.4</td>
<td>Faculty lounge/ break area</td>
<td>15</td>
<td>1</td>
<td>250</td>
<td>250</td>
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<td>A.0</td>
<td></td>
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<td></td>
<td></td>
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<td>Classroom &amp; Classroom Support</td>
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<td></td>
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<tr>
<td>110</td>
<td>B.1</td>
<td>30P Active Learning Classroom</td>
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<td>3</td>
<td>900</td>
<td>2700</td>
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<tr>
<td>110</td>
<td>B.2</td>
<td>40P Active Learning Classroom</td>
<td>40</td>
<td>2</td>
<td>1200</td>
<td>2400</td>
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<td>B.3</td>
<td>60P Active Learning Classroom</td>
<td>60</td>
<td>2</td>
<td>1500</td>
<td>3000</td>
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<tr>
<td>110</td>
<td>B.4</td>
<td>70P Active Learning Classroom</td>
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<td>1</td>
<td>1700</td>
<td>1700</td>
</tr>
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<td>110</td>
<td>B.5</td>
<td>10P Small Group Learning Classroom</td>
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<tr>
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<td>B.6</td>
<td>Seminar Room (15p)</td>
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<td>190</td>
<td>190</td>
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<tr>
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<td></td>
<td>Total</td>
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<td></td>
<td></td>
<td>10670</td>
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<tr>
<td>C.0</td>
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<td>Class Lab &amp; Lab Support</td>
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<td></td>
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<tr>
<td>210</td>
<td>C.1</td>
<td>Observation labs</td>
<td>5</td>
<td>4</td>
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<td>1000</td>
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<tr>
<td>215</td>
<td>C.5</td>
<td>Behavior Assessment Lab storage</td>
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<td>80</td>
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<tr>
<td>D.0</td>
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<td>310</td>
<td>D.1</td>
<td>Dean Office</td>
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<td>2</td>
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<td>600</td>
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<tr>
<td>310</td>
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<td>Assoc. Dean/ Large Office</td>
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<td>10</td>
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<td>2000</td>
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<td>D.3</td>
<td>Exec/ Medium Office</td>
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<td>12</td>
<td>150</td>
<td>1800</td>
</tr>
<tr>
<td>310</td>
<td>D.4</td>
<td>Faculty Office</td>
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<td>30</td>
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<td>3600</td>
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<td>310</td>
<td>D.5</td>
<td>Adjunct/ Staff Spaces</td>
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<td>1500</td>
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<tr>
<td>310</td>
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<td>Workstations/ Touchdown areas</td>
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<td>10</td>
<td>60</td>
<td>600</td>
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<tr>
<td>350</td>
<td>D.7</td>
<td>Large Conference room</td>
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<td>2</td>
<td>500</td>
<td>1000</td>
</tr>
<tr>
<td>350</td>
<td>D.8</td>
<td>Medium Conference room</td>
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<tr>
<td>315</td>
<td>D.9</td>
<td>Reception + Small Meeting + Collab</td>
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<td></td>
<td></td>
<td></td>
<td>28380</td>
</tr>
</tbody>
</table>
3.1 - SECOND FLOOR PLAN

- NOT IN SCOPE. DOES NOT REPRESENT MEP/FP REPLACEMENT & RELATED ARCHITECTURAL DEMO/New Construction. Refer to Program Narrative.

- REPLACE ELEVATORS & RESTROOM PLUMBING AND FINISHES

- REPLACE MECHANICAL & ELECTRICAL

- NEW PROGRAM AREA, DEMOLISH EXISTING & REPLACE WALLS AND FINISHES. SCHEME SIMILAR TO LEVEL 1

- UPGRADES AT ELEVATOR/ ELEVATOR LOBBY.
3.1 - SIXTH FLOOR PLAN

ARTS & SCIENCES PROGRAM:
2 DEPARTMENTS + DEPARTMENT HEAD SUITES EACH ON EACH END OF BUILDING. WILL INCLUDE BOARD ROOMS, CONFERENCE ROOMS, (OFFICE/BUSINESS OCCUPANCY)
BEHAVIOR ASSESSMENT, OBSERVATION ROOMS, ETC.

NOT IN SCOPE. DOES NOT REPRESENT MEP+FP
REPLACEMENT & RELATED ARCHITECTURAL, DEMO. NEW CONSTRUCTION. REFER TO
PROGRAM NARRATIVE.

