INTRODUCTION

Background

The Henderson building, formerly known as Human Development North, was designed by Charles Klauder, and constructed in 1931. The building has had several renovations since. Major interior renovations, which revised large portions of the interior layout of classrooms, lab spaces, and office spaces, were completed in 1963, 2009, 2016, and 2017. Currently, the building has labs, classrooms, and research offices located on three floors.

In April 2018, a Building Wide Facilities Assessment was conducted by Penn State to provide high-level recommendations for various systems within the building. The assessment concluded that several of the building systems are either not up to current building code and/or ADA code compliance, are in disrepair, or are approaching the end of their service life.

Scope

Gannett Fleming (GF) and BLT Architects (hereafter referred to as the “design team”) was tasked with preparing a systems renewal masterplan for the Henderson Building at Penn State’s University Park campus (PSU). The University requested a Facility Systems Master Plan to facilitate the prioritization of recommended repairs and upgrades within the current available funding (phase 1), followed by the design and engineering of the selected repairs and upgrades. The Facility Systems Master Plan was to include the further study of various systems, the development of design options, and opinions of cost to aid in the decision-making process. The systems that were to be evaluated included: Domestic Water Piping, ADA Compliance (Entrances, Elevators, and Bathrooms), Building-Wide HVAC Improvements, and Safe Access. Additionally, the design team was asked to provide recommendations for future repairs and upgrades not included in the phase 1 repairs and upgrades.

As a major part of the Facility Systems Master Plan, the non-compliant vertical transportation system within the building was reviewed and considered a priority for improvement. The design team was tasked with identifying structural, architectural, and mechanical impacts and estimated costs of potential solutions including replacement in-place, expansion in-place, relocation and new exterior construction.

The existing HVAC system requires upgrades to provide comfortable interior environments throughout the building to allow for optimal learning and working environments. Currently, the north wing at ground floor and the south half of the building on the first floor are not air conditioned, with several areas on the first floor conditioned via chilled-water fan coil units or window air conditioners. These areas were reviewed to determine the optimal means by which to provide air conditioning to the underserved spaces. Also included in this study were the required upgrades to the non-compliant restroom exhaust system at each floor, and the addition of a new hood and exhaust fan for the dishwasher in Kitchen Lab 224D.

Concurrently, the Safe Access Program had identified the Henderson Building as a priority for retrofit to ensure safe access to mechanical equipment in the attic. A previously completed renovation project addressed the first phase of these improvements. This study and subsequent project intend to address the balance of the safety concerns within and around the building.

Study

The design team reviewed existing drawings and performed site visits to review and confirm the findings from the previously completed Building Wide Facilities Assessment, and reviewed many design options for the type, location and layout of recommended mechanical upgrades, ADA compliant restrooms, and vertical transportation system upgrades. The design team worked closely with the College of Health and Human Development, General Purpose Classrooms Committee, Office of Physical Plant Departments of Planning, Design and Properties, Area Services, Engineering Services, and Work Control to develop the recommendations and design option analysis within this report. The design options were reviewed extensively with these Penn State stakeholder groups to identify several options that provided the most

benefit with the fewest detrimental impacts to the building, its users, and the campus. This report outlines the design options, their impact on the various building systems, and their projected cost impacts.

Gannett Fleming and BLTa submitted the 90% draft Henderson Systems Renewal Study document to Penn State on September 12, 2019. Upon Penn State's review of the document, there were several meetings and discussions. An option discussed in this study was chosen as the most ideal solution. Also, during that time, space in Chandlee Lab building (Lab 309 & Lab 310) was identified as potential space for a Foods Lab into which the existing Foods Lab 007 in the Henderson building could move. This would allow GPC 018 (lost in the chosen option) to be relocated to a more ideal location within the building as well as provide the College of Health and Human Development Student Services office with a larger and more ideal space to suit their needs. Appendices D, E, F, and G provide more information on these developments.

This masterplan addresses the following:

- Phase 1
  - Vertical Transportation System
  - Domestic Water Piping System
  - ADA/Code Compliance
    - Elevator
    - Restrooms
  - Building Wide HVAC Improvements
  - Safe Access
  - Fire Alarm
- Phase 2
  - Architectural
    - Safe Access
    - Adhered Ceilings
    - Potential Stair Railing Replacement
    - Exterior Repairs & Cleaning
    - Interior Repairs & Cleaning
  - Structural
    - Basement Terrace Structure
    - Future Inspections
  - Electrical
    - Lighting
    - Power
    - Access Control
  - Plumbing
    - Sanitary and Vent Piping Not Replaced in Phase 1 Restroom Renovations
    - Natural Gas Piping Replacement
    - Kitchen Lab Sink Traps
  - Fire Protection
    - Standpipe & Sprinkler Systems and Fire Department Connection

Codes & Regulations

The design options and recommendations were developed according to the requirements of the 2015 International Building Code and other applicable PA UCC requirements, as well as PSU Standards.

Assumptions

The purpose of the conceptual designs developed is to base the opinion of budget costs on realistic solutions. ***They should not be construed as the final designs for the project.***

MASTERPLAN FOR HENDERSON BUILDING SYSTEMS

PHASE 1

The following sections outline the major systems and options for building system improvements.

VERTICAL TRANSPORTATION

General

Several options for the location of the building's elevator were analyzed.

