PENNSTATE

Office of Physical Plant

The Pennsylvania State University
Physical Plant Building
University Park, PA 16802-1118

DATE: January 27, 2012

SUBJECT: Mueller and Whitmore Laboratories Renovation,
University Park

TO: Ballinger
BLTa
Ellenzweig
EYP
Francis Cauffman
Goody Clancy
Kling Stubbins
Payette
Perkins + Will/R3a
Stantec

Congratulations, your firm has been selected as one of the firms on a long list for the design of the above referenced project. The Selection Committee will review responses to this Request for Proposals and identify a short list of three firms to be interviewed.

It is necessary that you provide us with the information requested in the enclosed questionnaire no later than **February 21, 2012 at Noon.** Please answer all of the questions in the order requested. This will provide uniform information on all firms for evaluation and ultimate presentation to the Board of Trustees. We encourage you to be as brief as possible without sacrificing accuracy and completeness. A document not exceeding 60 pages should be more than adequate to provide the requested information. Please submit to my office **ten** copies of all materials. In order to better understand our goals and the major issues driving this project, we encourage you to visit the site and meet with the appropriate individuals representing the user group. Please contact Monica Reed, the Project Manager at 814-863-5765, mjr204@psu.edu to schedule your site visit and meeting. Please contact me if you have any process or planning questions.

In addition to the questionnaire, in order to help you formulate a response, enclosed you will find programmatic information and a utility and building systems scoping document for each building. Also included is a non-binding fee proposal form for you to fill out; please submit one copy of this form under separate cover; to assist you in filling out this form please assume a construction budget for both buildings of $18,500,000 and an FF&E budget of $600,000. Finally, you will also find a copy of our Form of Agreement 1-P; please review this agreement to ensure that your firm accepts all terms and conditions as written.

A decision regarding the firms to be interviewed will be made by March 1, 2012 and posted to our web site. Interviews with the three short-listed firms will be held on March 12, 2012.

Results of the interviews will be announced at the Board of Trustees meeting on March 16, 2012 and posted to our web site.

We appreciate your cooperation and interest in preparing this material. If the Board selects your firm, we will be looking forward to working with you on the development of this important project.

Please do not hesitate to call me if you have any other questions.

Sincerely,

David Zehngut
University Architect
207 Physical Plant
University Park, PA 16802
(814) 863-3158, fax (814) 863-7757
E-mail dxz3@psu.edu

Enclosures

cc: Selection Committee Members

QUESTIONNAIRE

Mueller and Whitmore Laboratories Renovation,
University Park

The following items of information must be supplied to the University. We have made no attempt to provide sufficient space below for you to fill in blanks but expect that you will provide the information requested on your own letterhead paper. **Failure to answer all questions will be reason for disqualifying your team from further consideration.** Please provide **ten copies** of all material submitted. The deadline for submission is **February 21, 2012 at Noon.**

1. Please describe your approach to this project. Include a description of the scope of work your team will provide.

2. In addition to any further thoughts you might have on the essence of this project, we would like to see further evidence of your firm's ability to translate design intentions into a meaningful project (including the site). Therefore, please discuss in detail, but in no more than one or two pages, an example from your portfolio relevant to our project that best indicates the appropriate resolution of an understanding of the uniqueness of a project, design intentions, and translation of those design intentions into a meaningful and synthesized final solution.

3. Qualifications and experience of the lead design team members, **including consultants**, to be assigned to this project. Provide a clear indication of the roles to be performed by each **individual**. Please be very specific regarding the personal involvement and on-site participation of each lead design **individual.**

4. Consultant firms, if any, proposed for this project:

Firm	No. of Projects Worked With Your Firm	Total Amt. Value
Structural Engineers		
Mechanical Engineers		
Electrical Engineers		
Landscape Architects		
Interior Designers		
Cost Estimators		
Others		

5. Experience of the firm and any consultants in the design of facilities similar to the ones proposed (college and other), completed or under construction during the past ten years. List for each the completion date, final construction cost and gross square feet provided, and be very specific about the services provided by your firm. Identify those specific projects included in the proposed design team experience listed in #3 above.

6. Experience of the firm and any consultants in the design of college and university buildings (not already included in # 5 above) completed or under construction during the

past ten years. List for each the completion date, final construction cost and gross square feet provided, and be very specific about the services provided by your firm. Identify those specific projects included in the proposed design team experience listed in #3 above.

7. Evidence of the team's commitment to sustainable design.

8. List five client references for similar scope projects completed during the past ten years, giving name and telephone number. In order to give us an indication of your cost control track record, please **provide accurate and complete data indicating the gross square foot area, the design estimated cost, bid cost, the final total construction cost and the bid date for each project.** Please explain the reason for any major discrepancies between estimated, bid and final construction costs. Please make sure the telephone number of each client reference is current.

9. Graphic examples of selected projects personally done by **the lead design architect**, including brief description and completion date.

10. Please provide a proposed design schedule for each component of this project in graphic form allowing one week for any necessary Penn State University review. Assume the design process will start in April, 2012.

11. List errors and omissions insurance coverage.

12. Number of personnel in present firm(s): Architects _____ Engineers _____
Interior Designers _____ Landscape Architects _____ Others _____

    Which of the above are professionally registered?

13. Briefly tell us how you address diversity within your team.

Mueller Renovation for Biology Instructional Laboratories

Project Summary

This project will renovate Mueller Laboratory to provide new and improved undergraduate Biology laboratory teaching spaces to support the core Biology courses for degree seeking students within this major and to improve the instructional environment for all students fulfilling their science general education requirements.

Background Information

Mueller Building was constructed in 1965 and contains 88,199 gross square feet with 52,762 assignable square feet. The building has had only minor renovations since it was constructed and is in poor condition. This building is the home of the Biology Department and contains the department offices, faculty offices, instructional and research laboratories along with all the support spaces for the department and a generally scheduled University classroom. Mueller Building contains seven floors and a penthouse.

In 1978 the building was named for Erwin W. Mueller a much-admired and respected member of the Penn State Department of Physics from 1952 to 1977. His work was given the highest recognition when he was awarded the National Medal of Science in 1977. Erwin

W. Mueller (1911-1977), a German-born American physicist, in 1955 became the first person to see an atom, using a microscope he invented.

Department of Biology

Faculty and Staff

The Department of Biology currently includes 44 graduate faculty members, 26 instructional/research faculty members, 9 adjunct faculty members, more than 100 graduate students, around 30 post docs, 14 research assistants, 15 research staff, and 14 staff members. In summary there are over 250 individuals working within the Biology Department to support the departments instructional, research and outreach missions.

Instructional Programs

The Penn State Biology Department offers six types of Bachelor of Science degrees, including degrees in General Biology, Neuroscience, Ecology, Genetics and Developmental Biology, Plant Biology, and Vertebrate Physiology. The Department also offers Master of Science and Doctor of Philosophy degrees in a wide range of research areas. The Department has over 40 graduate faculty members whom engage in cutting edge research. This Department is known as one of the top research Biology Departments in Higher Education in the world.

With an enrollment of over 1,000 students, the Biology major is the largest and most popular in Penn State's Eberly College of Sciences. In addition, the Biology courses are a popular choice for students to meet their general education requirements for all degrees and the Biology Department instructs over 8,000 students annually within the instructional laboratory spaces in Mueller.

A Biology student can select one of six options: General Biology, Ecology, Genetics & Developmental Biology, Neurobiology, Plant Biology, and Vertebrate Physiology. A freshman and sophomore in Biology will complete a rigorous curriculum, including two semesters of calculus, two semesters of both inorganic and organic chemistry, and a four-semester sequence of four introductory courses (with laboratory) in basic biology. By the end of the sophomore year, each student will have completed a minimum of seven laboratory courses, encompassing a wide range of basic skills. In the junior and senior year the Biology student will focus on an area of biology in line with your interests and career goals.

The curriculum is designed to help give students both the breadth and depth needed to understand modern biology at all levels of integration. Biology focuses on living organisms - what they are, where they live, how they evolve, and how they reproduce, grow and develop. Students will acquire an overview of the principle disciplines of biology from the molecular, cellular, genetic, organismal, community and evolutionary perspectives. With this foundation, they will understand the dynamic nature of biology, see how scientific principles from the natural sciences further the understanding of life,

and appreciate how these scientific endeavors provide an essential knowledge pillar for society. Students will focus their last two years of study in one of 6 core knowledge areas, with the goal of investigating current scientific knowledge supporting this theme, as well as constructing a flexible academic platform supporting future career paths, including those requiring graduate and professional degrees.

The Biology Department is committed to encouraging undergraduate research, with more than 100 undergraduates participating in various aspects of faculty research. Numerous scientific papers are published by the faculty with undergraduate co-authors each year Research among the biology faculty ranges from investigations using molecular analyses of bacterial, plant, and animal evolution; theoretical and experimental population genetics; plant growth and development; signal transduction by hormones; marine biology; neuroplasticity/synaptogenesis; plant biotechnology; gene expression and regulation; and much more. All this research enables our diverse faculty to offer up-to-date courses in various aspects of modern biology

Students will learn how to acquire diversified knowledge in biology appropriate to the individual student goals. The anticipated outcome will be a student with an ability to apply this knowledge by analyzing, interpreting and summarizing data in order to solve problems relevant to the discipline. Students should understand formal experimental design and opportunities should be available for students to participate in an authentic research experience.

Students will be able to communicate biological concepts, findings, and ideas effectively using both oral and written formats common to the discipline and to do so while maintaining the highest standards of academic integrity.

Research

The Department of Biology is known nationally and internationally for its scientific excellence. Faculty, research personnel, post-doctoral fellows and graduate students work in a broad spectrum of research areas, including cell biology, developmental biology, ecology, evolution, genetics, neuroscience, physiology and systematics.

The Department of Biology is the focal point of life science research at Penn State, and it enjoys close ties with other departments in the Eberly College of Science, especially the Departments of Chemistry, Biochemistry and Molecular Biology, and Statistics. The Biology faculty participates in intercollege graduate programs in ecology, genetics, physiology, and plant physiology, and interdepartmental and intercollege research collaborations are common. Some Biology faculty also are members of the The Huck Institute for Life Sciences, the Center for Gene Regulation, and the Penn State Institutes of the Environment.

Outreach

The Eberly College of Science Outreach Office helps organize, implement, direct, and find funding for multiple educational programs for families, K-12 students and teachers, the general public, and special audiences.

Mueller Instructional Lab Renovation Project Description

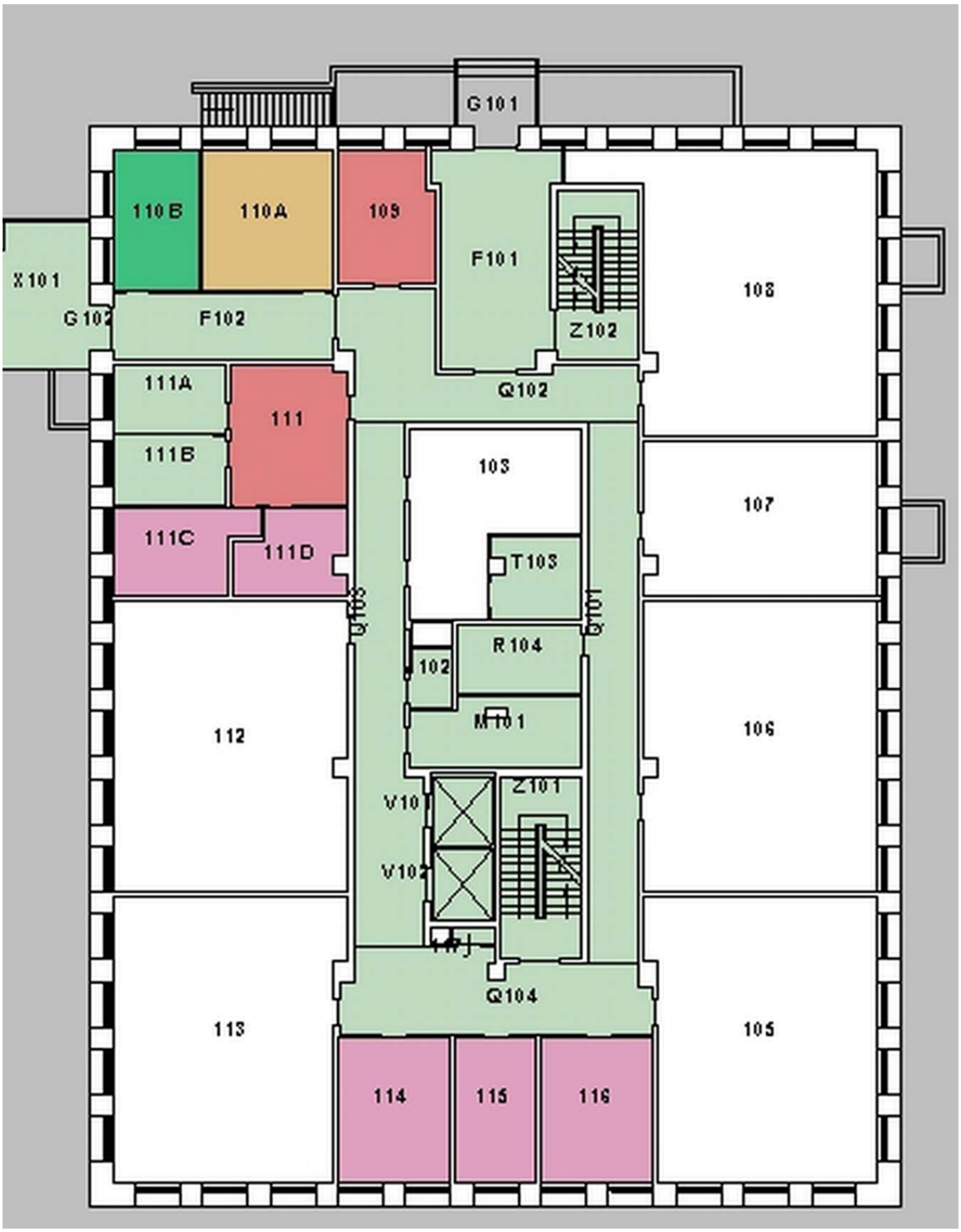
The priority for this capital project is to improve existing instructional laboratories for Biology and to create new laboratory spaces on the first, fourth and sixth floors of Mueller Laboratory. In addition, there are adjacent improvements desired to improve the environment and support spaces that serve the student population.

First Floor Mueller Laboratory

The entire first floor will be renovated to create six modern teaching laboratories and support spaces. This plan will accomplish the goal of providing an additional three teaching laboratories for the Biology 110 core laboratories that provide the instruction to over 1,500 students annually. Existing laboratory spaces on this floor will be totally improved to provide a layout of improved laboratory spaces in North Frear.

Existing office space will be reassigned to create an additional laboratory space and current anatomy/physiology laboratory spaces will be relocated to the sixth floor to allow space to create two more laboratory spaces for the Biology 110 courses. In addition, some other office spaces will be reassigned to create the storage and teaching office areas needed to support the instructional programs.