- REPLACE ELEVATORS & RESTROOM PLUMBING
  AND FINISHES
- REPLACE MECHANICAL & ELECTRICAL
- NEW PROGRAM AREA, DEMOLISH EXISTING
- UPGRADES AT ELEVATOR/
  ELEVATOR LOBBY

NEW DEPARTMENT
HEAD OFFICES

NEW OBSERVATION

NEW OBSERVATION

NEW CONFERENCE ROOM

NEW CONFERENCE ROOM

NEW OFFICES/
BREAKOUT SPACES

STUDENT (SUCCESS)
CENTER

NEW BEHAVIOR
ASSESSMENT
SECTION 04 BUILDING SYSTEMS NARRATIVE

4.0 - ARCHITECTURAL

4.1 - MECHANICAL

4.2 - PLUMBING

4.3 - ELECTRICAL

4.4 - FIRE ALARM

4.5 - FIRE SUPPRESSION
ROOF

A. CURRENT CONDITION
The current roof is broken up across various levels of the building. Reports indicated that the roof system was rebuilt circa 2007 and consists of torch applied modified bitumen roofing; a layer of gravel is readily visible as the top layer. The perimeter of the high roof at both the parapet and interior wall have continuous counter flashing. The roof includes asphaltic tiles for walkpads.

There are various penetrations for roof drains, window washing davits, mechanical supports, mechanical equipment, and parapet supports.

The various metal components utilized for equipment supports and façade supports are experiencing rust and deterioration of associated flashing.

There are several expansion joints that separate the two distinct building structural systems.

Localized ponding has been noted.

B. DEMOLITION
In general, the roof system is nearing the end of its expected life and warranty period. The roof system should be removed in its entirety and replaced with a single ply system with updated warranty. Existing penetrations and roof curbs no longer in use should be removed in their entirety.

A phasing and construction plan may necessitate a temporary dry-in of the roof to minimize any leaks into the building.

C. RECOMMENDATION
The current modified bitumen roof system will be replaced with a fully adhered 80 mils single ply TPO roof system to meet current standards as well as to provide a new warranty.

The roof system will consist of 5 inches of polyisocyanurate rigid board insulation to achieve an R-Value of 25 per IECC 2012.

The use of tapered insulation across the entire roof will be utilized to provide proper drainage and mitigate any ponding.

Preformed and custom shaped pipe boots will be utilized for any existing or new penetration.

Factory formed slip-resisting walkways will be provided to transverse the roof.

Continuous termination bar in sealant with counter flashing cut into parapet/interior wall with sealant.

Existing roof drains will be checked for serviceability and replaced as necessary.

A total of 4 drains will be added to ensure code required overflow drainage is met.

All window washing davits will be checked and certified. An additional 6 tieback supports will be added.

All abandoned equipment on roof deck to be completely removed.

Abandoned penetrations through the roof deck, as well as any deficiencies in the roof deck, will be repaired.

Expansion joints will be replaced with factory fabricated water-proofed units.

Metal fabrications visible to the street will be re-painted with a high-performance coating.

Metal items not visible to the street including, but not limited to, equipment supports, access ladders, guardrails, lifeline davits, etc. will be prepped, primed, and coated with a layer of rust-inhibitive paint.

FACADE / EXTERIOR ENVELOPE

A. CURRENT CONDITION
The exterior façade, consisting of granite and limestone panels with aluminum windows, are generally in good condition.

Surface discoloration from dirt and rainwater are noticeably evident up and down the structure.

There are roughly 370 aluminum windows, several of those at the penthouse have been recently replaced with thermally efficient units.

The entries consist of three individual aluminum storefront entrance systems at two locations, for a total of six. Embossed copper murals hang over the front entry.

There are roughly 20 louvers across the building in various states of serviceability.

B. DEMOLITION
A singular louver at the penthouse level is significantly damaged and should be removed.

C. RECOMMENDATION
Entire exterior of building will be pressured washed to remove dirt and discoloration.

All windows will be replaced with thermally efficient aluminum window system of a similar architectural character.

After installation, windows will be water spray tested and air chambered tested to ensure proper installation.

The 6 storefront entrances will be replaced with thermally efficient units. An ADA auto-operator will be installed on the east side for accessibility compliance.
4.0 - ARCHITECTURAL

Caulk at limestone and granite joints will be removed and replaced with color matched sealant and backer rod.

Repaint exterior metal items such as trim, handrails at front entry, handrails at loading dock, exterior hollow metal doors, and louvers.

Replace louver at penthouse.

CONVEYING SYSTEMS
A. CURRENT CONDITIONS
There are 5 elevators in the building. Elevators 1-3 are overhead direct current gearless traction passenger elevators serving the main building and are original installation from 1950. Elevators 4 & 5 are overhead alternating current geared traction passenger elevators serving the building addition and are original to the addition from 1973.

Elevator controls for the 3 DC gearless elevators were upgraded in 1991. The 2 AC geared traction elevators were upgraded in 2009.

Various defects were noted in all elevators.

Various safety code violations were noted in all elevators.

B. DEMOLITION
Control units of elevators 1-3 are past their useful life and should be replaced.

The DC gearless machines of elevators 1-3 are past their useful life and should be replaced.

The AC geared machines of elevators 4 & 5 are nearing the end of their useful life and should be reconditioned or replaced.

C. RECOMMENDATIONS
Due to age of equipment, and limited availability of replacement parts, Elevators 1-3 to be replaced in full (controllers, machines, car operating stations, cabs) with overhead AC gearless machine traction elevators.