Replacing the elevator in place raised several issues. Because the existing elevator is too small and not built to current Penn State and ADA requirements, the elevator shaft would need to be enlarged. The structural requirements for enlarging the shaft are significant due to the construction of the building's structural system. It would require underpinning of the existing foundations, extensive shoring and bracing of the floor systems, and would require the elevator to offline for the duration of construction. This would cause the building to be inaccessible per the requirements of the Federal Americans with Disabilities Act (ADA) during construction. Because of this, the building would need to be taken offline, or alternate provision at alternate facilities be provided for the duration of construction of the elevator.

Adding an elevator to the exterior of the building causes major aesthetic, cost and building traffic flow concerns. Because of the historic nature of the building and its prominent location on campus, adding a three-story addition to the exterior of the building, specifically on the Old Main (West) side of the building is highly recommended against by the University Architect. In addition to this, connecting the existing internal traffic flow to the exterior of the building in an efficient way is very difficult, and would unnecessarily take away assignable space within the building.

The optimal solution for the vertical transportation system is to provide a new elevator adjacent to the existing north stair. Relocating the elevator, rather than replacing it in its existing location, allows the existing elevator to remain in use during construction and allows the building to be accessible for the duration of construction. In addition to maintaining accessibility, relocating the elevator will improve accessibility and user experience as well as provide cost savings to the more expensive option of upgrading the elevator in place. While structural improvements for this option are also extensive, the floor structure in this location is more conducive to adding floor openings, and the elevator can be located such that the need for underpinning existing foundations can be minimized.

It is recommended that the existing passenger elevator in the Henderson Building be removed and a new, hydraulic elevator be installed adjacent to the North Stair Tower. The basis of design for the elevator includes a dual single stage, dual roped hydraulic elevator serving three (3) floors. The elevator will be sized at 3500lbs with a side opening arrangement to meet ADA and stretcher compliance. The elevator will meet the A17.1 2000 code with the 2002 Addenda as the State of Pennsylvania currently follows. Because this is a roped hydraulic elevator, an overspeed governor will be required in the overhead. An access door will be required from the outside of the hoist-way, unless a self-actuating and self-resetting governor is used.

Elevator Data

Capacity	3500 lbs
Speed	125 fpm
Stops	Three (3)
Openings	Three (3)

Net Travel	24 feet (estimated)
ADA Compliance	YES
Stretcher Compliance	YES – 24” x 84” with not less than 5” radius corners
Pit Depth	48” Minimum
Pit Ladder	Extend 48” above lowest landing
Overhead	13 feet from top landing to underside of hoist beam
Overspeed Governor	In overhead
Car Buffers	Spring
Hoistway clear inside wall to wall	7’-0” deep x 9’-0” wide
Cab inside clear dimensions	6’-8” wide x 5’-4-1/2” deep
Door Type	Single speed side opening
Door Size	3’-6” x 7’-0”
Rough Opening required	4’-6” x 7’-6”
Machine Room Size	8’-0” x 8’-0” recommended

Architectural

Currently the south courtyard entrance, the closest entrance to the existing elevator, is used as the accessible entry as well as the loading dock and a staging area for a dumpster. Meanwhile, the north courtyard is used as the primary entrance from the HUB side of the building. Relocating the elevator with minimal architectural interventions at the north courtyard entrance, including a new elevator vestibule accessible directly from the stairwell entrance, will allow the north courtyard entrance to become the primary entrance for all users.

Structural

Elevator Pit

As indicated above, the proposed elevator pit is located to minimize underpinning of the existing spread footing adjacent to the north stair tower. The existing drawings (Klauder 1930s) indicate the presence of an existing 5’-6”X5’-6” footing under the column in this location which is directly adjacent to the proposed elevator location. The existing top of footing is located 8” below the finished basement floor elevation.

The existing wall footing under the assumed masonry wall separating the stair tower from the proposed elevator area will need to be underpinned. The work includes demolition of the slab on grade on both sides of the wall to accommodate underpinning activities. The stair tower wall cannot be demolished and rebuilt as it extends to the roof and is self-supporting. Once the underpinning work is completed, the elevator pit is proposed to be installed next to the underpinned foundation

The proposed elevator pit is to be constructed from reinforced concrete base slab and walls. The approximate inner dimensions of the elevator pit are 8’-4”X6’-10”and is to be 4’-0” deep (per the elevator

consultant). A sump pump will be required in one corner. The base slab for the pit will be located at the bottom of the underpinning. The walls of the elevator pit are proposed to be constructed to first floor level. After backfilling the area around the elevator pit, the slab on grade is to be replaced in these locations.

Stair Well Wall Lintel

A doorway will be cut in the existing stairwell wall. The existing drawings indicate a 9" wall (Architectural First Floor Plan); the wall is assumed to be masonry. The wall will need to be temporarily supported using needle beams, or similar construction, to install the lintel. The lintel system is proposed to consist of two HSS posts and a beam.

Floor Level Framing for Elevator

At each elevator shaft opening level, the existing concrete beams, slab, and terra cotta infill (concrete beams span east to west on existing plan) span between the existing steel beams (which run north to south on existing plans), are to be removed at the elevator location. Removal will be required up to the next concrete beam. The existing slab will be sawcut and chipped. Steel support beams, which are proposed to span between existing structural steel beams, will be installed. The steel support beams will support the shaft wall framing, elevator rail supports, and support steel deck with a concrete slab to form the edge of the concrete slab at each floor. HSS posts will be located at the corners of the shaft for support beams and additional HSS posts support the rail brackets.