This floor will be the most heavily used for the undergraduate instructional programs. It is desired to create an additional restroom facility for men and to improve the restroom facilities to support the high use that this floor will support. It is also desired to improve the common areas such as lobby and hallways to improve finishes and to improve the appearance for the multiple users that will be served with the new, expanded and improved laboratory facilities. Below is the preliminary plan for the first floor of Mueller along with the current floor plan.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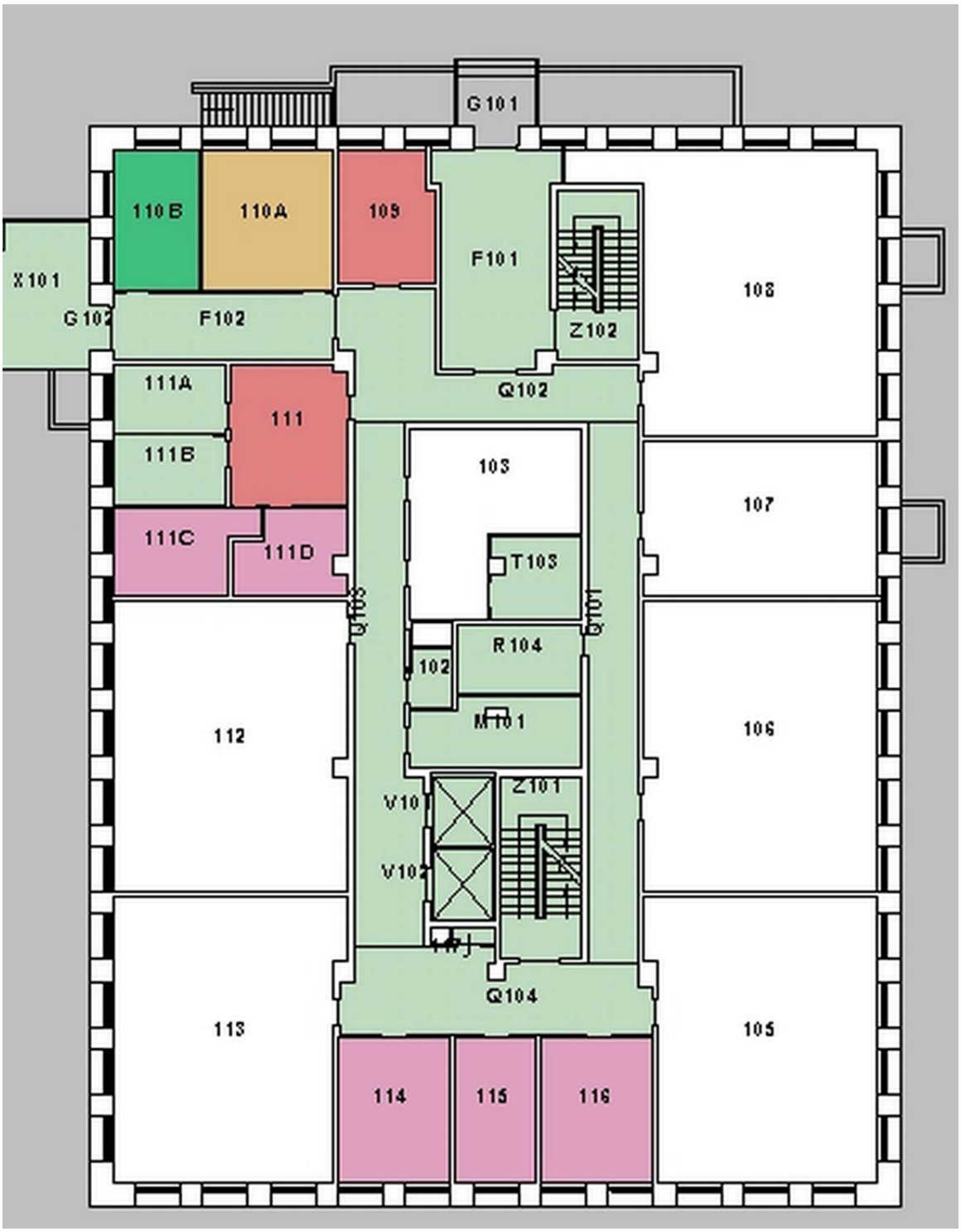
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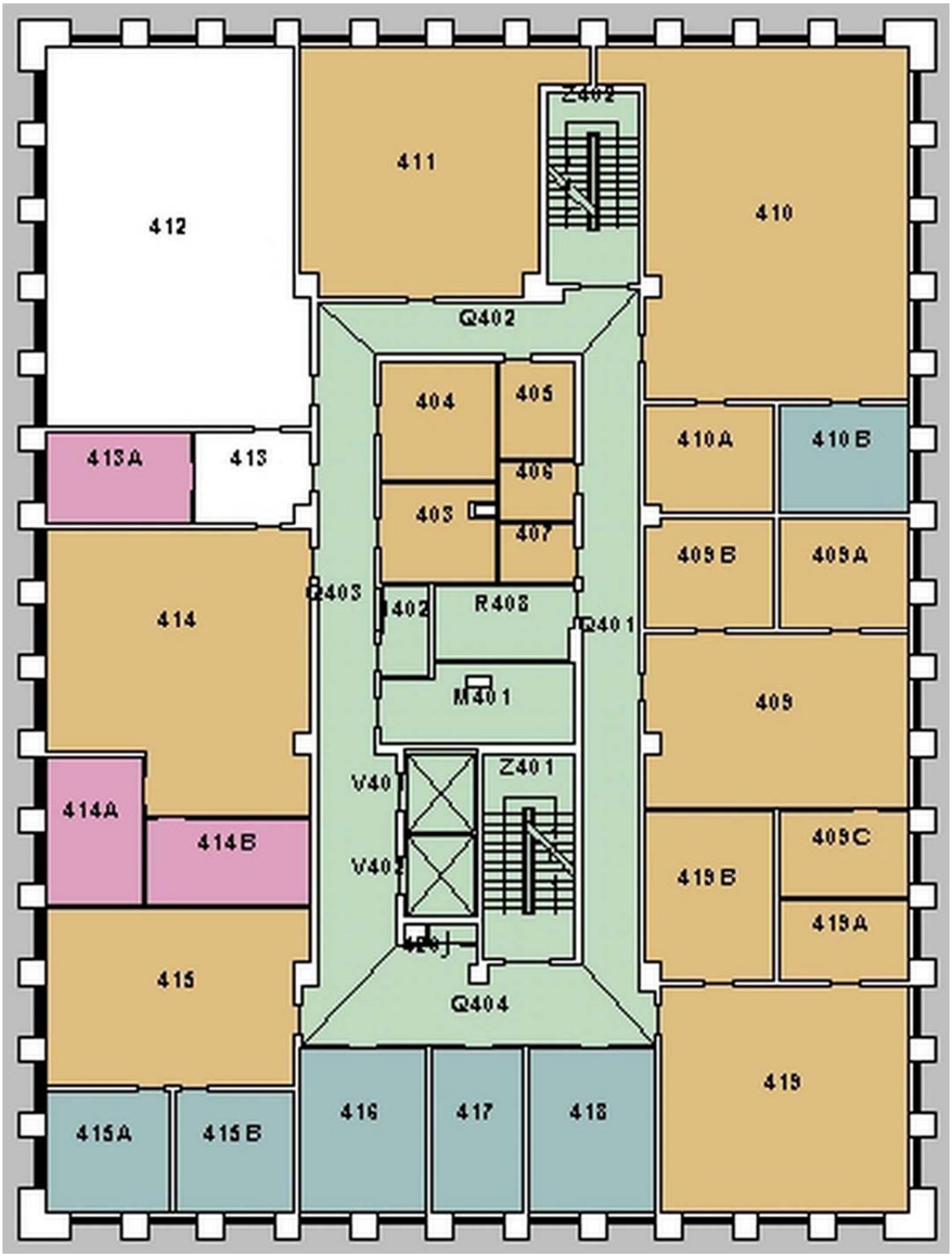
Fourth Floor Mueller Laboratory

The fourth floor Anatomy and Physiology instructional lab will be renovated to be used for undergraduate research projects associated with all laboratory courses in Biology. The purpose of this lab is to increase the exposure of our students to inquiry based learning and the conduct of scientific experiments. This space will also assist the faculty to integrate their teaching and research activities. The Biology Department has a mission to improve the hands on method of teaching and this space will provide an opportunity for students to engage in research projects and to work with faculty members in a research environment.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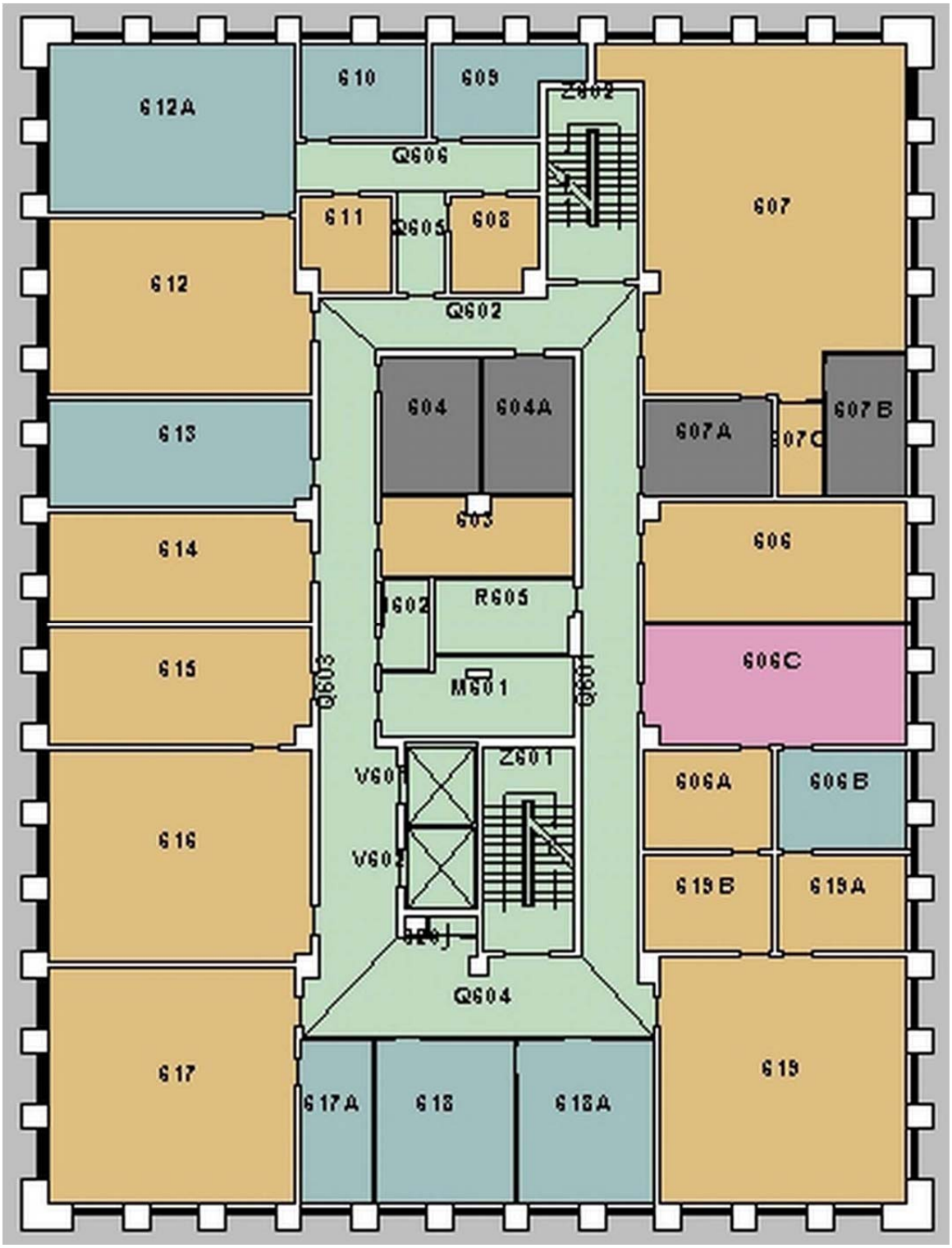
Sixth Floor Mueller Renovation

The sixth floor of Mueller will be renovated and existing research and support spaces to create three new anatomy/physiology teaching laboratories. Two existing laboratories on the first floor will be relocated to the sixth floor. This plan will allow the consolidation of the three Anatomy/Physiology Laboratories on the same floor

In addition, a new Cadaver Laboratory will be created to at last provide the actual experience that students should have as a part of their instruction in anatomy and physiology. This space will not only support the Biology majors but many other disciplines such as the Nursing program.

Two new office spaces will be created and the lab prep spaces needed to support these new modern laboratories.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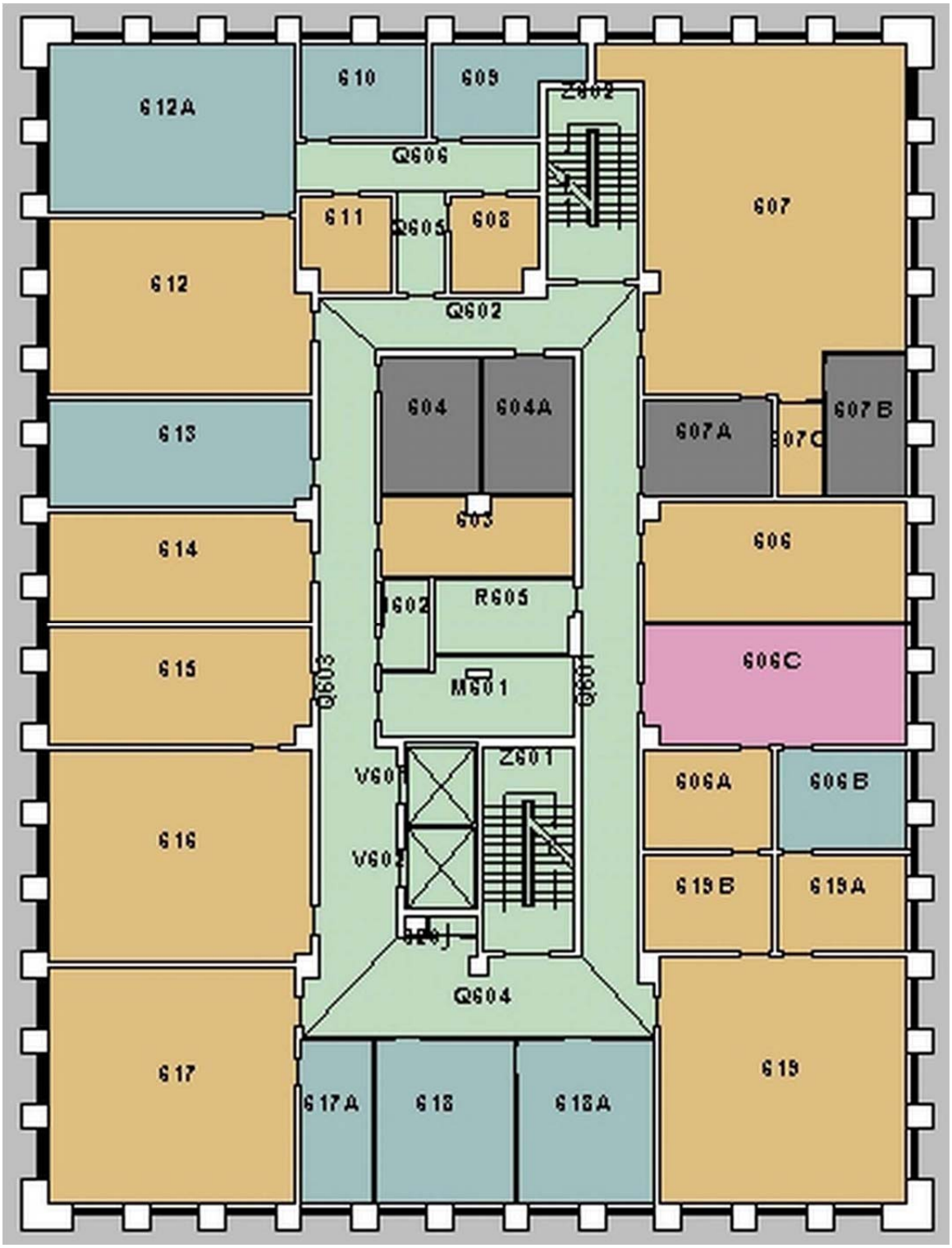
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General Renovation Considerations and New Equipment

The recent renovation of North Frear provides an excellent example of the type of improvements, finishes, configurations and laboratory furnishings desired for the improved and expanded teaching laboratories in Mueller Laboratory. (add pictures)

This projecct will also include the purchase and installation of new autoclaves adjacent to the laboratories on the first, fourth and sixth floors. All existing antiquated equipment within or serving the laboratories will be replaced such as the purchase and installation of new energy efficient refrigerators, freezers, and ice machines.