Corridor fixtures on elevators 1-3 to be replaced.

Pit ladder to be added at all elevator pits.

Pit lighting to be added at all elevator pits.

Smoke detectors to be added in machine room, top of hoistway, in elevator pits, and at each landing.

Shunt trip to be added to each elevator machine equipment in machine rooms.

Hoistway venting to be added at top of hoistways.

Gypsum board bevels added to all hoistway ledges each floor.

Due to age of equipment and limited availability of replacement parts, the geared machines of elevators 4 & 5 are to be replaced.

HVAC
A. CURRENT CONDITION
Current induction HVAC system does not function well. Owner intends to replace.

B. DEMOLITION
Existing induction system will be removed. This includes existing ductwork, grills, and related equipment.

C. RECOMMENDATION
Replace ceilings and patch and repair walls where existing mechanical ductwork, grills, and equipment will be removed.

This includes the induction system, located at the inside face of most exterior walls. Interior walls and flooring to be replaced at these locations.

CODES - WATER CLOSETS
A. CURRENT CONDITION
Toilet rooms at all levels do not meet ADA and IBC 2012 requirements.

B. DEMOLITION
In each toilet room with multiple toilet compartments, 1-2 existing toilet compartments will be demolished.

C. RECOMMENDATION
Install one wheelchair accessible toilet compartment in each toilet room with multiple compartments.

Replace flooring in all toilet rooms

Patch and repair walls where damaged.

CODES - STAIR & EXIT WIDTHS
Existing stair and exit widths appear to be compliant.

LEVEL 7
A. CURRENT CONDITION
Elevation of elevator lobby at level 7 is greater than 75ft above fireman ladder access. Code requires installation of enclosed elevator lobby.
B. DEMOLITION
Remove existing partitions directly adjacent to the elevators.

C. RECOMMENDATION
Install approximately 45 linear ft of smoke rated partitions, (floor-to-structure above) to create elevator lobby.
Install 2-3 viewing windows at new partitions.
Install 2-3 rated doors to be installed at new elevator lobby walls
Install dampers where new ductwork crosses elevator lobby partitions.
4.1 - MECHANICAL

A. CODES AND STANDARDS

HVAC systems will comply with the following minimum requirements:

- International Existing Building Code - 2012
- State of Tennessee High Performance Building Requirements - 2015
- University of Tennessee – Division of Facilities Planning - Designer’s Manual 2018

B. DESIGN CONDITIONS

- Indoor: 75°F DB, 50% RH summer; 70°F DB winter.
- Outside: 95°F DB, 78°F WB summer; 0°F DB winter.

D. DEMOLITION

In general, the existing HVAC systems have exceeded their expected useful life, will be demolished, and will be replaced with new. The exceptions to this will be that several items of recently installed equipment will be reused in the renovation as follows:

- One centrifugal chiller, one cooling tower, one boiler, one heating water primary pump, two air handling units serving the 1st floor, and the air distribution layout on the 1st floor (not including toilet area).

Material and equipment which has been removed will not be used in the new work.

Service procedures will maximize recycling, and prohibit venting, of chlorofluorocarbons and hydrochlorofluorocarbons during removal and disposal of equipment containing refrigerants in accordance with the Clean Air Act Amendments-1990, Title VI.

D. PHASING

The University intends to occupy portions of the building during construction which will require the Design Team to provide a phasing plan for replacement of HVAC systems while maintaining reasonable HVAC service to occupied floors. Phasing plan may require temporary portable equipment to maintain occupied floors.

The existing 2-pipe perimeter induction unit systems (airside and watside) serving both wings of the building will ultimately be completely removed, but portions of them will need to remain active during the renovation to maintain conditions on the 3rd, 4th and 5th floors until those floors are renovated within this project.

E. HEATING SYSTEM

Heating will be provided by a stand-alone building heating water system. Heating water will be distributed to heating coils in the air handling units, terminal units, and unit heaters. The heating water system will consist of one existing boiler, two new boilers, one existing primary heating water pumps, two new primary heating water pumps, two new secondary heating water pumps, and new piping. The heating water system will be located in the main mechanical room in the basement.

The existing boiler to be reused is a 750-MBH Aero Benchmark boiler installed in 2019.

The new boilers will be 2500-MBH low pressure condensing type boilers, rated for a minimum 125 psig hot water working pressure.

The primary and secondary heating water pumps will be horizontal split case type with premium efficiency motors sized to prevent overloading at any point along the pump curve. The secondary pumps will have variable frequency drives to modulate flow to maintain a constant system differential pressure.

Heating water piping 2.5" and larger will be ERW schedule 40 black steel and 2" and smaller will be type L hard drawn copper. Piping will be insulated with preformed fiberglass pipe insulation with white all service jacket with self-sealing lap. Exposed interior piping within 7' of floors will be protected with smooth aluminum jackets.

Heating water system accessories will include expansion tank, inline air/dirt separator, and manual batch type chemical feeder.