Attic/Roof Level Framing for Elevator

The interstitial space above the attic floor framing and below the roof beams will house the elevator override, machine beams and other overhead elevator equipment. The existing roof structure is not anticipated to be impacted with the additional structure above the existing attic floor. Existing steel attic beams will be cut, and supplemental framing will be installed to stabilize the proposed elevator tower and override. The override will be stabilized by existing structural steel and bracing within the override framing.

Mechanical/Plumbing/Fire Protection

With the new elevator, a split system will be required to serve the elevator machine room. A sump pump will also be required in the pit. Based on NFPA 13 and IBC 2015, the new elevator, a roped hydraulic type, will require a sprinkler at the bottom and top of the elevator shaft. The sprinklers will tie into the existing fire service entering the ground floor mechanical room with a new flow and tamper switch assembly tied into the building fire alarm system.

Electrical

The elevator pit will have a power connection for a sump pump and a ground fault, weatherproof service receptacle. The energy efficient LED lighting in the elevator pit will be designed to meet current ANSI 17.1 standards. The elevator shaft will have additional lighting to meet PSU standards. This lighting will be controlled with a weatherproof snap switch in the elevator pit. The elevator machine room will have new energy efficient LED lighting, a ground fault service outlet, power connections, and disconnects for equipment and fire alarm devices. A CAT6 cable for the elevator car intercom will homerun to the Telecommunications Closet and connect to an existing patch panel.

NEW MECHANICAL ROOM IN EXISTING GPC 001

Architectural

The new mechanical room is centrally located on the Ground Floor on the west side of the main corridor in an existing classroom and an existing restroom. This option fits entirely within the existing envelope of the building and has minimal visual impact on the building exterior. New louvers are required in the existing areaways that flank the main entrance facing Old Main but are primarily concealed by the existing areaway walls. The central location of the mechanical room creates relatively shorter duct distribution than other options being proposed. This mechanical room location is located relatively closer to the new MEP shaft created by the elevator relocation than other options being proposed. However, the ducts will need to pass below the primary building structure that runs north-south along the corridor wall. This option reduces the overall assignable space within the building and eliminates a general-purpose classroom. This option does not affect the loading or existing parking for the building.

Structural

All structural work for this option is referenced above under the Elevator-Structural section. No further structural improvements will be made other than the relocation of the elevator.

Mechanical/Plumbing

New VAV AHU

This will include the placement of a new VAV AHU into the existing classroom 001, women's restroom and office 004. The new AHU will serve the first-floor spaces that are not currently served by (E)AHU-1 and the entirety of the ground floor. The student lounge on the ground floor and living center on the first-floor systems will remain. This will include the removal of fan coil units and window air conditioners serving any of these spaces.

This option allows for two exterior wall locations for outside air intake and relief. The exterior wall space allocated in this option is not ideal for the louver sizes required for outside air intake and relief. New louver size will exceed the size of the existing openings available for use. With this option, existing electrical panels will need relocated to allow for the routing of ductwork to the intake louver.
The location of the new mechanical room is adjacent to an existing mechanical room but is not an ideal location for ductwork distribution up to the first floor. The addition of chases above the mechanical room would be required to not have large ductwork running down the corridor of the ground floor for supply and return. If those chases cannot be constructed, then the corridor ceiling of the ground floor would need lowered to allow for the routing of the larger ductwork. Because of the width of the mechanical room, additional doors may be required in the corridor to allow for the proper coil pull clearance of the new unit.

The new unit will be tied into the existing building's chilled and hot water systems. VAV terminal units with reheat will be added for the spaces served by the new AHU.

Restroom/Kitchen Hood Exhaust

This will include upgrading the restroom exhaust on each floor to meet current code requirements of 70 CFM per restroom fixture according to the 2015 IMC. This will also include the addition of a new hood and exhaust fan for dishwasher in Kitchen Lab 224D.

Building Automation Controls

A building automation controls upgrade should be planned for all building renovations to allow for better occupant comfort as well as an energy savings measure.

Restroom/Janitor Relocation

With the location of a new mechanical room taking the ground floor women's restroom, it will need to be relocated.

With the new elevator location, the restrooms on the ground, first, and second floors will also need to be relocated. New fixtures and piping will be provided to support the new restroom locations and layouts on each floor.

With the restroom relocation, a janitor room relocation will also occur. New mop sinks and piping will be provided to support the new janitor room locations on each floor.

Domestic Water Piping

The domestic hot- and cold-water distribution pipe from the Ground Floor center wing to the north wing has been replaced.

New hot-water and cold-water pipes, in the Ground Floor central corridor, are connected to the existing pipes, serving the fixtures in rooms J013 and Men R013 and the pipes up to the first floor.

New hot-water and cold-water domestic pipes and hot-water-return pipes, in the Ground Floor central corridor, connected to the existing pipes in the corridor Q002 that serve the Student Lounge kitchen 010A and the pipes extending up to the first floor.

The domestic hot water return pipe throughout the Ground Floor has not been replaced.

The hot-water and cold-water domestic pipes and hot-water-return pipes, in the Ground Floor central corridor, from the center wing to the south wing have not been replaced and are existing, prior to 1963.