This project will also include all building code and health and safety improvements to support the upgrade of the instructional laboratories along with building system upgrades such as HVAC, mechanical, plumbing and all other systems to provide for new modern teaching facilities. The executive summary for the most recent facility analysis for Mueller Laboratory is included within this program.

Individual room requirements are included in the following section.

Space Summary and Individual Space Forms

Facility Condition Analysis

MUELLER LABORATORY

BUILDING NUMBER: 0409-000

FACILITY CONDITION ANALYSIS

AUGUST 27, 2008

A. EXECUTIVE SUMMARY - MUELLER LABORATORY

Priority 1: $468,021

Priority 2: $99,609

Priority 3: $10,379,054

Priority 4: $4,241,998

Total Project Costs: $15,188,682

Facility Replacement Cost: $39,320,801

Facility Condition Needs Index (FCNI): 0.39

ADMINISTRATIVE OVERVIEW

This analysis is intended to update the initial Facility Condition Analysis prepared for Mueller Laboratory.

The facility was reinspected by ISES Corporation personnel to determine the number of previously recommended projects which had been completed and to ascertain the extent of new damage to the facility since the original inspection. The building was also surveyed for compliance with the Americans with Disabilities Act (ADA). This document is a reproduction of the original report information updated for subsequent damage, inflation, and new legislative requirements. Previously estimated project costs have been inflated based upon construction cost information published in Engineering News Record. Deficiencies which have been corrected since the original inspection have been eliminated from this report. New deficiencies observed during the reinspection have been incorporated into this report by either editing existing projects or adding new ones. Edited projects are identified by the addition of "(REV 2/08)" to the project title. New projects are indicated by the addition of "(2/08)" at the end of the title.

ASSET SUMMARY

The Mueller Laboratory is a multi-story building originally constructed as an administration and teaching laboratory used by the Biology Department. This facility is located on the main campus of Pennsylvania State University. Constructed in 1965, this 75,482 square foot facility has a ground floor and levels one through six. The building is currently being used to support laboratories and offices. The mechanical room in this building is located on the ground floor. The exterior finishes consist of brick, aluminum framed windows, glass and metal doors, and an EPDM flat roofing system.

SITE

The site landscaping is in very good condition and appears to be on a consistent renewal application. This well maintained landscaping program is expected to present a pleasant and enhanced look to the buildings site. There are no upgrades for the landscaping at this time. The asphalt parking area is in fair condition considering the age of the application. However, without resurfacing within the next ten years this surface will break down. Cracking and settlement of the asphalt were evident where the asphalt meets the concrete. It is recommended that any cracks be repaired and that any areas where elevation problems are evident be repaved. After these repairs are complete, it is recommended that asphalt, Type II slurry seal be applied along the asphalt pavement. The existing sidewalk is in fair condition considering the age of the applications. There are a few areas that

require some attention such as the curbing sections that match the asphalt surface finish. However, overall the sidewalks are expected to have a normal life cycle that extends beyond the ten-year outlook of this report. No work is required at this time.

EXTERIOR STRUCTURE

During the time of the inspection, the roof was covered with snow. Reports indicate that the existing roofing consists of an EPDM system. This ballasted roofing system had a warranty that expired in 2004. This is an indication that the roofing system is at life cycle depletion. It is recommended that the existing roofing system be replaced with a modified bitumen system. The exterior brick mortar joints appear to be in fair condition. However, due to harsh winter conditions, it is anticipated that mortar joints will begin to fail and require tuck pointing within the next ten years. This work is selective, so matching mortar should be applied. Following a detailed examination of the brick and repair of the mortar construction joints, the entire building should be pressure washed to remove soil and stains. There is significant rebar exposure in the ceiling deck of mechanical room M015. This deterioration of the concretize structure was caused by mechanical related equipment and has deteriorated the concrete to the point where the concrete beam supports are questionable. This situation can be dangerous and potentially cause a structural failure in that area. It is recommended that the occupants of the deck above be relocated and that temporary steel supports be added. A structural analysis is recommended, along with immediate repair.

The exterior aluminum window applications are in very good condition. There were no issues that surfaced during the time of the inspection. Therefore, no upgrades or recommendations are required at this time. The exterior service doors and access store front systems are in good condition and are expected to have a normal life cycle that extends beyond the ten-year outlook of this report. There are no recommendations for the exterior door systems at this time.

INTERIOR FINISHES / SYSTEMS

The interior finishes in this building vary, as selected offices and laboratories have been upgraded to include new casework, flooring, suspended ceiling, and painted wall finishes. However, additional recommendations are being made to upgrade the interior finishes of this building. There are painted walls throughout the entire facility. The interior finishes are in good condition, but will require an almost continual program of renewal in order to maintain an acceptable interior appearance. Cyclical painting should be considered as a standard approach to maintaining the quality of the interior finishes. It is recommended that all previously painted surfaces be repainted according to established cycles for this occupancy and use type. Budgetary considerations are taken into account for the next ten years for interior repairs and maintenance. Minor repairs should be completed before work begins.

The interior floor finishes include carpeting, 12 x 12 vinyl floor tile, 6 x 6 quarry floor tile, 9 x 9 vinyl composition tile, and terrazzo flooring. Selected areas of the building

have been upgraded to include new 12 x 12 floor tile, carpeting, and seamless vinyl composition flooring. The interior offices are primarily carpet. There are laboratories, offices, stair landings, and janitor's closets that still have 9 x 9 floor tile. Historically, carpeting has been placed over the 9 x 9 tile, which has been known to have asbestos containing material (ACM). As part of an overall level of effort, it is recommended that the carpeting throughout the building be replaced. Also, the 9 x 9 flooring should be replaced with 12 x 12 vinyl flooring. It is further recommended that the flooring in the laboratories be upgraded to a seamless floor with seamless cove base. The floor tiles and mastic should be sampled and tested for asbestos prior to any effort to refinish and reoccupy the building. The installation of some vinyl floor tile in the appropriate areas is recommended. All confirmed ACMs should be handled and disposed of according to all federal, state, and local rules and regulations.

Laboratory casework and countertops vary in design, age, and degree of deterioration within floors and suites. Many of the laboratories have been upgraded to include new casework. However, there are numerous laboratories that require a complete upgrade. Continuous contact with corrosive chemicals, reagents, and abrasives accelerates the wear of this furniture. Selective replacement of both base cabinets and countertops should be anticipated within ten years. Approximately 30 percent of the laboratory cabinetry and countertops are recommended for replacement. The new cabinetry is to be designed in accordance with current ADA requirements and include utility upgrades.

The suspended acoustical ceilings in this facility are in overall fair condition, and most do not presently need to be upgraded. However, over the next ten years, almost half of these tiles will need to be replaced. Install new suspended acoustical ceilings throughout the building.

The condition of the interior corridor doors varies, but it is generally fair. The majority of the doors are louvered along the bottom, and many of them lack door knobs. Various renovations in selected areas have included replacement of the doors and hardware. In an effort to upgrade the appearance of the corridors, security of the rooms, and overall quality of the system, the replacement of interior doors and hardware is recommended. The replacement units should be properly rated doors and should include new lever actuated locksets and closers.

ACCESSIBILITY

Present ADA legislation pertaining to building accessibility requires that building goods, services, and amenities be generally available. Selected area upgrades have been made in the past, including partial provisions to meet the ADA. However, this building still lacks full compliance with current ADA standards.

The difference in elevation between the main granite entrance and the asphalt pavement exceeds current accessibility requirements. This type of condition is a tripping hazard. Current legislation requires that changes in level up to one-quarter inch can be made without a transition. It is recommended that the surfaces be modified to create a smooth

transition. The exterior steps at the loading dock also require repair. A corner of the step has broken off and can be a tripping hazard.

The existing drinking fountains are a single-level design. This geometry tends to serve the needs of persons in wheelchairs or those who have difficulty stooping, but not both. To comply with the intent of current ADA legislation, it is recommended that one drinking fountain on each floor be replaced with a dual-level, refrigerated unit. The construction of wall alcoves may be necessary where the code required clearances are not available. Also, the seating in classroom 008 consists of chairs with table arms. This seating should be modified to accommodate wheelchair users.

There are eight restroom facilities. Each varies in condition and degree of accessibility. The interior finishes include terrazzo flooring, tiled walls, metal partitions, mirrors, and plumbing fixtures. These restrooms do not conform to current ADA legislation, as they lack proper space clearances and fixtures. As part of an overall level of effort, it is recommended that each restroom be completely upgraded to include reconditioned flooring, regrouted wall finishes, new suspended ceiling, an expansion of the area to obtain proper clearances, new fixtures, mirrors, coat hooks, and towel dispensers. A detailed design will be necessary for each restroom as renovation or retrofit is accomplished in conjunction with renovations in that area.

HEALTH

Apart from the suspected asbestos flooring, there were no health related issues observed or reported by management during the inspection of this facility.

FIRE / LIFE SAFETY

Structural fire separations are not maintained according to code requirements for new construction in significant areas of this facility. Past conduit installations have not been fire protected in the annular space around the conduit and concrete structure. All penetrations through fire-rated separations should be properly sealed in accordance with industry standards. The openings between the rails in the interior stairway do not meet the modern 4 inch sphere tests for opening size. Local codes now require that railing systems prevent the passage of a specific diameter sphere. To comply with code and limit university liability, it is recommended that infill be added to conform to the sphere test.

The guardrail along the exterior stairs at the northwest corner of the first floor does not conform to current codes. The opening between the rails exceeds the maximum 4 inch sphere test requirement. To prevent injury and liability, it is recommended that the railing be modified to conform to current codes.

This research lab structure and animal resource facility has no fire suppression. It is recommended by the NFPA that facilities of this type, use, and size be sprinkled throughout, and that sprinkling systems be fully supervised by a fire alarm system. Install fire suppression throughout the facility, including piping, sprinkler heads (as required by

code), pipe bracing, and supervising and alarm devices, as needed. This project should be coordinated with other piping, major HVAC/R, interior ceiling, and wall finish upgrades recommended elsewhere in this report to help reduce overall costs and the duplication of work efforts.

The fire alarm system is outdated and does not comply with ADA standards for visual alarm and pull station locations. Remove the existing system, and install a modern zone-type fire alarm system. Specify a point addressable, multi-zone, four-wire, Class A, supervised fire alarm panel with an annunciator. This work includes pull stations, audible / visual and visual devices, smoke detectors, duct smoke detectors, and heat detectors. Install all devices in accordance with current NFPA and ADA requirements. The system should report activation or trouble to an applicable receiving station, such as campus security and / or the local fire department.

The exit signs throughout the building are becoming timeworn and are recommended for replacement. The signage is not brightly illuminated and would be difficult to see in a smoke-filled corridor. LED applications are recommended for their low maintenance and energy-efficient features. Connect the new exit signs to the emergency circuit.

This facility is equipped with eyewash showers and emergency fountains, but there are not enough in some areas to provide a high margin of safety. In addition, some of the existing units are timeworn, and some of the eyewashes are low-grade, portable units. Remove the existing worn or low-grade showers and eyewashes. Install new emergency showers and eyewash fountains in all areas where related hazards exist. These should be permanent fixtures, connected to the building's water supply network, and provided with drains. They need to be clearly identified and located in unobstructed areas for easy access.

HVAC

Mueller Laboratory is on the university's high pressure steam loop. Heat exchangers and heating media components are largely original. Chilled water is supplied by a 1997 vintage, 11 ton process chiller (backs up the animal colony systems) and a 400 ton, 2003 vintage, air-cooled package chiller, with a glycol interface to tempered space. Air distribution is accomplished with built-up air conditioning units on the roof and a central station air handling unit in the ground floor mechanical room. Makeup air units deliver tempered air to fume hoods. With the exception of the recent cooling plant upgrade, the HVAC system has been in continuous service since 1965, but has sustained some direct digital control (DDC) upgrades, pump upgrades, and damper upgrades. The DDC system is partly Staefa and partly Automated Logic design. Despite recent fume hood system improvements, controls upgrades, and somepump replacements, the system remains a poor design. Corridor doors are louvered to return supplied air through door louvers and exhaust the air at the hood faces. This design is antiquated by modern lab design standards, and many system components are quite old and operating under capacity. The future of this facility should include a complete HVAC redesign and replacement so that

pressure gradients can be properly maintained and heat (or cooling) energy can be recovered.

Complete system redesign is needed. Demolish and dispose of all outdated equipment, and install a new modern HVAC system with variable air volume VAV and constant volume air distribution, as needed. This includes new air handlers, ductwork, terminal units, heat exchangers, pumps, piping, controls, and electrical connections. Specify DDCs for the new equipment. Incorporate variable frequency drives (VFD) into the new HVAC design, as applicable.

Lab fume hoods have been upgraded over time and the rooftop exhaust fans include some heat recovery and similar modern features. Generally, these systems have some remaining life that should be utilized before replacement. No major fume hood upgrade is recommended at this time because of theremaining service life of the base elements.

ELECTRICAL

Electrical power is supplied to the building through two 12,470 volt feeders. The dry-type transformers have rated capacities of 500 kVA and 750 kVA. The GE switchgear and distribution sections are original to the 1965 year of construction. Considering many decades of continuous service, the transformers and switchgear have exceeded their statistical life cycles and need to be scheduled for replacement. Additionally, primary electrical upgrades are recommended to augment proposed HVAC, lighting, andelectrical upgrades. Remove the existing primary equipment, and install new transformers and switchgear that include 480 volt power for lighting and mechanical equipment and 208 volt power for other circuits.