F. COOLING SYSTEM

Cooling will be provided by a stand-alone building chilled water system. Chilled water will be distributed to cooling coils in the air handling units. The chilled water system will consist of one existing chiller, one new chiller, two new chilled water pumps, an existing cooling tower, two new condenser water pumps, and new piping. The chillers and pumps will be located in the main mechanical room in the basement.

The existing chiller is a 300-ton JCI-York chiller installed in 2018.

The new chiller will be a 300-ton water-cooled, centrifugal chiller with energy performance in compliance with ASHRAE Standard 90.1-2010. Acceptable refrigerants will be R-134A, R-514A, or R-1233zd.

Chilled water pumps will be horizontal split case type with premium efficiency motors sized to prevent overloading at any point along the pump curve. The pumps will have variable frequency drives to modulate flow based on system differential pressure and regulated within the chiller’s allowable limits.

Chilled water piping 2.5" and larger will be polypropylene pressure piping (basis of design Aquatherm Blue) and 2" and smaller will be type L hard drawn copper. Piping will be insulated with preformed fiberglass pipe insulation with all service jacket with self-sealing lap. Exposed interior piping within 7' of floors will be protected with smooth aluminum jackets.
4.1 - MECHANICAL

The existing cooling tower is a 2000-gpm Baltimore Aircoil crossflow cooling tower installed in 2021.

Condenser water pumps will be horizontal split case type with premium efficiency motors sized to prevent overloading at any point along the pump curve. The pumps will have variable frequency drives to allow soft start with reduced inrush current.

Condenser water piping 2.5" and larger will be polypropylene pressure piping (basis of design Aquatherm Blue) and 2" and smaller will be type L hard drawn copper. Outdoor piping will be insulated with preformed fiberglass pipe insulation with all service jacket with self-sealing lap and protected with smooth aluminum jackets.

Chilled water system accessories will include expansion tank, inline air/dirt separator, manual batch type chemical feeder, and temperature maintenance cable on outdoor condenser water piping.

G. AIR HANDLING UNIT ROOM MODIFICATIONS

Existing chilled water risers in rooms will be replaced with new vertical risers and branch piping to air handling units.

New heating water risers will be added to rooms with new vertical risers and branch piping to air handling units.

All existing steam piping will be demolished.

Air handling unit rooms in the original 1949 building will be modified to add one outside air intake louver and one relief air louver (similar to air handling unit rooms in the 1973 addition).

H. AIR CONDITIONING SYSTEMS

Air handling units serving each wing on each floor will be designed for recirculated air with approximately 25-30% minimum outside air. These systems will be provided with 100% airside economizer capabilities.

Air handling units will be standard modular, draw-through, factory-fabricated, medium pressure type including the following features:

- 2" thick, solid, galvanized steel, double-wall casings with rigid foam insulation between the walls. Perforated inner walls at fan sections for improved acoustic performance.
- 12" deep MERV 13 cartridge filters and 2" deep MERV 8 pleated pre-filters.
- Heating water type preheat coils with 30º∆T.
- Chilled water type cooling coils with maximum face velocity of 450 FPM, maximum 8 rows of depth, and 16º∆T.
- Premium efficiency fan motors with variable frequency drives.
- Relief air fans: to be provided for air handling units with airside economizer cycles. These fans will have variable frequency drives, controlled to an overall balance between outside air intake and relief air discharge.

Communications rooms, electrical rooms with transformers, and elevator control rooms throughout the building will be served by ductless split systems or air handling units with economizer capability.

Mechanical rooms with building level HVAC service equipment will be ventilated with exhaust fans and heated with unit heaters.

I. SUPPLY AIR SYSTEMS

Supply air systems on each renovated floor will be provided with variable air volume terminal units with hot water reheat coils. Return air systems will be fully ducted type, unless prohibitive by existing plenum conditions.

Supply air systems on each shell floor will be provided with ductwork main and heating water piping mains stubbed out of air handling unit room. Floor will be provided with hot water unit heaters for heating of shell space.

Ductwork:
- Ductwork will conform to SMACNA recommendations and will have the following static pressure classifications:
  1. From air handling units to supply terminal units: 4" wg.
  2. From terminal units and supply air valves to grilles, registers and diffusers: 2" wg.
  3. Return air and toilet exhaust ductwork: -2" wg
- Medium-pressure supply ductwork will be factory-fabricated, single-wall, round or flat oval ductwork.
- Ductwork will be galvanized steel, unless noted otherwise herein.
- Ductwork will be insulated for energy conservation and to prevent condensation as follows:
  1. Exposed supply air, outside air, and mixed air ductwork will be insulated with 2" rigid fiberglass board insulation finished with 8 oz. canvas set in white lapping adhesive.
  2. Concealed supply air ductwork will be insulated with 2" flexible fiberglass insulation.

J. EXHAUST SYSTEMS

Toilets and janitor closets will be exhausted through new toilet exhaust systems. Rooms will be exhausted at a minimum rate of 2.5 CFM per square foot. Toilet exhaust will be served by centrifugal power roof ventilators located on the roof.