New hot-water and cold-water pipes were interconnected from the existing pipes in the Ground Floor central corridor to the existing domestic pipes in the Mechanical Room M008 serving the Janitor J008 and the toilet room on the first floor.

New hot-water and cold-water pipes were extended from Reception 005 up to the first floor Reception 104. These new pipes continued up to the ceiling and connected to the existing pipes serving the second-floor fixture. The domestic water pipes on the first floor had some replacement work done in the 1963 renovation.

The cold-water pipe, in the north wing chase, which ran up to the first-floor ceiling and connected to the existing north wing distribution pipe, has been replaced.

The hot-water pipe, in the north wing chase, which ran up to the first-floor ceiling and extended in the ceiling to office 114C, has been replaced and connected to the existing hot-water pipe.

The center wing and south wing pipes have not been replaced, installed prior to the 1963 renovation.

Any cold and hot domestic piping or hot return piping that has not been replaced on the ground, first, and second floor, as noted above, will be replaced.

Water Coolers

Water coolers are located on each stair landing from the ground floor to the second floor with the piping supporting them coming from the adjacent toilet rooms. The water coolers are not original and have been replaced over time. The location of these water coolers is a code violation by today's standards, but the locations are grandfathered by the original installation due to the past building renovations not reaching the threshold level required to bring the building in compliance with the current code.

These water coolers will be removed from the stair tower landings and replaced with new HiLo units with bottle fillers adjacent to new restroom locations from the ground floor to the second floor.

Floor Drains

A new floor drain(s) will be provided for each option in the new mechanical room location for drainage of air conditioning condensate and general maintenance.

Electrical

Lighting

The renovated spaces on the first floor will be designed with new energy efficient LED light fixtures. The light fixture and foot candle levels will be as described as on the Office of Physical Plant website. The light controls will be local to each area, or room designed per the building codes and owner standards. Emergency egress lighting will be designed for the mechanical room and each restroom.

Power Distribution

The renovated spaces on the first floor will be designed with appropriate power connections for mechanical and plumbing equipment. Receptacles for office equipment will be based on furniture layouts. The existing power distribution will be reused, except in the new mechanical room, where new sub-distribution panel board and a branch circuit panel board will be necessary.

Fire Alarm

The renovated spaces will be designed with additional audio and visual fire alarm devices to meet NFPA-72. Smoke detectors will be added to provide elevator recall. The existing fire alarm control panel will be replaced, with existing devices reconnected. The new mechanical space will have heat detectors. Fire alarm duct detectors for air handling units, that are greater than 2,000 cubic feet per minute, on both the supply and return ducts of the unit.

Telecommunications & Technology

The renovated areas on the first floor will be designed to meet the needs of PSU – Office of Telecommunications and Network Services. This will include internet and voice capabilities as well as all new CAT6 cabling with RJ45 outlets for all spaces. Each jack location be designed with two (2) CAT6 cables. The CAT6 cabling will homerun to the Telecommunications Closet and be connected to existing patch panels. The cables will be tested to meet current TIA and PSU standards.

NEW MECHANICAL ROOM IN EXISTING GPC 018

Architectural

The new mechanical room is located on the north side of the Ground Floor between the existing north and west areaways in an existing classroom.

This option fits entirely within the existing building envelope and has minimal visual impact on the building exterior. New louvers are required in the existing areaway on the north side of the building and in the existing areaway to the north of the main entrance but are primarily concealed from the Old Main. The location of the mechanical room on the north side of the building creates relatively longer duct distribution than other options being proposed. This mechanical room location is located relatively farther from the new MEP shaft created by the elevator relocation than other options being proposed. The ducts do not need to pass below the primary building structure that runs north-south along the corridor wall.

This option does reduce the overall assignable space within the building and eliminates a general-purpose classroom. This option does not affect the loading or existing parking for the building.

Structural

All structural work for this option is referenced above under the Elevator-Structural section. No further structural improvements will be made other than the relocation of the elevator.

Mechanical/Plumbing

New VAV AHU

This option includes the placement of a new VAV AHU into the existing Classroom 018. The new AHU will serve the first-floor spaces that are not currently served by (E)AHU-1 and the entirety of the ground floor. The student lounge on the ground floor and living center on the first-floor systems will remain. This includes the removal of fan coil units and window air conditioners serving any of these spaces.

This option allows for exterior wall locations for outside air intake and relief. The exterior wall space allocated in this option is ideal for the louver sizes required for outside air intake and relief. This option allows the intake and relief to be on opposite sides of the mechanical room.

The location of the new mechanical room is not central to the building layout and the spaces it will serve. However, the addition of chases on the first floor in the classroom above will allow for smaller ductwork distribution through the corridor of the ground floor. If those chases cannot be constructed, then the corridor ceiling of the ground floor would need lowered to allow for the routing of the larger ductwork.

The new unit will be tied into the existing building chilled and hot water. VAV terminal units with reheat will be added for the spaces served by the new AHU.

Restroom/Kitchen Hood Exhaust

This includes upgrading the restroom exhaust on each floor to meet current code requirements of 70 CFM per restroom fixture according to the 2015 IMC. This also includes the addition of a new hood and exhaust fan for dishwasher in Kitchen Lab 224D.