Emergency power for the building consists of two automatic transfer switches connected to the campus emergency power network. These do not alternately power the elevator according to records and university reports. The existing transfer switches power emergency power distribution panels supporting exit signs, corridor lights, and stair lights. It is recommended that the university increase the emergency feeder size and add an additional transfer switch to power one of the two elevators for emergency fire service control.

The secondary electrical system includes a combination of outdated Westinghouse, Square D, and GE breaker panels. These are original vintage panels. The increased use of electrical equipment for research, as well as proposed HVAC upgrades, serves to overburden a system that was designed without consideration of these loads. There are reports of overloaded circuits and inadequate power. Electrical devices, including switches and receptacles, are uniformly worn. It is recommended that the secondary electrical system be replaced in its entirety to ensure safe and reliable power to building occupants.

Lighting throughout the facility is mainly fluorescent, but there are incandescent lights in mechanical rooms and other utility areas. The lamps in the fluorescent fixtures were

noted to be distinctly different. There is a combination of green tipped, T12 lamps, and fixtures that have been retrofit with modern T8 lamps and electronic ballasts. Most of the fixtures and diffusers are in fair to poor condition, with the exception of those in some of the recently renovated laboratory spaces. Since lighting quality is gauged by both efficiency and proficiency, a complete lighting upgrade is recommended in conjunction with other proposed electrical upgrades. Older fixtures retrofitted with lower illuminating components do not improve lighting quality necessarily. Replace incandescent and worn fluorescent light fixtures with new energy-efficient units. The new lighting system should operate on 277 volts for improved energy efficiency.

PLUMBING

The water main enters the building in the ground floor mechanical room. There is presently no backflow preventer at the water main to protect against cross-contamination of the building`s water system with the domestic water supply. However, the assembly is presently on-site and assembled. The completion of this work was scheduled the week of last reinspection, so this report considers the work completed from the perspective of future budgeting needs.

Replacement of the domestic hot water converter is recommended. As it ages, the heat exchanger's efficiency is reduced by internal tube scaling and weakening of heat transfer support surfaces. A new heat exchanger, circulating pump, controls, and associated piping and electrical equipment are recommended. This work includes the demolition of existing equipment. This facility includes piping for domestic water, distilled water, natural gas, compressed air, and other specialty systems. Water supply piping is mostly copper and original. Laboratory process fluids piping is mostly threaded pipe and original. Shutoff valves and gas cocks are uniformly worn. Failure to replace the water and process piping within the scope of this report will result in frequent leaks and consequential maintenance costs. In coordination with other recommended plumbing upgrades, replacement of the water and process piping is recommended. During demolition, areas affected by hazardous materials will be encountered. Remediation costs are included.

Drain piping throughout the facility is threaded galvanized and cast-iron pipe for normal wastes. Laboratory waste piping consists of acid resistant plastic and Pyrex glass piping. Most of the drain piping is original. Failure to replace the drain piping within the scope of this report will result in frequent leaks and increasing maintenance costs. There is one duplex sewage ejector system in the lower level. This system has been restored, but maintains some original components. It is suitable for additional service.

In coordination with other recommended plumbing upgrades, replacement of the acid and normal waste drain piping is recommended. It was reported that mercury and other hazardous material residues are present in the existing drain lines. Remediation costs are included for this project.

The base fixtures in the restrooms appear to be original to the 1965 construction. Fixtures are outdated and showing considerable signs of wear. The components and valves on these fixtures are also dated and in need of replacement. New water closets and urinals consume approximately one-half the amount of water as the older vintage fixtures. It is recommended that all plumbing fixtures that are original to the 1965 construction be replaced with new fixtures that meet all applicable ADA regulations. It is also recommended that hands-free faucets and automatic flush valves be installed for their sanitary benefits and water saving features.

WORK COMPLETED SINCE LAST INSPECTION

• Backflow preventer was on-site and assembled, yet not yet installed. This work is consideredcomplete from the perspective of future budget needs.

• Fire rating compromises have been upgraded.

PENNSTATE

Eberly College of Science

Whitmore Lab

First Floor Undergraduate Chemistry Lab Renewals

Facilities Resources and Planning
1/4/2011
Rev: 9/21/2011

Background

Whitmore Lab was constructed in 1953. Its use has not materially changed since its construction, being used for Chemistry Labs for introductory undergraduate studies and advanced studies. Introductory undergraduate labs are located on the First Floor, consisting of seven labs of 24 stations and one lab with thirty stations. Approximately 1200 undergraduates from nearly all Colleges at the University are taught in these spaces during the school year. To support these undergraduate labs are an instrument lab, one student project lab and one supplies room.

The facilities have not been updated since19?? and show the wear and tear of intense use. Ventilation is a problem as is general HVAC function. The existing labs no longer meet the teaching requirements for undergraduate education. Presently, all instrumentation activities take place in one room that is shared by all lab classes. This places a tremendous pressure on students to complete their required work in a limited time-frame. Additionally, under-hood work is extremely limited as only two hoods are available; they are remotely located and in great demand. The one student project room must do double duty as it contains one of the two fume hoods. Students cannot set up projects and leave them in the hoods for maturation because of the general labs need. Labs require support spaces that are readily available by the associated labs.

Programmatic Needs

The Department requires eight undergraduate labs holding twenty-four (24) stations in order to satisfy the scheduling needs of the University.

Basic chemistry lab education has changed, needing less apparatus to perform experiments but needing more instrumentation-focused and under-hood experience than it previously did. This has led to the problems the Department currently experienced. To alleviate the problem, a reorganization of the labs is recommended along with the creation of shared instrument labs and additional student project rooms. Two layouts have been studied to achieve the goals and are attached. Lab furniture should be sit-down tables with limited fixture storage, similar to the new Biology labs created in North Frear. However, the chemistry department would propose low-height tables (30 inches) and standard-height seating, as opposed to 36 inch high in combination with lab stools. A central utility chase with seating-height reachable shelving would be the desired set-up. Each lab also needs a chemical storage cabinet.

Building Improvements

Besides the functional needs of Chemistry, there are also functional problems with existing building systems and the presence of hazardous materials that should be addressed along with any major renovation of the labs. A complete renewal of the First Floor is warranted to improve the educational value and experience for the University's undergraduate students. Essentially, a complete gut of the lab portion of the First Floor should be accomplished, with a full upgrade of systems to meet the needs of the educational mission and the University's energy savings goals. This would include replacement of windows, lighting, steam heating, and the addition of chilled water cooling, insulation (where feasible), energy-saving fume hoods and heat recovery systems. The existing asbestos tile flooring should be completely replaced with appropriate lab flooring (such as epoxy flooring) and corridor floors using high traffic flooring. Transite access panels in the corridor also need to be replaced.

Other Considerations

Chemistry must still be able to offer labs during any renovation activity. They can function at a reduced level if four labs remain in service at all times. Ideally, renovation of one side would be accomplished, then the other. Corridor renovations could be scheduled during down times as the project progresses. Temporary services may be required and tie-in to existing services on other floors will also have to be considered.

A family (uni-sex) restroom should also be created to provide handicapped accessibility facilities that can be used by families and others.

Projected total cost could run as high as $9 million, depending on a full assessment of the building systems and the effort required to maintain existing services during and after construction.

Department Comments regarding Whitmore facilities

Facility Items of Concern for the General Chemistry Labs in Whitmore Laboratory

1. Air Bonnets in the General Chemistry Labs-

   The air bonnets in the general chemistry instructional labs do not have adequate air pull and provide poor ventilation and removal of chemical fumes. In order for the bonnets to vent any fumes, the students have to be directly up against them. The lack of ventilation limits us in the types of experiments we can run in these rooms.

   We have had OPP come in and look at the air handling systems on them. They have made some adjustments to them because they found improperly sized belts and pulleys them. The bonnets in room 106 have been more problematic. They perform more poorly than the bonnets in the seven other classrooms. It seems that no matter what adjustments they make to the system, they cannot bring them up to the same performance level of the other rooms.

   Larry Johns, who takes care of facility issues for the Chemistry building, went through the labs and looked at the bonnets. We noticed that there was a lot of dust and dirt in the vent system for the bonnets. He indicated that there were procedures for cleaning this out and it may help the performance of the bonnets. Ideally, it would be nice if the bonnets were replaced with an updated system or with hoods.

2. Lack of Temperature Control in the General Chemistry Classrooms-

   There is a lack of temperature control in the first floor labs. Steam pipes run under the rooms on the left side of the hall. It is extremely hot in those rooms all year around. All of the rooms are very hot during the late spring, summer, and early Fall sessions due to lack of air conditioning in the rooms.

   The lack of temperature control greatly impacts the students. It impacts their learning because they have difficulty focusing on their experiments when it is extremely hot because they are uncomfortable. It also impacts their health. We have had a number of students pass out due to the heat. On average, 3 to 4 students pass out each semester.

3. Lack of Support to Install Air Conditioning in 104 Whitmore-

   We acquired an air conditioning unit and the duct work from the Frear Building when it was renovated. It is presently sitting in the basement of Whitmore waiting to be installed into 104 Whitmore. We have been unable to obtain funds to have it installed.

   104 Whitmore Lab is the instrument room for the general chemistry labs and it is also used as a prep area by the laboratory prep staff. It is extremely hot in the summer time and cold in the winter time. This makes it difficult to stabilize the

instruments so they may be used in student labs. It also creates an uncomfortable work environment for the laboratory prep staff.

4. Balance Tables-

The balance tables in the general chemistry labs are not as sturdy as they should be. They bow and move if a student happens to lean on them. This affects the accuracy of the balance readings which directly affects the student's results.

5. Update the General Chemistry Instrument Room-

The general chemistry instrument room (104 Whitmore) is in need of an update. This used to be the chemistry stockroom area. Currently, it contains tables that were made from scrap materials from shelving. People often get splinters in their clothes or hands if they brush against the tables. The walls are dirty, the floor tile is cracked and worn and the duct work is exposed in the ceiling. We would like to have the walls painted, the floor tile replaced, a drop ceiling installed and lab benches or tables installed in this room

6. Update the Lobby, Cubicle and Hallway Areas-

These areas are worn, dark and dated looking. Students use the lobby area to meet with teaching assistants and to study and work on lab reports. This one of the floors we use to hold the student poster session at the end of each semester. We also have many potential students and parents pass through this during the spring and summer months. We would like this area to be made more inviting. Brighter lighting, painting the halls and new furniture would help to achieve this in these areas.

Whitmore Lab

Basic program objectives defined by Facilities Resources and Planning:

1. Eight undergraduate class labs to hold 24 students per lab
    a. Each lab shall have two 6-foot fume hoods, with one lab having ductwork with a higher level of protection.
    b. Point exhaust is desired at each station.
    c. All cabinetry shall be replaced
    d. Student work stations shall be 4'-6" wide x 2'-0" deep x 34" high. They shall be roll-under tables, similar to those used in Biology labs in North Frear. Each work station shall have a slide-in drawer unit for storing small lab utensils and supplies. There shall be one handicapped accessible bench in each lab. All seating shall be standard height, similar to N. Frear seating. See schematic layout of basic lab configuration, attached.
    e. One instructor's station shall be provided in each lab.
    f. Wall-mounted cabinetry shall be provided.
    g. The center sections shall remain visually open so students can see TV monitors/projector screens.
    h. Each lab shall have at least one TV monitor (possibly 2 strategically placed), a mounted overhead digital projector and screen. These shall be connected via network to a central server system to allow for simultaneous presentations to all labs. There shall also be an overhead camera at each instructor's workstation that will allow for individual class viewing or simultaneous broadcasts to all labs.
    i. Labs shall be able to be blacked out for screen viewing.
    j. Where possible, provide student storage of personal items such as, coats and backpacks. These can be open shelving. Lockers are not preferred.
2. A separate Instrumentation Lab shall be provided for every two Class Labs
    a. Labs shall be directly connected to adjacent Class Lab and shared between the labs.
    b. The space shall be flexible enough to allow instructors to arrange instruments required for specific experiments to be set up and others stored.
    c. The lab will use computers; network interconnectivity is required.
    d. No fume hoods are required.
3. Student Project Room
    a. Two Student Project rooms shall be provided
    b. Each Project room shall have two 6-foot fume hoods
    c. Ample worktop space shall be provided
    d. Card-swipe access control

4. General Instruments Room
    a. The Instruments Room is a dedicated lab space that houses all the instruments that cannot be readily moved to the other individual Instrument Labs due to size, weight or number of units available. Individual classes will be scheduled to use the lab on a rotating basis.
    b. The lab will be equipped with sit-down seating and moveable work benches to accommodate 24 students. One station shall be handicapped accessible.
    c. Instrument storage cabinets shall be provided.
5. Class/Lab Services Room
    a. This space will house a certain amount of chemicals needed for the lab experiments. Shelving shall be provided as needed. The
6. Support Office
    a. A support office is required to be maintained. This space is currently located in the Lobby of the building. It is enclosed and secured.
    b. Students routinely contact the staff located in the office; visibility is important.
    c. Standard office utilities are required.
7. Replacement Office
    a. This space is required to accommodate employees in existing office 109.
    b. Standard services to accommodate the staff shall be provided.
8. Uni-sex Restroom
    a. Whitmore was designed with raised end sections to the building that house offices and restrooms. While an accessibility strategy needs to be developed for these four areas, a separate, uni-sex family-style restroom is proposed as part of the renovation. This would be on the same floor level as the lab spaces.
9. Lobby
    a. Restore the finishes in the Lobby and improve the entry vestibule.
    b. Replace Lobby furniture with appropriate seating/informal study furniture.
    c. WiFi capability
10. Corridor
    a. Restore the finishes in the corridor
    b. Replace the asbestos-containing access panels with new, code-acceptable access panels.
    c. Improve the appearance of the corridor accessories to be design-coordinated with the building's motif.

11. General requirements

    a. Doors into Class Labs, Student Project Rooms, Class/Lab Support Room, and the General Instrument Lab shall be handicapped accessible and at least a 5'-0" wide overall opening to move equipment and supplies.

    b. Class Labs will still need to be conducted while renovations are in progress. Chemistry instructors noted they can operate on a schedule similar to the University of Iowa's lab structure. This would allow four labs to be taken off-line at a time. This is not a permanent instructional model they wish to employ at Penn State, but they can make do during the remodeling.

    c. Sound isolation between spaces (consider 6-inch CMU for walls as is presently)

Assessment of Options

In both options created, a standard Class Lab module width was developed to meet the base need of the Class Lab as defined above. This lead to the determination that a 23-foot wide lab would accommodate the necessary furniture and lab hoods, while providing adequate circulation space. The existing building dimensions lend very well to the 23-foot module. Where possible, existing walls and door openings were kept intact. Breaches through the utilities chases will be required and will likely require relocation of existing utilities. The addition of fume hoods will present challenges regarding the best locations and configurations to run exhaust ductwork. For this exercise, it was assumed that ductwork could be installed within the utilities chases to vent through the roof.