K. STAIRWELL PRESSURIZATION SYSTEMS

Existing stairwell pressurization systems in Stairs A, B and C will be replaced with new systems. New systems will be designed to comply with Section 909.20.5 of the International Building Code-2012.
4.1 - MECHANICAL

L. AUTOMATIC TEMPERATURE CONTROL SYSTEMS

All existing controls will be replaced by an open-protocol building control system (BCS), including a web-based remote operation system, to control the chilled water systems, heating water systems, air handling units, exhaust systems, and terminal units. The system will be tied into the existing campus facility management system. Software graphics with pictorial representations of equipment and devices being controlled will be provided.

M. HVAC TESTING, ADJUSTING AND BALANCING

Systems will be tested, adjusted, and balanced to achieve proper operation, design flow, temperature and pressure differentials, and pressure drop through piping, ductwork, equipment, and components.

N. HVAC SYSTEMS COMMISSIONING

The project will require commissioning of HVAC equipment and building control systems as required by the State of Tennessee High Performance Building Requirements.
A. CODES AND STANDARDS

Plumbing systems will comply with the following minimum requirements:

- International Existing Building Code-2012
- State of Tennessee High Performance Building Requirements
- University of Tennessee – Division of Facilities Planning – Designer’s Manual 2018

B. DEMOLITION

In general, the existing plumbing systems have exceeded their expected useful life, will be demolished, and will be replaced with new. The exceptions to this will be that several items of recently installed equipment will be reused in the renovation as follows:

- One domestic water heater.

Material and equipment which has been removed will not be used in the new work.

C. PHASING

The University intends to occupy portions of the building during construction which will require the Design Team to provide a phasing plan for replacement of plumbing systems while maintaining reasonable plumbing service to occupied floors. Phasing plan may require temporary portable equipment to maintain occupied floors.

D. PLUMBING FIXTURES

Water Closets: elongated vitreous china, floor-mounted, manual flush valve type, 1.28 gallons per flush with white open front seats.

Lavatories: vitreous china, under-mount type, with manual faucet, 0.5 gpm flow control, and grid strainer.

Urinals: vitreous china, wall-hung, sensor-activated, flush valve type, 0.125 gallons per flush.

Water Fountains: electric, modular type with in-wall chiller, extended round receptors, and bottle filler with separate isolation option.

Sinks: service sinks will be terrazzo, floor type with grid strainer, rim guard and faucet with hose thread outlet, vacuum breaker and wall brace. Break room sinks will be stainless steel, self-rimming type, with swing spout faucet, and 1.5 gpm flow control. Kitchen sinks and faucets will be specified by the Food Service Consultant.

E. DRAINAGE SYSTEMS

Sanitary Drainage System:

- The existing sanitary drainage systems will be replaced to serve renovated toilets and janitor closets. Sanitary drain, waste, and vent systems will extend from 5’ outside the building to all fixtures and equipment requiring service. Drainage and vent stacks will extend vertically through the roof. The system will be provided with traps, vents, and cleanouts as required by code. Trap guards will be provided for all floor drains.

- Elevator pits will be provided with sump pumps with the discharge piped indirectly to the sanitary system.

Rainwater Drainage System:

- The existing rainwater drainage systems will be replaced from the roof drains to 5’ outside the building. Piping will extend from these drains to 5’ outside the building. Cleanouts will be provided as required by code. Drain bodies and horizontal rainwater piping above grade and within heated spaces will be insulated to prevent condensation.

Piping:

- Sanitary and rainwater drainage and vent piping above grade will be hubless cast iron pipe and fittings with heavy duty compression type couplings. Drainage piping below grade will be PVC with solvent cement joints.

F. DOMESTIC WATER SYSTEMS

Water Service:

- The existing water service pipe into the main mechanical room will be reused. The water service will be provided with dual RPZ type backflow prevention devices in accordance with local code. Pressure reducing valves will be provided, as required, to control excessive water pressure.

Water Distribution:

- The renovated building will be served with new vertical risers in each building wing and horizontal distribution system to each fixture group.

- Isolation valves will be provided the building’s domestic water entrance, at the base or top of each vertical riser, at each branch to commons areas serving 2 or more fixtures, and at each wall hydrant or equipment connection. Water hammer arresters will be provided for shock suppression. Water connections for mechanical system make-up will be isolated from the domestic water system by reduced pressure backflow preventers.

- A central water pressure booster system will be provided to serve the upper floors of the building. The system will be duplex type with vertical multi-stage pumps and VFD controllers.

- Water connections for mechanical system make-up will be isolated from the domestic water system by RPZ type backflow preventers.
4.2 - PLUMBING

Domestic Hot Water:

- The domestic hot water service will be extended from the existing domestic water heater to the plumbing fixtures. Domestic hot water heating systems will include the necessary control valves, expansion tank, pumps, and thermostatic mixing valves.
- The existing domestic water heater is a 100-gallon, gas-fired Bock EZ100-199N water heater installed in 2019.
- A hot water circulating pump will be provided to limit temperature loss throughout the system to 10°F maximum. Circulating system will include flow balancing assemblies.
- The domestic hot water will be heated to 140°F.
- A master thermostatic mixing valve will be installed at the water heater to reduce the hot water temperature to the building to 120°F.