Building Automation Controls

A building automation controls upgrade should be planned for all renovations to this building to allow for better occupant comfort as well as an energy savings measure.

Restroom/Janitor Relocation

With the new elevator location, the restrooms on the ground, first, and second floor will also need to be relocated. New fixtures and piping will be provided to support the new restroom locations and layouts on each floor.

With the restroom relocation, a janitor room relocation will also occur. New mop sinks and piping will be provided to support the new janitor room locations on each floor.

Domestic Water Piping

The domestic hot-water and cold-water distribution pipe from the Ground Floor center wing to the north wing has been replaced.

New hot-water and cold-water pipes, in the Ground Floor central corridor, connected to the existing pipes serving the fixtures in rooms J013 and Men R013 and the pipes up to the first floor.

New hot-water, cold-water, and hot-water-return pipes, in the Ground Floor central corridor, connected to the existing pipes in the corridor Q002 that serve the Student Lounge kitchen 010A and the pipes extending up to the first floor.

The domestic hot-water-return pipe throughout the Ground Floor has not been replaced.

The domestic hot-water, cold-water, and hot-water-return pipes, in the Ground Floor central corridor, from the center wing to the south wing have not been replaced and are existing, prior to 1963.

New hot-water and cold-water pipes were interconnected from the existing pipes in the Ground Floor central corridor to the existing domestic pipes in the Mechanical Room M008 serving the Janitor J008 and the toilet room on the first floor.

New hot-water and cold-water pipes were extended from Reception 005 to the first floor Reception 104. These new pipes continue to the ceiling and connect to the existing pipes serving the second-floor fixture.

The domestic water pipes on the first floor had some replacement work done in the 1963 renovation.

The cold-water pipe, in the north wing chase, which ran up to the first-floor ceiling and connected to the existing north wing distribution pipe, has been replaced.

The hot-water pipe, in the north wing chase, which ran up to the first-floor ceiling and extended in the ceiling to office 114C, has been replaced and connected to the existing hot-water pipe.

The center wing and south wing pipes have not been replaced or installed prior to the 1963 renovation. Any domestic cold, hot, or hot-return piping that has not been replaced on the ground, first, and second floor, as noted above, will be replaced.

Water Coolers

Water coolers are located on each stair landing from the ground floor to the second floor with the piping supporting them coming from the adjacent toilet rooms. The water coolers are not original and have been replaced over time. The location of these water coolers is a code violation by today's standards, but the locations are grandfathered by the original installation due to the past building renovations not reaching the threshold level required to bring the building in compliance with the current code.

These water coolers will be removed from the stair tower landings and replaced with new HiLo units with bottle fillers adjacent to new restroom locations from the ground floor to the second floor.

Floor Drains

A new floor drain(s) will be provided for each option in the new mechanical room location for drainage of air conditioning condensate and general maintenance.

Electrical

Lighting

The renovated spaces will be designed with new energy efficient LED light fixtures. The light fixture and foot candle levels will be as described as on the Office of Physical Plant website. The light controls in each area will be local to each area, or room designed per the building codes and owner standards. Emergency egress lighting will be designed for each rest room, and the mechanical room.

Power Distribution

The renovated spaces will be designed with appropriate power connections for mechanical and plumbing equipment. Receptacles for office equipment will be based on furniture layouts. The existing power distribution will be reused, except in the new mechanical room, where a new branch circuit panel board will be necessary.

Fire Alarm

The renovated spaces will be designed with additional audio and visual fire alarm devices to meet NFPA-72. Smoke detectors will be added to provide elevator recall. The existing fire alarm control panel will be replaced, with existing devices reconnected. The new mechanical space will have heat detectors. Fire alarm duct detectors for air handling units, that are greater than 2,000 cubic feet per minute, on both the supply and return ducts of the unit. Where devices are replaced 1 for 1, replace wiring to these devices.

Telecommunications & Technology

The renovated areas will be designed to meet the needs of PSU – Office of Telecommunications and Network Services. This will include internet and voice capabilities as well as new CAT6 cabling with RJ45 outlets for all spaces. Each jack location be designed with two (2) CAT6 cables. The CAT6 cabling will homerun to the Telecommunications Closet and be connected to existing patch panels. The cables will be tested to meet current TIA and PSU standards.

RESTROOMS

Anticipated building renovations will trigger a code requirement that the restrooms be brought into current code compliance, including fixture counts. The building is under-fixtured based on current code and University policies.

In addition to being under-fixtured, the planned relocation of the elevator and some of the proposed mechanical room renovations will affect the existing restroom locations. The occupancy for the building was calculated floor-by-floor based on use, primarily business use for the offices and assembly occupancy for the classrooms. The required fixture count was then calculated for each floor. Current code requires that the total number of water closets for the building increase from 17 to 24.

Both the Ground and First Floor require more fixtures, a total of 9 water closets (4-M / 5-W), per floor, which is more than the Second Floor, requiring a total of six water closets (3-M / 3-W). This is due to the larger classroom assembly uses on the Ground and First Floor. The Second Floor is primarily office use. The change of use of one of the classrooms or some of the office space on the Ground Floor would reduce the fixture requirement on the Ground Floor.

The intent for the restroom renovations on the Ground and First Floors is to create new multiple-stalled restrooms in the center wing of the building. As much as possible, the restrooms shall be in locations, or adjacent to locations, with existing plumbing risers.