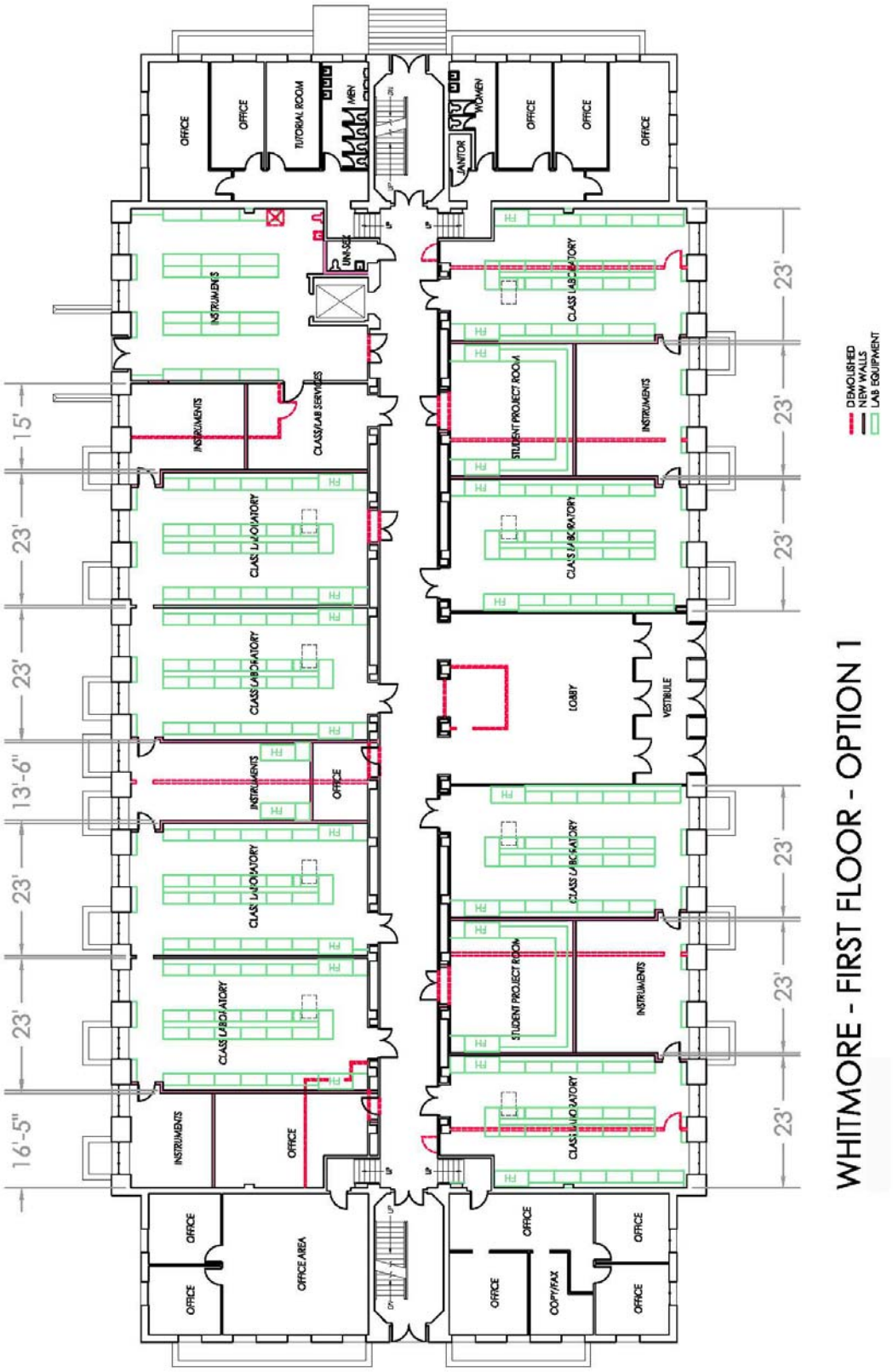
OPTION 1:

1. The driving design consideration for this option was the removal of the office in the Lobby. This will allow a larger gathering space for students and a nicer entrance to the building. The office cubicle does not appear to be original to the building.
2. The Support Office relocation is ideally to be near the center of the building. This caused a compromise to the layout of Instrument Lab space on the east side.

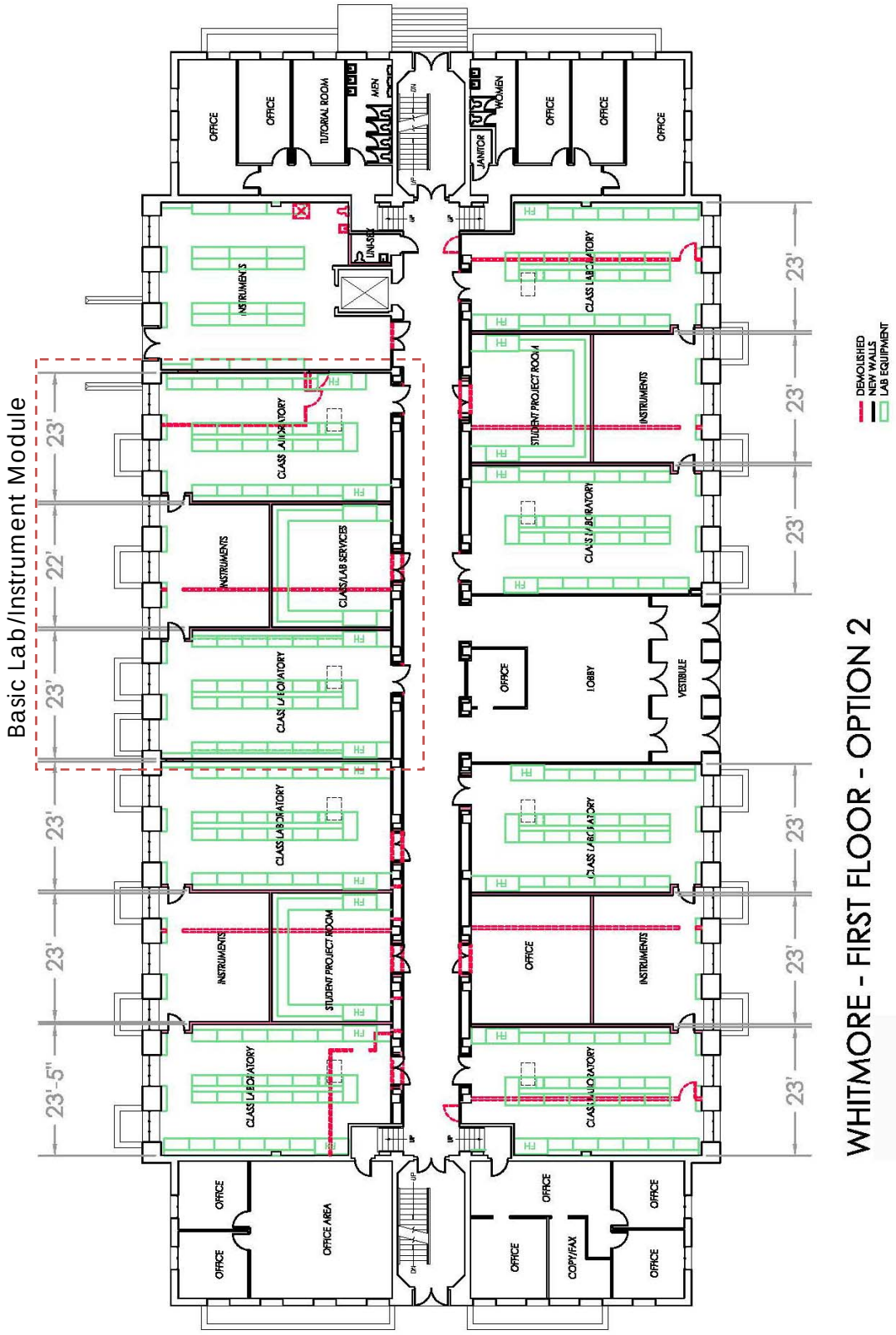
OPTION 2:

1. This layout retains the Support Office in its current location. The office should be redesigned to be more transparent, while keeping with the architectural motif.
2. The east side is laid out using the 23-foot width module. This layout works much better than Option 1 in this regard. Instrument Lab spaces can be sandwiched between the two adjoining Class Labs.
3. Another advantage is the creation of an additional space similar in size to the proposed Student Project Rooms whose proposed use would be to house the Relocated Office 109. If this space is eventually vacated, it could become another Student Projects Room or used for other Chemistry functional needs.

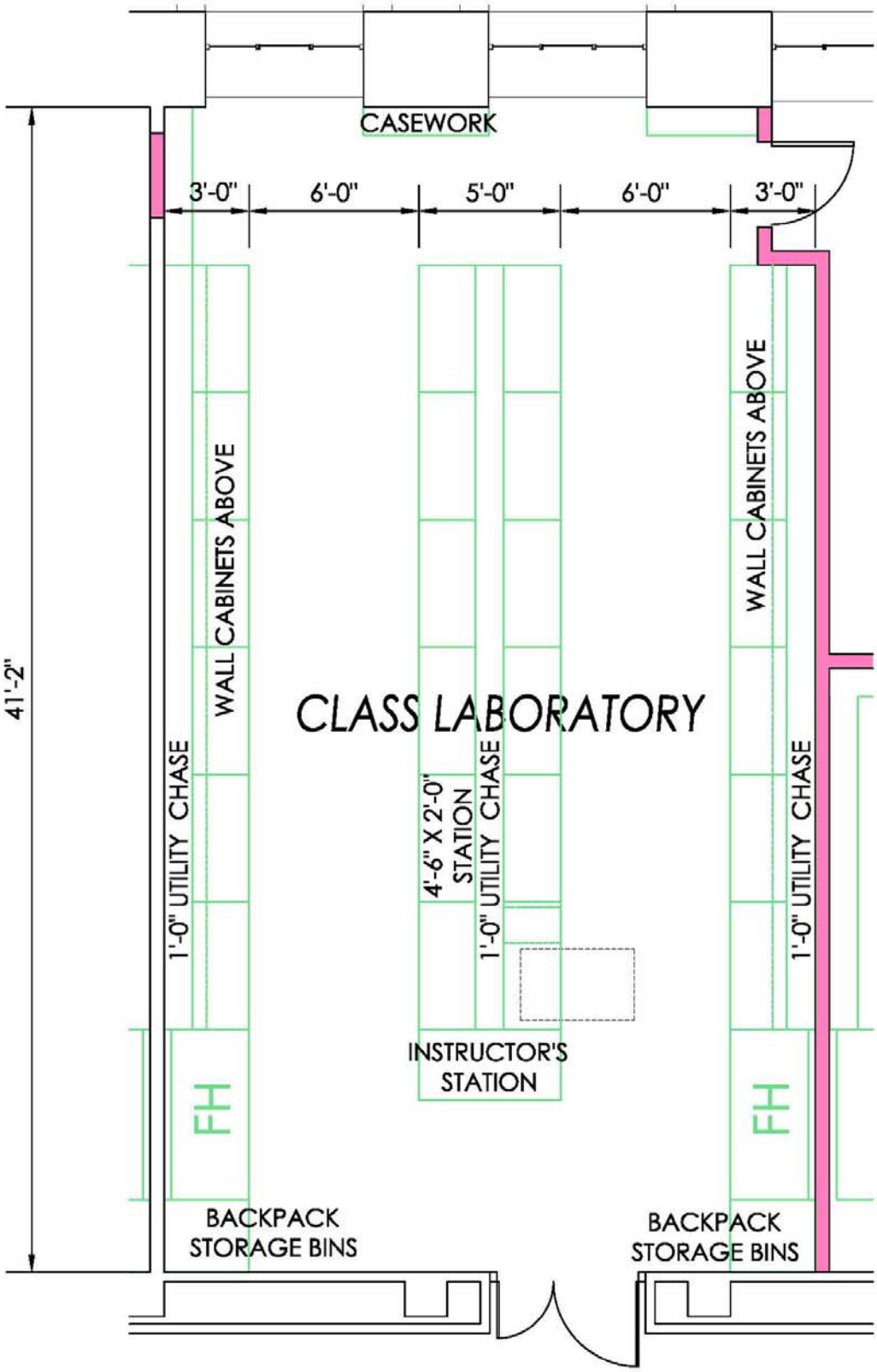
OPTION 1


WHITMORE - FIRST FLOOR - OPTION 1
DEMOLISHED
NEW WALLS
LAB EQUIPMENT
OFFICE
TUTORIAL ROOM
MEN
WOMEN
JANITOR
INSTRUMENTS
CLASS/LAB SERVICES
CLASS LABORATORY
STUDENT PROJECT ROOM
LOBBY
VESTIBULE
OFFICE AREA
COPY/FAX
16'-5"
13'-6"
15'
23'

OPTION 2


WHITMORE - FIRST FLOOR - OPTION 2
Basic Lab/Instrument Module
DEMOLISHED
NEW WALLS
LAB EQUIPMENT
OFFICE
TUTORIAL ROOM
MEN
WOMEN
JANITOR
UNISEX
INSTRUMENTS
CLASS LABORATORY
STUDENT PROJECT ROOM
CLASS/LAB SERVICES
LOBBY
VESTIBULE
OFFICE AREA
COPY/FAX
23'
22'
23'-5"

General Class Lab Layout



PENNSTATE

Office of Physical Plant
Energy and Engineering Division
Engineering Services

The Pennsylvania State University
Physical Plant Building
University Park, PA 16802-1118

INFRASTRUCTURE SCOPING DOCUMENT
MUELLER LAB RENOVATION

This memo describes the building system requirements to support the Laboratory renovations to the Mueller building at the University Park Campus.

GENERAL

All aspects of the design must conform to the University's Design Standards, which can be found on the OPP website below.
http://www.opp.psu.edu/planning-construction/design_and_construction_standards/standards-and-forms

The Design Professional team shall coordinate efforts in an iterative process to apply holistic, sustainable design principles to the renovated spaces. The design shall meet the architectural functional and aesthetic objectives, help achieve comfortable and pleasing indoor environmental conditions with effective combined use of passive elements, and be purposefully integrated with the HVAC and lighting systems so that all work effectively together to minimize dependence on non-renewable energy use and associated owning and operating costs for the life of the building.

Design for Completeness:

All projects are expected to be complete at their conclusion, meaning that the project generates no need for additional efforts beyond the planned scope. Above all, the campus maintenance staff is not available to complete projects or provide remedies to problems caused by the project.

Energy Conservation:

The University's overall energy performance objective is that all facilities shall achieve a minimum of at least 30% energy savings over the latest version of the ASHRAE 90.1 standard as defined in 01 81 13 Sustainable Design Requirements. The Design Professional shall strive to obtain that result by combining innovative design along with implementing the latest version of ASHRAE Standard 189.1 Standard for the Design of High-Performance Green Buildings. For a partial renovation of a facility, the Professional shall submit a report with quantitative analysis including simplified energy simulation calculations to document how the proposed design contributes toward meeting that goal.