Piping:

- Domestic water piping within the building will be type L hard copper with wrought copper sweat type fittings, and joints using lead-free solder. Water piping below slabs on grade will be type K soft copper with no joints below slab.
- Piping will be insulated with preformed fiberglass pipe insulation with all service jacket with self-sealing lap. Exposed interior piping within 7’ of floors will be protected with smooth aluminum jackets.

G. FUEL GAS SYSTEMS

Gas Service and Distribution Systems:

- The existing natural gas meter and service pipe into the main mechanical room will be reused.
- The fuel gas system will provide natural gas at 14” wg from the gas meter outside the building to the boilers and domestic water heaters in the main mechanical room.

H. PLUMBING SYSTEMS COMMISSIONING

The project will require commissioning of water heating systems as required by the State of Tennessee High Performance Building Requirements.

Piping:

- Piping above grade will be schedule 40 black steel pipe with welding or threaded fittings as required.
**A. GENERAL**

Electrical systems will comply with the following minimum requirements:

- International Existing Building Code-2012
- NFPA 70-2017, National Electrical Code
- State of Tennessee High Performance Building Requirements
- University of Tennessee – Division of Facilities Planning – Designer’s Manual 2018

**B. DEMOLITION**

In general, the existing electrical systems have exceeded their expected useful life, will be demolished, and will be replaced with new. The exceptions to this will be that several items of recently installed equipment will be reused in the renovation as follows:

- One 480/277V switchboard, one engine-generator set, two automatic transfer switches, four emergency power panelboards (XE3, XE3a, XW3a, and XM), lighting fixtures on the 1st through 5th floors, receptacles and power devices on the 1st through 5th floors, and power connections to existing HVAC equipment that remains.
- Material and equipment which has been removed will not be used in the new work.

**C. PHASING**

The University intends to occupy portions of the building during construction which will require the Design Team to provide a phasing plan for replacement of electrical systems while maintaining reasonable electrical service to occupied floors. Phasing plan may require temporary portable equipment to maintain occupied floors.

**D. PRIMARY DISTRIBUTION SYSTEM**

The existing electrical utility service consists of two pad-mount transformers – one 208/120V serving the original 1949 building and one 480/277V serving the 1973 addition.

This project will remove the 208/120V service and replace it with a new 480/277V service, including a new utility transformer.

**E. SECONDARY ELECTRICAL SYSTEM**

Electrical service for the original 1949 building will originate from the new pad-mount utility transformer and will be 480Y/277V, 4-wire, wye connected, grounded neutral. The secondary feeder will be installed in a new underground concrete-encased duct bank from the pad-mount transformer to the secondary service switchgear.

Existing electrical service for the 1973 addition will remain.

In general loads will be served as follows:

- LED lighting - 277 V.
- Motors 0.5 hp and larger - 480 V, 3-phase.
- Receptacles and motors 0.33 hp and smaller - 120 V, single-phase through use of step down transformers.

New service switchboard will consist of a low-voltage switchboard. Service switchboard will be front accessible with individually mounted main and group mounted feeder devices. Switchboard bussing will be copper and will be braced for the available fault current. Main device will be stationary, insulated case type circuit breaker and feeder devices will be molded case circuit breakers. Solid state ground fault protection will be provided for main circuit breaker and feeder devices 1000 A and larger. Service switchboard will be provided with integral surge protection device.

New service switchboard will be provided with an electronic power monitor to meter multiphase amperes and volts, and power parameters. Main meter will be equipped with a communications port for connection to the campus SCADA network.

Feeder risers to existing panelboards on the 1st floor will remain. New feeder risers will be cable in conduit to supply power to distribution and branch circuit panelboards.

Branch circuit panelboards will be provided on each floor to serve lighting and receptacles on the same floor. Protective devices in panelboards will bolt-on type circuit breakers. Bussing in panelboards will be copper. Panelboards will have minimum 15% spare circuit breakers plus 10% spaces for future breakers. Dry-type transformers will be provided to serve receptacle and other 120 V loads. Dry-type transformers will be copper wound, 480 delta primary, 208Y/120 V secondary, 220°C insulation, 150°C rise, high-efficiency type.

Wiring will be insulated conductors installed in raceways. Conductors will be copper with type THWN/THHN or XHHW insulation. Conductors for power wiring will be minimum #12 AWG and a maximum of 500 kcmil. Separate neutral conductors will be provided for each branch circuit phase conductor. Conductors will be color coded the entire length to indicate various phases, neutral and ground.