On the second floor, there are two existing single-user restrooms within office suites that will remain during renovations and reduce the requirements for new restrooms. There are two approaches for renovation of the Second Floor, the first is the less invasive approach, which is to add new single-user restrooms or two small multiple-stalled restrooms along the corridor, partially utilizing the new space along the corridor created by relocating the elevator. The second approach is a more comprehensive renovation of the Second Floor to improve overall building efficiency and simplify the circulation on the Second Floor. Currently the circulation on the Second Floor is circuitous and dissimilar from the circulation on the two floors below, where the corridor is direct, and circulation is clear. Reconfiguring the Second-Floor program and running the central corridor straight through the center wing will allow for the addition of two small multiple-stalled restrooms off the corridor.

PHASE 2

General

The information below is a summary of the attached Appendix C, Building Wide Facilities Assessment, dated May 18, 2018.

Architectural

Safe Access

A significant project was completed in 2016 in the attic area to create a walkway through the building to aid the maintenance technicians' access to the units, piping and ductwork in the attic area. While the existing access project covers most of the attic area, an additional 20 linear feet of 3'-0" wide (minimum) access with fiberglass grating and handrail should be provided on the southwest side of the attic space. The proposed additional access will require small cross overs to be constructed over existing ductwork to remain.

Adhered Ceilings

An adhered ceiling has been installed directly under the concrete beams above the drop ceiling. In some locations throughout the building, the adhered ceiling is becoming delaminated. The adhered ceiling should be removed (abated if required) as each area is renovated.

Potential Stair Railing Replacement

The railings located in the stair towers serve as both guardrails and handrails, but are not compliant to current IBC requirements. Given the historical nature of the building, structural integrity of the railings, and no proposed changes to the stairways, by code, existing handrails and guardrails at all stairs are permitted to remain as is. However, the handrail/guardrail and stair system is not ADA compliant due to rise/run, graspability, continuity and extension requirements. Because all buildings after 2010 are required, by federal law, to be ADA accessible where technically feasible, this non-compliance should be remedied. There is some debate as to what is considered "technically feasible", but in this case the area allotted for the stairs is not adequate to allow the stairs to be reconstructed per ADA requirements. The railings, however, would be an item within the stair system that could be replaced and not considered technically infeasible. It is recommended that the existing guardrails/handrails be completely removed and reconstructed to comply, to the fullest extent feasible, to current building codes and accessibility laws.

Exterior Repairs & Cleaning

The exterior of the building appears to be in generally good condition. There are a few locations at which repairs/improvements are recommended. These areas include damaged brick and mortar areas, damaged/deteriorated exterior door sills, broken/missing window grilles, missing/deteriorated joint sealant at west terrace stairs, rusting railings at light wells, overgrown light well vegetation, and worn/chipped door finishes.

Interior Repairs & Cleaning

The interior of the building appears to be in generally good condition. There are a few locations at which repairs/improvements are recommended. These areas include damaged wood trim at stair doors, damaged flooring and base trim in corridors.

Structural

Basement Terrace Structure

In the Basement area under the main entrance stairs and terrace, where the mechanical and electrical rooms are situated, cast in place concrete beam and slab support the stairs to the main entrance on the west side of the building. The concrete beams in the basement are sloped concrete members with deterioration present. These beams, slabs and wall appear to have been fixed in the past. However, some additional damage has been noted.

Future Inspections

A full structural inspection of the mechanical and electrical rooms under the entrance stair should be undertaken. There is evidence of water infiltration in the past which appears to have been patched and resolved. However, there are enough issues including concrete beam to concrete wall interfaces, concrete beam to masonry pier interfaces, slab to masonry pier interface and concrete spalls to warrant further investigation.

Electrical

Lighting

Replace any existing interior fluorescent lighting throughout the building with new energy efficient LED lighting, following PSU standards. Replace any exterior lighting with new LED light fixtures. Restore existing antique light fixtures at front entrance.

Power

Replace the entire existing power distribution throughout the building. This would include both normal and normal / emergency power. This would include replacing the main distribution switchboard, step down transformers, sub-distribution and all panelboards. This would include new feeders. This would not include any distribution installed during Phase 1 renovations, or any distribution installed during recent renovations.

Fire Alarm

Replace any fire alarm devices and wiring not replaced during the Phase 1 project.

Access Control

Replace existing access control system with new I-STAR panel, new card readers, ancillary devices and wiring on exterior doors and telecom closets.

Plumbing

Sanitary and Vent Piping Not Replaced in Phase 1 Restroom Renovations

Existing sanitary and vent piping in the building appears original to the building in most areas. This piping should be scoped to find locations that are deteriorated and replaced as necessary from the roof level to below grade where it exists the building. This would include any piping that is not replaced during Phase 1.

Natural Gas Piping Replacement

The natural gas piping is approximately 50 years old and reaching the end of its useful life. It is recommended that it be replaced as areas are renovated.

Kitchen Lab Sinks

Sinks in the kitchen lab are provided with S-traps which are not allowed per code. It is recommended that sinks with S-traps be replaced with P-traps. Any sink that drains indirectly into a floor sink is not required to have a trap and it can be removed.