Other Design Resources:

Whole Building Design Guide – Academic Laboratories
http://www.wbdg.org/design/academic_lab.php

The following OPP Engineering Services Resources page lists useful links and references for additional generally recognized, industry-wide design guidance: http://www.opp.psu.edu/about-opp/divisions/ee/engineering/eng-resources/bldg-mech

BUILDING THERMAL ENVELOPE

The consultant shall determine the approximate existing building envelope thermal performance values with respect to energy use and thermal comfort criteria in ASHRAE 55 Thermal Environmental Conditions for Human Occupancy, Section 5.2 Method for Determining Acceptable Thermal Conditions in Occupied Spaces. Perform calculations and analysis for representative spaces.

Envelope upgrade options shall be evaluated further and recommendations made based on a life cycle cost analysis if the existing values are determined to be significantly lower than the prescriptive values in the latest version of ASHRAE Standard 189.1. Notify the Project Manager if comfort criteria cannot be met due to impact of poor thermal envelope.

FIRE / LIFE SAFETY

According to the 2008 Facility Condition Analysis Report, fire-rated separations had not been maintained according to code requirements for new construction in significant areas of this facility. However, corrections to Mueller were reported to be completed under a more recent DGS Fire Stopping Project (Rachel Prinkey – Project Manager).

The Design Professional shall incorporate design details and construction information in the project documents to ensure that all penetrations through required fire-rated separations (whether due to existing conditions, demolition or new work) shall be properly sealed in accordance with industry standards.

21 00 00 FIRE SUPPRESSION

This research lab structure and animal resource facility has no fire suppression. It is recommended by the NFPA that facilities of this type, use, and size be sprinkled throughout, and that sprinkling systems be fully supervised by a fire alarm system. Properly installed and maintained sprinkler systems are proven life safety systems and would greatly reduce the fire loss potential.

Therefore a combined automatic fire suppression system should be installed throughout the building for the protection of the building and its occupants as part of this work. The fire suppression system shall include piping, sprinkler heads (as required by code), pipe bracing, and supervising and alarm devices, as needed. The systems shall be designed and installed in accordance with FM Global Design Standards and the appropriate National Fire Protection Association (NFPA) Standard. The standpipe hose connections shall be 2 ½" hose valves with threaded 2 ½" to 1 ½" reducers. All hose connections shall be provided with National Standard

Hose Thread. A new backflow preventer shall be provided for the new sprinkler system on the combined water service.

Coordinate this work with other major HVAC, piping, interior ceiling, and wall finish upgrades to help reduce overall costs and the duplication of work efforts.

22 00 00 PLUMBING

This facility includes piping for domestic water, distilled water, natural gas, compressed air, and other specialty systems. Water supply piping is mostly copper and original. Laboratory process fluids piping is mostly threaded pipe and original. Shutoff valves and gas cocks are uniformly worn. Failure to replace the water and process piping will result in frequent leaks and consequential maintenance costs. In coordination with other recommended plumbing upgrades, all water and process piping in the project areas and all building mains shall be replaced. During demolition, areas affected by hazardous materials will be encountered.

Drain piping throughout the facility is threaded galvanized and cast-iron pipe for normal wastes. Laboratory waste piping consists of acid resistant plastic and Pyrex glass piping. Most of the drain piping is original. Failure to replace the drain piping will result in frequent leaks and increasing maintenance costs. There is one duplex sewage ejector system in the lower level. This system has been restored, but maintains some original components. It is suitable for additional service.

In coordination with other recommended plumbing upgrades, replacement of the acid and normal waste drain piping in the project area and the main building stacks and drains is required. It was reported that mercury and other hazardous material residues are present in the existing drain lines. Coordinate abatement and remediation of all hazardous material in accordance with EH&S requirements. Refer to Division 02 of the Design & Construction Standards.

The base fixtures in the restrooms appear to be original to the 1965 construction. Fixtures are outdated and showing considerable signs of wear. The components and valves on these fixtures are also dated and in need of replacement. New water closets and urinals consume approximately one-half the amount of water as the older vintage fixtures. All existing plumbing fixtures within the project extents shall be replaced with new fixtures that meet all applicable ADA regulations, ASHRAE 189.1 prescriptive requirements for Water Use Efficiency, and the University design standards. Plumbing fixtures shall be low consumption type. Urinals shall be pint flush. Women's water closets shall be dual flush type. It is also recommended that hands-free faucets and automatic flush valves be installed for their sanitary benefits and water saving features.

This facility is equipped with eyewash showers and emergency fountains, but there are not enough in some areas to provide a high margin of safety. In addition, some of the existing units are timeworn, and some of the eyewashes are low-grade, portable units. Remove the existing worn or low-grade showers and eyewashes. Install new emergency showers and eyewash fountains in all areas where related hazards exist. These should be permanent fixtures, connected to the building's water supply network, and provided with drains. They need to be

clearly identified and located in unobstructed areas for easy access. Coordinate “tepid” water requirements with OPP / Project Manager.

Perform a need assessment for all special plumbing systems required for the program and processes in the building (such as emergency fixtures, lab gases, lab waste, and different types of lab processed water systems) with technical representatives of the research staff and review with OPP. Where laboratory processed water distribution systems are required, select the most appropriate equipment, with the lowest operating and maintenance life cycle costs, to meet the project requirements. Generally speaking, very specialized high purity water system equipment for very limited use is often the responsibility of the user rather than installed and maintained by OPP. The project specifics shall be determined as part of the need assessment.

> Note: It has been reported there is a steam still in the basement providing distilled water up to the 4th floor and a Reverse Osmosis unit providing RO water to 5th and 6th. This has not been verified in the field. Details of capacity, condition, areas served, and whether suitable for the actual new program requirements should be confirmed by the Design Professional.

Domestic water must not be used to provide process cooling in a ‘once-through’ manner. If there is a need for process cooling, it shall be provided by a dedicated recirculating process cooling system.

23 00 00 HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

Overview of existing systems

Mueller Laboratory is served by the University's high and low pressure steam loops. A 6” campus low pressure steam main serves the space heating loads and domestic hot water loads. Minimum steam pressure at the connection to the building is approximately 5 psi. A 2” high pressure line passes through a pressure reducing station in the main mechanical room in the basement to provide medium pressure steam for lab processes. That medium pressure source was later tapped on an upper level in the building to serve an added makeup air unit on the roof that provides makeup air to floors 5 and 6. A project is currently underway (Ron Gurskey – Project Manager) to correct a steam supply deficiency to that unit, which is likely to involve increasing the pipe size serving the unit and possibly replacing the pressure reducing station in the basement as an interim remedy. Also, another project is currently underway (Jeff Spackman – Project Manager) to install (2) central heating heat exchangers (1) duty, (1) standby with capacity of 300 gpm from 180 to 200 deg. F and (2) main hot water pumps at 360 gpm, 65.9‘ head each. Closed loop water quality has been reported to be poor.

Chilled water is currently supplied by a 400 ton, 2003 vintage, air-cooled package chiller on the roof, with a glycol loop serving make-up air units and to a heat exchanger for regular (non-glycol) chilled water to serve space conditioning terminal units throughout the rest of the building. A small chiller that used to serve the animal facility was recently removed due to equipment failure. The associated animal facility air handler was recently replaced and has now that its chiller has been removed, has been reconnected to main building chilled water loop (non-glycol) and provisions were made for temporary backup chiller as needed. Closed loop water quality has been reported to be poor.

Ventilation air distribution is accomplished primarily with (2) makeup air units on the roof (1) with air to air heat recovery serving floors 1-4 and another without heat recovery serving 5 and 6. There is also a small multizone makeup air unit serving the animal rooms on the ground floor. An air handling unit in the ground floor mechanical room also serves some spaces on the ground and 1st floor.

Space comfort heating and cooling air conditioning is accomplished with perimeter finned tube on floors 1-4 and terminal recirculating fan-coil type units in most zones. FCU's and FTR are in poor condition and Area Supervisor has been requesting projects to replace valves. FCU strainers are hard to access and consequently proper cleaning has been deferred.

With the exception of the more recent heating and cooling plant modifications and upgrades, the HVAC system has been in continuous service since original installations. Despite recent fume hood system improvements, controls upgrades, and some pump replacements, the system remains a poor design, particularly for a science lab facility. Corridor doors are louvered to return supplied air through door louvers and exhaust the air at the hood faces. This design is antiquated by modern lab design standards, and many system components are quite old and operating under capacity.

Lab fume hoods have been upgraded over time and the rooftop exhaust fans include some heat recovery and similar modern features. Generally, these systems have some remaining life that should be evaluated before replacement.

Mechanical Major Maintenance Initiatives:
A project is currently underway to evaluate and correct some existing HVAC systems to improve operation and reduce energy use. The Project Manager is Sam Bertolino. These initiatives include:

- Chemical treatment / Closed loop water quality
- AHU valve replacement
- Zone Valve replacement
- Fan VFDs.
- Pump VFDs
- Outdoor Air and Economizer Air handler control
- Exhaust Fan Control

New HVAC Work

General

Most of the building's existing HVAC equipment is beyond its expected service life and/or will not be adaptable for re-use. In general, this facility should include a complete HVAC redesign and replacement so that science labs that are prohibited by current codes from recirculating air can be done properly, pressure relationships can be properly maintained, and heat and cooling energy can be recovered. The anticipated scope would be to demolish and dispose of all outdated equipment, and install modern HVAC systems with new central system, non-circulating variable air volume VAV air distribution systems with air to air heat recovery for science lab spaces and recirculating VAV air distribution systems for non-lab spaces, as appropriate.

Equipment Selection: Design Professional shall carefully evaluate and properly select the most effective equipment type and to best suit the needs of the application with emphasis on minimizing operating and life cycle cost, rather than minimizing size and first cost.

Part Load Operation: Carefully evaluate system turndown requirements. Consider modular, multiple unit configurations where effective and practical for proper and efficient low part load operation and to help prevent complete system or building shutdown upon failure of a single primary HVAC system component.

Primary and Terminal Equipment Zoning: The simplest and most effective method of energy conservation is to turn things off when not in use. To this end, zones with similar uses, environmental conditions, fresh air ventilation rates and occupancy schedules should be grouped together, to the extent possible, on the same HVAC system, to accommodate unoccupied shutdown. In general, general offices should be grouped together, but separate from classrooms and both should be separate from lab/research zones requiring 24/7 operation and/or 100% outside air.

Space Planning: Comply with requirements in 01 05 05 Space Planning. Coordinate generous space programming allowance for equipment and shaft space for M/P/E distribution systems, including future flexibility for future expansion.

Heating Plant

Perform a capacity analysis of existing plant with respect to anticipated new loads and indicate any required upgrades to steam service and hydronic heating plant. See Div 33 Utilities. If replacement or upgrades are required with respect to the new system just now going in, they shall be based on variable flow pumping system with adequate redundancy for research application. The project shall ensure that the incoming steam service(s) are equipped with steam meter(s) to report flow, pressure, temperature, and total usage; refer to the 'Energy Metering' section below. All steam condensate shall be returned to the campus steam plant. Condensate return pumps shall preferably be pressure powered type, using compressed air from the campus system. Any new heating control valves shall be 2-way, modulating.

Cooling Plant

Although the building is currently cooled by an existing chiller, there are plans to connect to campus chilled water in the future. See Div 33 Utilities.

In general, Direct Expansion (DX) cooling systems will not be accepted on this project unless approved by the Office of Physical Plant, Engineering Services.

Building chilled water pumps shall include variable frequency drives (VFD's) to reduce pumping energy during periods of low cooling loads. Any new chilled water control valves shall be 2-way, modulating.

If any spaces in the building are critical enough to require redundant cooling sources, the back-up cooling system shall be closely coordinated with the University and approved by the Office of Physical Plant, Engineering Services during the building design.

Equipment and processes must not utilize domestic water in a 'once-through' cooling manner. Mechanical process cooling systems must be provided to serve any process load.

Ventilation

General: All occupied areas shall be provided with mechanical ventilation to meet the current building code and ASHRAE Standard 62.1, including those spaces with operable windows. Design mechanical ventilation quantities shall not be reduced by the presence of operable windows. Demand based ventilation control strategies shall be used to vary outside air quantity to maintain allowable CO2 or VOC levels.

Other ventilation and pressure relationship requirements shall comply with the most current edition of the International Mechanical Code and ASHRAE Applications and as further defined by the project specific User Requirements.

Below are the references prohibiting recirculation of air in "science labs" in the 2009 International Mechanical Code.

> International Mechanical Code, 2009
> SECTION 403
> MECHANICAL VENTILATION
> **403.2.1 Recirculation of air.** The outdoor air required by Section 403.3 shall not be recirculated. Air in excess of that required by Section 403.3 shall not be prohibited from being recirculated as a component of supply air to building spaces, except that:
> 1. Ventilation air shall not be recirculated from one *dwelling* to another or to dissimilar occupancies.
> 2. Supply air to a swimming pool and associated deck areas shall not be recirculated unless such air is dehumidified to maintain the relative humidity of the area at 60 percent or less. Air from this area shall not be recirculated to other spaces where more than 10 percent of the resulting supply airstream consists of air recirculated from these spaces.
> 3. Where mechanical exhaust is required by Note b in Table 403.3, recirculation of air from such spaces shall be prohibited. All air supplied to such spaces shall be exhausted, including any air in excess of that required by Table 403.3.
> 4. Where mechanical exhaust is required by Note g in Table 403.3, mechanical exhaust is required and recirculation is prohibited where more than 10 percent of the resulting supply airstream consists of air recirculated from these spaces.
>
> **TABLE 403.3**
> **MINIMUM VENTILATION RATES**
> OCCUPANCY CLASSIFICATION
> **Education**
> Science laboratories[g]
> g. Mechanical exhaust is required and recirculation is prohibited except that recirculation shall be permitted where the resulting supply airstream consists of not more than 10 percent air recirculated from these spaces (see Section 403.2.1, Items 2 and 4).

Based on previous projects and conversations with Bill Dreibelbis, EH&S considers any lab with a fume hood to be a science lab in this regard and are not to be recirculated and need to be kept negative with respect to adjacent spaces. Some other "labs" that have specialized scientific, electronic equipment or computers labs that do not include the use of hazardous gases or chemicals nor include fume hoods may not have to comply with the prohibition against

recirculation. It is recommended going forward that those types of clean, low-risk health hazard spaces should preferably be named something else to avoid confusion with regard to these ventilation requirements.

Since the existing facility has recirculating fan-coil units serving lab areas, for any renovation in this facility that involves upgrading science labs, and thus needing to meet current building codes and laboratory standards, a complete system redesign is anticipated.

General Laboratory Ventilation:

Laboratory Ventilation systems shall comply with current edition of **ANSI/AIHA Standard Z9.5.**
The purpose of this standard is to establish minimum requirements and best practices for laboratory ventilation systems to protect personnel from overexposure to harmful or potentially harmful airborne contaminants generated within the laboratory.

Refer to **2007 ASHRAE Handbook—HVAC Applications, Chapter 6 – Education Facilities and Chapter 14 - Laboratories.**

Perform **Hazard Assessment** and establish **Design Parameters** for the project specific program for **Teaching Laboratories** / **Clinical Laboratories**. One key determination that needs to be made is whether any or all of the teaching labs will be required to operate in 100% outside air mode, and if so whether part-time or full-time.