Raceways will be minimum 0.75" for power and minimum 1" for communications. In general, electrical metallic tubing will be provided for interior wiring installations. Rigid metal conduit will be provided for exposed raceways serving fire pumps, fire pump control equipment, and where susceptible to damage. Flexible metal conduits will be provided for connections to recessed lighting fixtures, motors, dry-type transformers, and electrical equipment subject to movement or vibration. Liquidtight flexible metal conduits will be provided for connection to equipment exposed to rain or spray and fire pumps.

Electrical systems, circuit and equipment will be grounded and bonded. The maximum resistance of electrical systems to ground will be 3 ohms. A green colored grounding conductor will be installed in raceways with phase conductors.
4.3 - ELECTRICAL

A new lightning protection system will be provided and will be the concealed type installed with UL lighting protection inspection certificates.

F. LIGHTING

Interior and exterior lighting will be LED type. Illumination levels for work surfaces will be provided in accordance with IESNA recommended illumination levels. Means of egress will be illuminated per NFPA 101.

Lighting fixtures on each renovated floor and in renovated toilets will be a mixture of recessed 2x2s, linears, and downlights.

Lighting fixtures on each shell floor (for stumble lighting) and in mechanical and electrical rooms will be 4' strip lights with wraparound lens.

Exterior lighting will be UTC campus standard lighting fixtures.

Lighting control systems will be designed to UTC standards.

G. EMERGENCY POWER SYSTEM

The existing emergency power system includes a 250-kW engine-generator set, automatic transfer switches, remote annunciator, and accessories to automatically supply power during a utility power failure. This equipment was installed in 2021.

Existing automatic transfer switches (ATS-1, ATS-2) will be relocated in an emergency electrical room separated from the 480/277V switchboards, as required by NFPA 110. Additional automatic transfer switches will be provided to separate emergency loads, legally-required loads, and optional-standby loads per NEC. Emergency and legally required distribution will be designed for selective coordination of overcurrent devices.

Emergency and standby power system loads:
- Egress lighting and exit lights.
- Elevators
- Fire detection and alarm systems.
- Fire protection systems.
- Lighting and receptacles in main and emergency electrical rooms.
- Public safety communication systems.
- Sump pumps.
- Automatic doors for handicap door operators.
- Lighting, receptacles, and outlets serving communication equipment rooms.
- Cooling systems for communication equipment rooms.
- Miscellaneous building loads as required by UTC.

H. FIRE PUMP

The new fire pump will be served from two sources, a dedicated service connection from the new pad-mount service transformer and from the emergency power system. Supply conductors will be kept independent of all other wiring and will be fire-rated where routed inside the building. Supply conductors will connect to a listed fire pump combination controller and transfer switch.

I. COMMUNICATION SYSTEM

A complete communications system (equipment, equipment racks, cabling, duct banks, conduits, cable trays, pathways, equipment rooms, work area outlets, wireless LAN, etc.) will be furnished and installed per UTC Information Technology satellite equipment room and structured cabling requirements.

Communications service will originate from existing UTC telecommunication manholes. Underground concrete-encased duct bank will extend from existing manhole to building entry room.

J. SECURITY SYSTEMS

Electronic security systems will include a system of intrusion detection, access control and alarm monitoring, and video surveillance. Building exterior entry will be provided with electric strikes with access control and alarm monitoring. Classrooms will be provided with UTC locking requirements. Video surveillance will be provided at building main entrances and exits.

K. ELECTRICAL SYSTEMS COMMISSIONING

The project will require commissioning of lighting controls systems as required by the State of Tennessee High Performance Building Requirements.

Exterior pole-mounted site emergency phones will be provided.

A distributed antenna system (DAS) may be required to enhance wireless communications within the building.
A. CODES AND STANDARDS

Fire alarm systems will comply with the following minimum requirements:

- International Existing Building Code - 2012
- NFPA 70-2017, National Electrical Code
- NFPA 72-2010, National Fire Alarm Code

B. DEMOLITION

In general, the existing fire alarm systems have exceeded their expected useful life, will be demolished, and will be replaced with new. The exceptions to this will be that several items of recently installed equipment will be reused in the renovation as follows:

- Main fire alarm panel and NAC panels in Fire Command Center and fire alarm devices serving the 1st floor.

Material and equipment which has been removed will not be used in the new work.

C. PHASING

The University intends to occupy portions of the building during construction which will require the Design Team to provide a phasing plan for replacement of fire alarm systems while maintaining fire alarm service to occupied floors.

D. DESIGN CRITERIA

The fire alarm system serving the building renovations will be an extension of the existing Simplex Model 4100 fire alarm system located in the Fire Command Room on the 1st floor.

Fire alarm system will be a supervised, local protective signaling system employing multiplex communication and individually addressable initiating devices.

Wiring will be installed in metallic raceways.

E. CONTROL EQUIPMENT

Control equipment will be modular in construction, UL listed, and housed in a steel cabinet. Operating voltage will be 24 V D.C. Standby power will be furnished by a self-contained emergency battery power supply.

Signaling line circuits and initiating device circuits will be arranged so that the number of connected devices does not exceed 75% of circuit capacity.