Fire Protection

Standpipe & Sprinkler Systems and Fire Department Connection

The building does not currently have a sprinkler system. There are two standpipes on each side of the building outside the stair towers. Each floor has a fire hose cabinet located outside each stair tower with “CAMPUS PRESSURE ONLY” signs. It is recommended that these valves are tested, and a fire department connection is added to the incoming service. Along with this a sprinkler system should be added to serve the entirety of the building per NFPA 13.

APPENDIX D – CHANDLEE FOODS LAB MOVE

Background

Gannett Fleming submitted a 90% draft Henderson Systems Renewal Study document to Penn State on September 12, 2019. Upon Penn State's review of the document, there were several meetings and discussions. It was determined that Option 3B was the most viable solution. This option included placing the mechanical room in the existing GPC Classroom 018 in the northwest corner of the building. The main issue with this option was that it removed a valuable GPC classroom from the building.

Also, during that time, space in Chandlee Lab building (Lab 309 & Lab 310) was identified as potential space for a Foods Lab into which the existing foods lab in the Henderson building could move. This move would free up valuable space within the Henderson building and would potentially alleviate the need for swing space as part of the building renewal construction process.

The purpose of this supplemental Appendix D is to identify, at a high level, order of magnitude scope and opinion of budget for the portion of the project specifically related to moving the Foods Lab to the Chandlee Building.

It should also be noted that this portion of the study report was prepared during the 2020 COVID-19 Pandemic, and as such, the design team made use of existing building information made available by Penn State. While design and engineering can be progressed to the design development level, a visual site survey will need to be performed prior to final design completion.

Architectural

Penn State Planning, Design, & Properties office of Space Management provided Gannett Fleming and BLTa with floor plans of the Chandlee space in question. The floor plans included a proposed layout for the Foods Lab. The proposed layout was used for the basis of design for providing scoping and opinion of probable cost budget.

Plumbing

The plumbing engineering scope in the Chandlee Building would be to modify the existing domestic water, sanitary, and vent piping to serve the locations of new sinks throughout the kitchen lab. This does not include gas piping for possible gas ranges. From review of existing building drawings, it does not appear the gas piping would be of adequate size to serve new gas ranges if changed from electric.

Mechanical

The mechanical engineering scope in the Chandlee Building would be to modify existing supply and exhaust systems in labs 309 and 310 for the renovation of the student food laboratory. This will include the addition modification of Fan coil units for make-up air and space cooling and heating. This will also include the modification of the existing space exhaust as required for hoods above ranges to tie into existing building exhaust system. This will also include addition and modification of controls for all new equipment as required.

Electrical

The electrical engineering scope in the Chandlee Building would be to provide new lighting, lighting controls, power, fire alarm, and telecommunications for the student foods laboratory. The condition of existing space is unknown. The electrical scope would include new recessed LED light fixtures in all areas. The lighting controls would be local switches with integral occupancy sensors for small enclosed rooms, and ceiling mounted occupancy sensor with local switches for larger open areas. A new branch circuit panel board would

be designed for power in the space. This panel board would be fed from existing electrical distribution in the main electric room. This panel board would be feed the appliances in the space and convenience receptacles, along with any proposed mechanical equipment. New fire alarm notification devices would be designed for the space. The fire alarm devices would be connected to the existing fire alarm control panel. The space would be designed with telecommunications outlets to support the program. The new telecommunications outlets would be connected to existing patch panels in the Telecommunications Closet.

Fire Protection

The fire protection engineering scope in the Chandlee Building would be to modify existing sprinkler head locations as required for ceiling modification as required for new layout. The addition of ansul fire protection systems for the hoods will be added as required by code.

Opinion of Budget

Totals below include Overhead and Profit, Soft Costs, Permit Fees, and Approvals. Direct Costs to the University such as hazardous materials abatement and telecommunications wiring will need to be added. See Appendix 'G' for additional costing information.

Relocation of Existing Foods Lab 007 to Chandlee 309-310

Total: $812,746

APPENDIX E – STUDENT SERVICES RENOVATION

Background

Gannett Fleming submitted a 90% draft Henderson Systems Renewal Study document to Penn State on September 12, 2019. Upon Penn State's review of the document, there were several meetings and discussions. It was determined that Option 3B was the most viable solution. This option included placing the mechanical room in the existing GPC classroom 018 in the northwest corner of the building. The main issue with this option was that it removed a valuable GPC classroom from the building.

Also, during that time, space in Chandlee Lab building (Lab 309 & Lab 310) was identified as potential space for a Foods Lab into which the existing foods lab in the Henderson building could move. This move would free up valuable space within the Henderson building and would potentially alleviate the need for swing space as part of the building renewal construction process. The College of Health & Human Development (HHD) has indicated that the vacated space would be ideal for needed expansion for their department of Student Services. The space would be ideal for that use considering its visibility and adjacency to a well-travelled foot path on campus in the HHD area of campus.

The purpose of this supplemental Appendix E is to identify, at a high level, order of magnitude scope and opinion of budget for the portion of the project specifically related to relocating student services to the location of the existing Foods Lab.

It should also be noted that this portion of the study report was prepared during the 2020 COVID-19 Pandemic, and as such, the design team made use of existing building survey information previously obtained by the design team. While design and engineering can be progressed to the design development level, a more detailed visual site survey will need to be performed prior to final design completion.

Architectural

Based on block plans provided by Penn State, and a square footage analysis of the space in question, it was determined that approximately 2,500 square feet can be made available into which student services can expand. Student services currently occupies approximately 1,600 square feet. The renovation would include the complete removal of floor and ceiling finishes, walls, casework, and all other associated interior construction in the existing foods lab.