> It is important to (1) review design parameters with the safety officers and scientific staff, (2) determine limits that should not be exceeded, and (3) establish the desirable operating conditions. For areas requiring variable temperature or humidity, these parameters must be carefully reviewed with the users to establish a clear understanding of expected operating conditions and system performance.
> Because laboratory HVAC systems often incorporate 100% outside air systems, the selection of design parameters has a substantial effect on capacity, first cost, and operating costs. The selection of proper and prudent design conditions is very important.
> **2007 ASHRAE Handbook—HVAC Applications, p. 14.2**

Determine ventilation/makeup system requirements and design associated energy saving equipment and controls to minimize energy consumption while maintaining occupant safety. Options could include:

- automated indoor air quality sensing and demand based ventilation control such as Aircuity (to sense odors related to biology procedures),
- manual switches that enable spaces to be operated at low/high ventilation rate for a user selectable time period.
- Air-to-air heat recovery.

Anatomy Lab Ventilation:

A prior program description from the Biology Department for a proposed project at Thomas Building indicated adequate ventilation requirements for laboratory specimen dissection.

[These details shall be confirmed with the OPP Project Manager and the Biology Department for the current program in Mueller.]

Anatomy Teaching Lab 1 (from **Detailed Space Descriptions - Biology Spaces**)

"Chemical odor from the specimen preservatives used in the anatomy classrooms spreading out into the hallway has been a recurring problem for the anatomy teaching labs currently in Mueller. With the addition of human cadaver specimens into one of the anatomy teaching labs, ventilation in these rooms needs to be very good.

The Human Anatomy and Physiology Society's recommendation for a cadaver based teaching laboratory is 18-20* room air changes per hour with the intake vents at floor level to move fumes away from the students' breathing area."

*Note (OPP – Engineering Services): There have been further discussions since this was initially defined. As a result, consensus was reached that the design criteria of **12 air changes per hour** is sufficient in lieu of the 18-20. This is in accordance with the rate recommended by ASHRAE for Autopsy labs and by Department of Veterans Affairs - *HVAC REQUIREMENTS* IN *AUTOPSY SUITE* - www.cfm.va.gov/til/techSumm/tSumAut.doc.

Also adapted from the document above, the following additional HVAC requirements for Autopsy Suites shall apply:

- Maintain negative pressure at all times in all anatomy lab spaces.
- Provide a dedicated, non-recirculating air system to the anatomy labs. It shall be completely separate from any air handling unit that recirculates air to and from other general, classroom and non-lab spaces. This is required in order to prevent accidental recirculation of anatomy lab odors due to potential malfunction of return/exhaust mode and pressurization control dampers. The dedicated system shall be capable of operating in 100% outside air makeup and full exhaust mode with the 12 ach/hr rate while dissections are being performed in either anatomy lab. It shall also be capable of reduced airflow rates yet maintaining negative pressure within each anatomy lab when spaces are unoccupied and dissections are not actively occurring in either anatomy lab.
- Provide an operating interlock between supply and exhaust fans.
- Provide a dedicated exhaust system for anatomy lab for purposes of independent control of anatomy labs, separated from rest of general or other lab exhaust. Locate fan at or near the roof and discharge at the highest point of the building. Discharge air through a minimum 7 feet high stack with a terminal velocity of 4000 fpm.
- Provide pressure-independent, air flow tracking control valves in the supply, return and exhaust air to each anatomy lab for independent control of operational modes.
- Exhaust from anatomy labs with dissection of preserved specimens is odorous but not hazardous nor infectious. The prohibition against energy recovery from exhaust air for autopsy labs therefore does not apply. Therefore energy recovery is recommended in accordance with the prescriptive requirements in ASHRAE 189.1.

- Coordinate location of exhaust with downdraft tables. Review industry best practices to confirm whether additional exhaust room air near each dissection table by placing two wall registers about 178 mm (7 inches) above finished floor is required for this anatomy lab application.

See additional comments below (in italics) from Biology Department Lab Coordinator, John R. Waters, Ph.D., Ph: 814-863-1154, johnwaters@psu.edu

- *The high ventilation suggested in the HAPS guideline is to clear formalin that may gas off the specimens and general control of odor. Since cadavers would be preserved, the risk of pathogens being spread via air or direct contact is small to none. Therefore based on my conversation with Curt Speaker in EHS, the dedicated exhaust systems, HEPA filtration, emergency power for autopsy exhaust fans, and exhaust air register placement that OPP Engineering Services mentions do not apply to human cadaver labs.*

- *There is no minimum humidity level necessary to work with preserved human cadavers. The tissue is already chemically preserved, and is regularly treated as needed with a wetting solution.*

Anatomy Teaching Lab 2 (from **Detailed Space Descriptions - Biology Spaces**)

"Chemical odor from the specimen preservatives used in the anatomy classrooms spreading out into the hallway has been a recurring problem for the anatomy teaching labs currently in Mueller. There will be NO human cadaver specimens in this room, but there will be smaller animal specimens, so ventilation in this room still needs to be very good." [Note: This definitely should be clarified with the Biology Department to see if still current.]

Air-to-Air Energy Recovery Equipment:

In general, apply energy recovery equipment in accordance with current edition of ASHRAE Standard 189.1 Standard for the Design of High-Performance Green Buildings. This supersedes the minimum requirements in International Energy Conservation Code/ASHRAE 90.1. The energy recovery system effectiveness required by Standard 189.1 is also more stringent than the current minimum building code requirements.

Do not apply rotary energy recovery wheels to systems with risk of cross leakage from contaminated air streams such as chemical lab fume hood exhaust or animal facilities. In those cases, use equipment with no potential for cross leakage.

Provisions shall be made to bypass or control the energy recovery system to permit air economizer operation as required elsewhere in the Standard 189.1.

Fume Hoods:

Shall have controls to operate exhaust and makeup air only when needed. Do not use hoods to store materials and then run 24/7.

Low Flow or Velocity Hoods At a 12" vertical sash height, the minimum face velocity should be 60 fpm.
Existing hoods should not be adapted to function as low flow hoods. Low flow/velocity hoods should be purchased as hoods designed for low flow operation.
Other considerations for fume hoods:

- Fume hoods should not be situated directly opposite occupied work stations
- Fume hoods should not be located within the laboratory to avoid cross currents at the fume hood face due to heated, cooling or ventilation supply or exhaust diffusers
- Note: The 2008 National Institutes of Health (NIH) Design Requirements Manual for Biomedical Laboratories and Animal Research Facilities (DRM), formerly called the NIH Design Policy and Guidelines, is the only detailed design requirements and guidance manual for biomedical research laboratory and animal research facilities in the U.S. Compliance to the DRM, which promulgates minimum performance design standards for NIH owned and leased new buildings and renovated facilities, ensures that those facilities will be of the highest quality to support Biomedical research. The DRM requirement that fume hood face velocity never falls below 80 feet per minute applied to buildings that are constructed using NIH funding, and also applied to NIH funded renovations if the entire building is gutted, or if more than 50% of the building is renovated.

Specialized exhaust systems (Hazardous, Research Lab Fume Hood, Smoke Control, etc.):

Apply variable air volume control wherever practical for optimal energy conservation – beyond code minimum prescriptive requirements.
Refer to Chapter 5 Exhaust Systems of International Mechanical Code for special requirements.
Comply with ANSI/AIHA Z9.5-(current) for Laboratory Ventilation systems.

Air Conditioning (General Requirements)

Air handlers shall have mixing and blending devices/sections and adequate length to prevent air stratification and nuisance tripping of freezestats. Economizer operation shall also be provided to allow the use of outside air for cooling. The air handling units must be located indoors. Indoor mechanical space will be needed to accommodate new air handlers, pumps, heat exchangers, and other equipment. Mechanical space must be incorporated into the building programming during the schematic design phase of the project. Adequate service space shall be provided around and within air handlers to allow for proper maintenance of the equipment. Refer to 23 70 00 CENTRAL HVAC EQUIPMENT for more detailed requirements.

Incorporate variable frequency drives (VFD) into the new HVAC design, as applicable. Any new variable frequency drives shall be specified to have a Bacnet interface supplied by the equipment manufacturer. Motors on VFD's shall include motor shaft grounding for motor bearing protection against damage due to electrical discharge fluting. See 26 29

23 Variable-Frequency Motor Controllers for VFD guide specification to be edited for project specific requirements.

New HVAC systems shall be quiet, economical and easy to operate and maintain. Variable flow fans and pump systems shall be used. Main ducts, piping mains, VAV terminals and other HVAC equipment requiring periodic maintenance shall be located to minimize disruption to normally occupied spaces. In addition, care shall be taken to prevent VAV terminals from being located above or near spaces where noise is of particular concern.

Designs that de-couple sensible and latent loads in order to minimize supply airflows (e.g. chilled beams) could be considered if their winter chilled water requirements are low enough and inoperable windows are acceptable.

Any new air terminal units shall be pressure independent type. Supply air terminals shall be provided with hot water heating coils for winter heating and summer reheat control. A dedicated VAV terminal and thermostat shall be provided for each space. Spaces shall not be "ganged together" on a single VAV terminal without prior approval from the Office of Physical Plant, Engineering Services. Hot water baseboard perimeter radiant heat shall be provided throughout the renovated building, and shall be zoned to match VAV box zoning. Each perimeter heat zone shall contain a dedicated control valve. Each VAV reheat coil shall contain a dedicated control valve. Use latest VAV TU reheat guideline sequence posted in Division 25. Use zone level demand based ventilation controls including occupancy sensors for "standby" mode and CO2 sensors in classroom spaces. VAV terminals shall be connected to light occupancy sensors where available for use in occupied/standby/unoccupied sequences.

Summer dehumidification shall be accomplished using methods that will minimize or eliminate the need for simultaneous heating and cooling. Winter humidification shall not be provided unless required to meet minimum requirements for research.

In general, decentralized convective heating and cooling terminal units such as fan coil units or unit ventilators shall not be considered for this project. Equipment that requires chilled water for cooling in the winter shall not be used, unless approved by the Office of Physical Plant, Engineering Services. Exception: Terminal units such as fan coil units (chilled water or DX) shall be strategically applied to unoccupied spaces with continuous sensible cooling requirements so that primary air handling equipment is not required to run during normal unoccupied periods.

Spaces such as server rooms or telecommunication equipment rooms shall have dedicated cooling equipment. Equipment selection shall be approved by the Office of Physical Plant, Engineering Services.

Specify DDC controls for the new equipment in accordance with Design Standards Div 25.

Other Coordination:

The Biology Department requested that renovations should include replacement of autoclaves in Mueller, and energy inefficient refrigerators, freezers and ice machines replaced in the

instructional labs. Currently no autoclave is present on the first floor, it is requested that an analysis of the space and utilities be made to determine if an autoclave could be installed on this floor. Autoclaves will also be required near the proposed 6th and 4th floor instructional labs.

Refrigerators, Freezers and Ice Machines: Recommending application of low pressure drop water cooled equipment if a process cooling loop is added to the building to support other process cooling needs.

Coordinate medium pressure steam supply to autoclaves.

SPECIAL MECHANICAL SYSTEMS

All special systems required for the programs and processes in the building shall be coordinated with University personnel. Special mechanical systems shall be reviewed with both the building Users and the Office of Physical Plant, Engineering Services.

25 00 00 INTEGRATED AUTOMATION (BUILDING AUTOMATION SYSTEM – BAS)

The existing building automation system (BAS) is a mixture of mostly Staefa Smart2 and some Automated Logic Corporation (ALC). A project is currently underway to upgrade controls to ALC on the primary makeup air / exhaust systems (confirm scope of project with Bob Mulhollem - Manager of Environmental Systems).

All new BAS work shall be direct digital control (DDC) and shall communicate at the building level using BACnet protocol. Automated Logic Corporation (ALC) control systems shall be used for all control work associated with this renovation. The new BAS shall be integrated into the existing University's Central Control System 'front-end' graphic user interface software. The University's standard BAS guide specification shall be used and edited as appropriate; no other BAS specification is acceptable. All third party equipment that is supplied with an on board controller, such as vfd's, etc shall be specified to have a Bacnet interface supplied by the equipment manufacturer. All aspects of the BAS shall be closely coordinated with the University and approved by the Office of Physical Plant, Engineering Services during the building design.

Provide controls to comply with the most current control sequence guidelines. Coordinate most current version with Office of Physical Plant, Engineering Services. Systems shall utilize control point reset optimization and continuous supervisory monitoring and diagnostic alarming strategies to reduce energy consumption:

The BAS shall provide interval trend data to the campus Enterprise Utility Management System (EUMS) via Bacnet communication. The Emergency and Demand Response Enterprise Utility Management System (EUMS) Equipment Control Strategies shall be extended to any new or reused HVAC equipment that is part of this renovation project.

26 00 00 ELECTRICAL

POWER

Limited "standby" power is available but must be approved by Engineering Services. "Emergency" power for egress lighting and exit signs does exist.

Normal power is available at 480V and 208V. Additional capacity is adequate at 480V, but may be limited at 208V.

LIGHTING

New luminaires shall be fluorescent or LED in color temperature of 4100K, with a CRI of 80+.

Utilize 48" linear T8 lamps, 28 watt "energy saving extra-long life" version. Ballasts shall be NEMA "premium" efficiency, parallel operation, program-rapid start. Ceiling height permitting, use pendant-mount direct/indirect luminaires for Labs, Offices, etc.

LED source shall be used for decorative and downlight fixtures. Luminaires shall have a minimum efficiency of 60 lumens/watt. Minimum L_{70} fixture life shall be 50,000 hours.

Provide stand-alone occupancy sensing for all spaces. Sensors to have HVAC output relay to allow for BAS monitoring for unoccupied HVAC setback.

Refer to Design and Construction Standards for further details.

27 00 00 COMMUNICATIONS

Refer to www.opp.psu.edu/planning-construction/design_and_construction_standards/division-27-communications#section-0

Also refer to the PSU TNS (Office of Telecommunications and Network Services) Minimum Standards for Telecommunications Facilities for requirements.

28 00 00 ELECTRONIC SAFETY AND SECURITY

Refer to www.opp.psu.edu/planning-construction/design_and_construction_standards/division-28-electronic-safety-and-security#section-0

Penn State requires security access control on all new and renovated buildings. Refer to Penn State's Policy SY 33 ELECTRONIC SECURITY AND ACCESS SYSTEMS and SECURITY ACCESS CONTROL SPECIFICATIONS. Contact Ed Gannon at ejg3@psu.edu for guidance on applying these to the project.

28 31 00 FIRE DETECTION AND ALARM

Any new work associated with this project shall conform to the University Standards.

University Park systems shall be compatible with, and able to report to and be controlled by, the Siemens Pyrotronics CXL Fire Command Center used by University Police Services.

For fire alarm related inquiries please contact PSU Electronics Engineer, Scotty Eble at (814) 865-1627.

33 00 00 UTILITIES

All new construction or renovation projects which necessitate modification of or an addition to existing utility systems must be coordinated with and approved by Engineering Services in the Energy & Engineering Division of OPP.

Any expansion or renovation of conditioned space must include an assessment of the adequacy of the utilities infrastructure.