Speaker circuits will be selectable for 1-way transmission of voice instructions. The circuit selector panel will be mounted adjacent to or integral with the CPU and will include individual zone selector switches, an all-call switch, and a microphone with press-to-call button and coil cord.

Strobe circuits will be powered by new power supplies with battery backup on the floor that they are located on. New power supplies will be integrated into the existing fire alarm system. Circuits will be arranged so that the number of connected devices does not exceed 75% of circuit capacity.

F. ALARM INITIATING DEVICES

Alarm initiating devices will include addressable manual pull stations, monitor modules, duct detectors, heat detectors, and smoke detectors. Addressable monitor modules will be provided for nonaddressable devices including sprinkler water flow switches, sprinkler pressure switches, valve tamper switches, and fire pump status.

G. NOTIFICATION DEVICES

Alarm signaling devices will consist of speakers and strobe lights.

Auxiliary functions will be performed by control modules located within 36° of the controls for the equipment to be operated.
4.5 - FIRE
SUPPRESSION

A. CODES AND STANDARDS
Fire suppression systems will comply with the following minimum requirements:
• International Existing Building Code - 2012
• NFPA 13-2010, Installation of Sprinkler Systems.
• NFPA 14-2010, Installation of Standpipe and Hose Systems.
• NFPA 20-2010, Installation of Centrifugal Fire Pumps.
• University of Tennessee - Division of Facilities Planning - Designer’s Manual-2018.

B. DEMOLITION
In general, the existing fire protection systems have exceeded their expected useful life, will be demolished, and will be replaced with new. The exceptions to this will be that several items of recently installed piping and sprinklers will be reused in the renovation as follows:
• Sprinkler branch piping and sprinkler heads serving the 1st through 5th floor.
Material and equipment which has been removed will not be used in the new work.

C. PHASING
The University intends to occupy portions of the building during construction which will require the Design Team to provide a phasing plan for replacement of fire protection systems while maintaining fire protection service to occupied floors.

D. DESIGN CRITERIA
The building will be protected throughout by a new combined system of Class I wet standpipes and automatic sprinklers.
Systems will comply with the requirements of the University’s insurance underwriter.

E. SPRINKLER SYSTEM
New sprinkler piping will be sized by hydraulic calculations. Mechanical rooms, electrical rooms, and storage areas will be classified Ordinary Hazard Group 1. Other areas will be classified light hazard. Hydraulic design criteria will be in accordance with NFPA 13-2010, Paragraph 11.2.3 as follows:
• Light hazard areas will be designed to provide a minimum density of 0.10 gpm/ft². Maximum area per sprinkler will be 225 ft².
• Ordinary hazard, Group 1 areas will be designed to provide a minimum density of 0.15 gpm/ft². Maximum area per sprinkler will be 130 ft².
• Minimum design area will be the most hydraulically demanding 1500 ft² for wet systems and 2000 ft² for dry systems.
• A simultaneous inside hose demand of 100 gpm will be included for light hazard areas and 250 gpm for ordinary hazard areas.
• Sprinkler connections on each floor will include a monitored control valve, a flow switch, and a test/drain connection. A drain riser with discharge at the building exterior will also be provided to serve each sprinkler system.

F. STANDPIPE SYSTEM
Wet standpipes will be located within heated stairwells. Hose thread pattern will match the local fire department pattern.

G. SPRINKLER HEADS
Commercial, quick response, UL listed type.
Sprinklers in areas having lay-in ceilings will be semi-recessed pendant type with a white finish and white ceiling cup. Sprinklers in grid ceilings will be aligned and located in the center of tiles.
Sprinklers in areas having sheetrock ceilings will be concealed type with a finish as specified by the Architect.
Sprinklers in shell floors and other exposed areas will be upright type.

H. PIPING
Above ground piping will be black steel with threaded, grooved, or welded fittings. Piping 2" and smaller will be schedule 40 and pipe 2.5" and larger will be schedule 10. No plain-end fittings, strap-on branch outlets, or couplings employing set screws will be used. Pump suction piping and piping subject to alternate wetting and drying will be galvanized. Underground piping will be cement-lined ductile iron with mechanical joints or HDPE. Underground piping will be anchored with concrete thrust blocks and tie-rods.

I. WATER SUPPLY
Water supply is fed from a separate connection to the city mains. A UL-listed, ASSE-approved reduced pressure detector backflow preventer will be installed on the fire water service to isolate the fire suppression systems from the city mains.

J. FIRE PUMP
A new electric motor-driven, horizontal split case fire pump will be provided.
Fire department connections (FDC) and fire pump test headers will be provided as needed. These devices will be wall-mounted or freestanding.
Fire pump controllers will be UL listed for use with electric motor-driven fire pumps and will include the motor starter, power transfer switch, and solid-state reduced-voltage starting.
K. MONITORING

The fire suppression system will be monitored by the building fire alarm system. Monitor points will include trouble and alarm conditions for water flow switches, valve tamper switches, and fire pump status.