The space would be designed to maximize natural daylight and be welcoming and user friendly to the students that will utilize the space. The space will include offices, support spaces, and student spaces. The exact program for the space has not been established at the time of this report, but for purposes of establishing an opinion of probably cost budgeting, an even mix of offices and student spaces was assumed.

Design and finishes were assumed to be on the higher end to establish the light and welcoming environment typical of student commons and student services spaces.

Mechanical

The mechanical engineering scope for the Student Services would be to modify existing supply and return ductwork in the space for the new student services area and addition of new VAV boxes to serve the spaces. The existing hot water piping in the area will require modification to serve new VAV boxes as well. This would also include modification of existing building controls for this space.

Electrical

The electrical engineering scope in the Student Services would be provide new lighting, lighting controls, power, fire alarm, and telecommunications for the space. The electrical scope would include a new recessed

LED light fixtures in all areas. The lighting controls would be local switches with integral occupancy sensors for small enclosed rooms, and ceiling mounted occupancy sensor with local switches for larger open areas. Dimming controls would be provided for meeting rooms and areas with audio-visual equipment. The existing panel boards in the space would be used to feed convenience receptacles, along with any proposed mechanical equipment. New fire alarm notification devices would be designed for the space. The fire alarm devices would be connected to the existing fire alarm control panel. The space would be designed with telecommunications outlets to support the program. The new telecommunications outlets would be connected to existing patch panels in the Telecommunications Closet.

Opinion of Budget

Totals below include Overhead and Profit, Soft Costs, Permit Fees, and Approvals. Direct Costs to the University such as hazardous materials abatement and telecommunications wiring will need to be added. See Appendix 'G' for additional costing information.

Relocation of Existing Student Services 005 to Foods Lab 007

Total: $883,505

APPENDIX F – NEW GPC CLASSROOM

Background

Gannett Fleming submitted a 90% draft Henderson Systems Renewal Study document to Penn State on September 12, 2019. Upon Penn State's review of the document, there were several meetings and discussions. It was determined that Option 3B was the most viable solution. This option included placing the mechanical room in the existing GPC classroom 018 in the northwest corner of the building. The main issue with this option was that it removed a valuable GPC classroom from the building.

Also, during that time, space in Chandlee Lab building (Lab 309 & Lab 310) was identified as potential space for a Foods Lab into which the existing foods lab in the Henderson building could move. This move would free up valuable space within the Henderson building and would potentially alleviate the need for swing space as part of the building renewal construction process. The College of Health & Human Development (HHD) has indicated that the vacated space would be ideal for needed expansion for their department of Student Services. Because HHD Student Services will be, in this scenario, vacating their existing space, an opportunity for relocating, rather than removing, the existing GPC 018 Classroom was introduced.

The purpose of this supplemental Appendix F is to identify, at a high level, order of magnitude scope and opinion of budget for the portion of the project specifically related to relocating General-Purpose Classroom (GPC) 018 to the space vacated by Student Services.

It should also be noted that this portion of the study report was prepared during the 2020 COVID-19 Pandemic, and as such, the design team made use of existing building survey information previously obtained by the design team. While design and engineering can be progressed to the design development level, a more detailed visual site survey will need to be performed prior to final design completion.

Architectural

Based on block plans provided by Penn State, and a square footage analysis of the space in question, it was determined that approximately 1,000 square feet can be made available into which a new GPC classroom can be located. The existing currently occupies approximately 866 square feet. The renovation would include the complete removal of floor and ceiling finishes, walls, casework, and all other associated interior construction in the existing Student Services suite.

The space would be designed to maximize natural daylight and be welcoming and user friendly to the students and staff that will utilize the space. The space will be designed according to Penn State Planning, Design, & Properties Classroom & Technology Design & Construction Minimum Requirements guidelines.

Mechanical

The mechanical engineering scope for the General-Purpose Classroom (GPC) would be to modify existing supply and return ductwork in the space for the new GPC and addition of a new VAV box to serve the space. The existing hot water piping in the area will require modification to serve new VAV box as well. This would also include modification of existing building controls for this space.

Electrical

The electrical engineering scope General Purpose Classroom would be to provide new lighting, lighting controls, power, fire alarm, and telecommunications for the space. The electrical scope would include new recessed LED lighting fixtures. The lighting controls would be local dimming switches and ceiling mounted occupancy sensors. The room design would follow the Penn State Planning, Design, & Properties

Classroom & Technology Design & Construction Minimum Requirements guidelines. This would include lighting controls at the entrance to the room and at the teaching station. New power outlets would be provided on the perimeter walls, and at the instructors' podium and for any audio-visual equipment. A new fire alarm horn strobe would be added to the space. The fire alarm device would be connected to the existing fire alarm control panel. The space would be designed with telecommunications outlets to support the program. The new telecommunications outlets would be connected to existing path panels in the Telecommunication Closet.

Opinion of Budget

Totals below include Overhead and Profit, Soft Costs, Permit Fees, and Approvals. Direct Costs to the University such as hazardous materials abatement and telecommunications wiring will need to be added. See Appendix 'G' for additional costing information.

Relocation of General-Purpose Classroom 018 to Student Services 005

Total: $267,800