The Utility Demand and Consumption form (See 00 51 00 Miscellaneous Forms) shall be completed by the Professional for every project. The information will be used to evaluate the impact on the existing distribution systems, and to request operating funds for the facility. The consumption data should be estimated as accurately as possible, and provided with the final design submission.

WATER SERVICE

The water service to the Mueller Building is serviced with 6-inch cast iron pipe. The water main that this service comes off of is a 10-inch cast iron pipe. The service line shall be replaced with the properly sized ductile iron pipe as part of the building upgrade project, and a new fire service shall be extended to the building.

The current water meter is a 3-inch Neptune Compound Meter. There are two 3-inch Apollo/Conbraco reduced pressure principle backflow preventers (BFP) in parallel, which were installed in January 2011. The pressure readings on the last BFP tests (1/28/11) were 55 (BFP #1) and 52 (BFP #2) psig, respectively.

The fire service will be required to have an Apollo/Conbraco Double Check Backflow Preventer. The building's fire service pressure requirements will need to be evaluated to determine if a booster pump(s) is/are required for the building's fire service.

SANITARY SYSTEMS

No known deficiencies exist in the building sanitary sewer system service. The Design Professional shall ensure that all new connections to the building drainage system conform to Penn State Safety Policy SY40 – Disposal of Pollutants in University Sanitary Systems. New drainage loads shall be reviewed with the Office of Physical Plant, Engineering services, to ensure no sanitary sewer permitting are required.

STORM DRAINAGE

The existing building storm drainage system has been surveyed by the University to determine the presence of illegal cross-connections between the storm system and the sanitary drainage system. The Design Professional shall contact the Office of Physical Plant, Engineering Services, for cross connections locations and shall include corrective measures for all cross-

connections, noted in the University survey and discovered during design, in the project documents.

CAMPUS CHILLED WATER DISTRIBUTION

Review the anticipated chilled water needs of the new work with Glenn Lelko, the Campus Chilled Water Utility Engineer. If the scope of the project develops as an overall HVAC system renewal as anticipated, then it would be an appropriate time to make that connection.

The nearest campus chilled water source is a 24" mains located near the southwest corner of Mueller, in the walkway area approximately midway between Pond and Whitmore Labs. To connect Mueller, the plan is to extend the 24" mains north, and run a set of 8" branches into the mechanical room in the northwest corner of the ground floor. Isolation valves shall be provided in the new 8" underground piping before it enters the building. The final location of the valves will be determined by PSU during design.

The campus chilled water piping layout inside the building must comply with the University's standard arrangement as shown in the University's 'Chilled Water Service - Building Entrance Piping Diagram'. It is not anticipated that a plate and frame heat exchanger will be required to separate the building chilled water system from the campus chilled water system. However, if new air handling units are located outside the building (i.e. on the roof), a heat exchanger will be required, and the building chilled water system will be required to contain a glycol solution.

STEAM ENERGY DISTRIBUTION

The building is supplied with steam as described above, through a walkable steam tunnel. If the high or low pressure lines need to be upsized to support the new anticipated loads, the steam and condensate lines can be replaced back the mains within the existing tunnel system without requiring excavations.

PENNSTATE

Office of Physical Plant
Energy and Engineering Division
Engineering Services

The Pennsylvania State University
Physical Plant Building
University Park, PA 16802-1118

INFRASTRUCTURE SCOPING DOCUMENT
WHITMORE LAB RENOVATION

DESIGN STANDARDS

All aspects of the design must conform to the University's Design Standards, which can be found on the OPP website (http://www.opp.psu.edu/planning-construction/design_and_construction_standards/standards-and-forms).

The Design Professional team shall coordinate efforts in an iterative process to apply holistic, sustainable design principles to the renovated spaces. The design shall meet the architectural functional and aesthetic objectives, help achieve comfortable and pleasing indoor environmental conditions with effective combined use of passive elements, and be purposefully integrated with the HVAC and lighting systems so that all work effectively together to minimize dependence on non-renewable energy use and associated owning and operating costs for the life of the building.

Energy Conservation:

The University's overall energy performance objective is that all facilities shall achieve a minimum of at least 30% energy savings over the latest version of the ASHRAE 90.1 standard as defined in 01 81 13 Sustainable Design Requirements. The Design Professional shall strive to obtain that result by combining innovative design along with implementing the latest version of ASHRAE Standard 189.1 Standard for the Design of High-Performance Green Buildings. For a partial renovation of a facility, the Professional shall submit a report with quantitative analysis including simplified energy simulation calculations to document how the proposed design contributes toward meeting that goal.

The simplest and most effective method of energy conservation is to turn things off when not in use. To this end, spaces with similar occupancy schedules should be grouped together, to the extent possible, on the same HVAC system, to accommodate unoccupied shutdown.

Design for Completeness:

All projects are expected to be complete at their conclusion, meaning that the project generates no need for additional efforts beyond the planned scope. Above all, the campus maintenance staff is not available to complete projects or provide remedies to problems caused by the project.

Other Resources:

Whole Building Design Guide
http://www.wbdg.org/design/academic_lab.php

The following OPP Engineering Services resources page lists useful links and references for additional generally recognized, industry-wide design guidance:
http://www.opp.psu.edu/about-opp/divisions/ee/engineering/eng-resources/bldg-mech

ENVELOPE

The consultant shall determine the approximate existing building envelope thermal performance values with respect to energy use and thermal comfort. Envelope upgrade options shall be evaluated further based on a life cycle cost analysis if the existing values are determined to be significantly lower than the prescriptive values in the latest version of ASHRAE Standard 189.1.

21 00 00 FIRE SUPPRESSION

This facility currently is not equipped with a fire suppression system. NFPA recommends that facilities of this type, use, and size be sprinkled throughout, and that sprinkler systems be fully supervised by a fire alarm system. Properly installed and maintained sprinkler systems are proven life safety systems and would greatly reduce the fire loss potential.

Therefore, provisions for a combined automatic fire suppression system should be installed with the renovation of the first floor, and plans for installation throughout the entire building should be integrated into the master plan as part of this work. Questions pertaining to the acceptability of sprinklering the first floor alone with other floors to follow in the future need to be answered, as there may be code implications, and the installation of sprinklers will impact the design of the smoke detection system. Replacement of the building's existing 4" galvanized water service may be required if it cannot meet the anticipated flow requirements of an automatic fire suppression system. The fire suppression system shall include piping, sprinkler heads (as required by code), pipe bracing, and supervising and alarm devices, as needed. The systems shall be designed and installed in accordance with FM Global Design Standards and the appropriate National Fire Protection Association (NFPA) Standard. The standpipe hose connections shall be 2 ½" hose valves with threaded 2 ½" to 1 ½" reducers. All hose connections shall be provided with National Standard Hose Thread. A new backflow preventer shall be provided for the new sprinkler system on the combined water service.

Coordinate this work with other major HVAC, piping, interior ceiling, and wall finish upgrades to help reduce overall costs and the duplication of work efforts.

22 00 00 PLUMBING

This facility includes piping for domestic water and other specialty systems. In coordination with other recommended plumbing upgrades, replacement of the piping is recommended. During demolition, areas affected by hazardous materials may be encountered.

In coordination with other recommended plumbing upgrades, replacement of waste drain piping is recommended.

It is recommended that all plumbing fixtures be replaced with new fixtures that meet all applicable ADA regulations, ASHRAE 189.1 prescriptive requirements for Water Use Efficiency, and the University design standards. Plumbing fixtures shall be low consumption type. Urinals shall be pint flush. Women's water closets shall be dual flush type.

Remove existing worn or low-grade showers and eyewashes. Install new emergency showers and eyewash fountains in all areas where related hazards exist. These should be permanent fixtures, connected to the building's water supply network, and provided with drains. They need to be clearly identified and located in unobstructed areas for easy access. Coordinate “tepid” water requirements with OPP / Project Manager.

Perform a need assessment for all special plumbing systems required for the program and processes in the building (such as emergency fixtures, lab gases, lab waste, and different types of lab processed water systems) with technical representatives of the research staff and review with OPP. Where laboratory processed water distribution systems are required, select the most appropriate equipment, with the lowest operating and maintenance life cycle costs, to meet the project requirements. Generally speaking, very specialized high purity water system equipment for very limited use is often the responsibility of the user rather than installed and maintained by OPP. The project specifics shall be determined as part of the need assessment.

Domestic water must not be used to provide process cooling in a ‘once-through’ manner. If there is a need for process cooling, it shall be provided by a dedicated recirculating process cooling system.

23 00 00 HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

A large portion of the building’s existing HVAC systems are beyond their expected service life and/or will not be adaptable for re-use. Examples include fan coil units, unit ventilators, convectors, steam/condensate piping, exhaust systems. One of OPP’s long term goals for the building is to eliminate the building’s chillers and utilize campus chilled water, as well as to eliminate terminal steam heating coils and instead utilize hot water. Another goal is to prohibit the installation of new fan coils and small zone level air handlers. These complexities will require that a full building masterplan be developed prior to any renovation of the first floor. The purpose of this masterplan will be to guide the future individual floor-by-floor renovations of basement, second, and third floors by connecting to the HVAC ductwork/piping risers and plumbing risers that are to be installed under the immediate first floor renovation. Plans for the future renovation of basement, second, and third floors will need to be anticipated with regard to vertical shaft location sizing for HVAC ductwork/piping and plumbing piping.

New air handlers for the first floor renovation should be located within dedicated mechanical equipment rooms located indoors, and preferably on the floor that they serve. The practice of installing air handling equipment within lab spaces above drop ceilings does not work well and should be avoided. It will be necessary for the consultant's study to include space for air handling equipment within the proposed architectural floor plan. If program space within the existing building footprint cannot be given up for mechanical equipment, then an exterior mechanical tower addition (similar to that installed at Boucke Building), or a new rooftop penthouse should be considered. Well defined plans for the future renovation of basement, second, and third floors will need to be anticipated with regard to mechanical space for future air handling equipment, as it makes the most sense for these spaces to be aligned vertically throughout the building.

Utilize 100% outside air variable air volume (VAV) central station air handling systems with lab supply and exhaust boxes for lab spaces.

Utilize VAV central station air handling systems with VAV boxes for office or other space types that can tolerate the recirculation of air.

Consolidate air handling equipment to the greatest extent possible to minimize the number of units.

Air handlers shall have mixing and blending devices/sections and adequate length to prevent air stratification and nuisance tripping of freezestats. Economizer operation shall also be provided to allow the use of outside air for cooling. The air handling units must be located indoors. Indoor mechanical space will be needed to accommodate new air handlers, pumps, heat exchangers, and other equipment. Mechanical space must be incorporated into the building programming during the schematic design phase of the project. Adequate service space shall be provided around and within air handlers to allow for proper maintenance of the equipment. Refer to 23 70 00 CENTRAL HVAC EQUIPMENT for more detailed requirements.

Incorporate variable frequency drives (VFD) into the new HVAC design, as applicable. Any new variable frequency drives shall be specified to have a Bacnet interface supplied by the equipment manufacturer. Motors on VFD's shall include motor shaft grounding for motor bearing protection against damage due to electrical discharge fluting. See 26 29 23 Variable-Frequency Motor Controllers for VFD guide specification to be edited for project specific requirements.

New HVAC systems shall be quiet, economical and easy to operate and maintain. Variable flow fans and pump systems shall be used. Main ducts, piping mains, VAV terminals and other HVAC equipment requiring periodic maintenance shall be located to minimize disruption to normally occupied spaces. In addition, care shall be taken to prevent VAV terminals from being located above or near spaces where noise is of particular concern.

Designs that de-couple sensible and latent loads in order to minimize supply airflows (e.g. chilled beams) could be considered if their winter chilled water requirements are low enough and inoperable windows are acceptable.

Any new air terminal units shall be pressure independent type. Supply air terminals shall be provided with hot water heating coils for winter heating and summer reheat control. A dedicated VAV terminal and thermostat shall be provided for each space. Spaces shall not be "ganged together" on a single VAV terminal without prior approval from the Office of Physical Plant, Engineering Services. Hot water baseboard perimeter radiant heat shall be provided throughout the renovated building, and shall be zoned to match VAV box zoning. Each perimeter heat zone shall contain a dedicated control valve. Each VAV reheat coil shall contain a dedicated control valve. Use latest VAV TU reheat guideline sequence posted in Division 25. Use zone level demand based ventilation controls including occupancy sensors for "standby" mode and CO2 sensors in classroom spaces. VAV terminals shall be connected to light occupancy sensors where available for use in occupied/standby/unoccupied sequences.

Summer dehumidification shall be accomplished using methods that will minimize or eliminate the need for simultaneous heating and cooling. Winter humidification shall not be provided unless required to meet minimum requirements for research.

In general, decentralized convective heating and cooling terminal units such as fan coil units or unit ventilators shall not be considered for this project. Equipment that requires chilled water for

cooling in the winter shall not be used, unless approved by the Office of Physical Plant, Engineering Services. Exception: Terminal units such as fan coil units (chilled water or DX) shall be strategically applied to unoccupied spaces with continuous sensible cooling requirements so that primary air handling equipment is not required to run during normal unoccupied periods.

The new design must include hot water perimeter radiant heat.

Spaces such as server rooms or telecommunication equipment rooms shall have dedicated cooling equipment. Equipment selection shall be approved by the Office of Physical Plant, Engineering Services.

Heating Plant

All new heating coils shall be designed to utilize hot water. Hot water shall be generated by new steam fired shell/tube heat exchanger(s). Minimum steam pressure at the connection to the building is approximately 5 psi. Pumping shall be variable flow with adequate redundancy for the application. The new hot water system shall be sized to handle the entire building's heating load. Piping shall be sized and installed such that it can be extended to serve the entire building as floors are renovated in the future. New heating control valves shall be 2-way, modulating.

Cooling Plant

Chilled water for all new chilled water coils shall be generated via campus chilled water through a new plate/frame heat exchanger. The new heat exchanger, piping, and pumping systems shall be sized to handle the entire building's cooling load. Install separate heat exchangers and pumps as required to serve the building's process cooling needs utilizing campus chilled water. Piping shall be sized and installed such that it can be extended to serve the entire building as floors are renovated in the future. Any new chilled water control valves shall be 2-way, modulating.

In general, Direct Expansion (DX) cooling systems will not be accepted on this project unless approved by the Office of Physical Plant, Engineering Services.

If any spaces in the building are critical enough to require redundant cooling sources, the back-up cooling system shall be closely coordinated with the University and approved by the Office of Physical Plant, Engineering Services during the building design.

Ventilation

All occupied areas shall be provided with mechanical ventilation to meet the current building code and ASHRAE Standard 62.1, including those spaces with operable windows. Design mechanical ventilation quantities shall not be reduced by the presence of operable windows. Demand based ventilation control strategies shall be used to vary outside air quantity to maintain allowable CO2 or VOC levels.

Other ventilation and pressure relationship requirements shall comply with the most current edition of the International Mechanical Code and ASHRAE Applications and as further defined by the project specific User Requirements.

Below are the references prohibiting recirculation of air in "science labs" in the 2009 International Mechanical Code.

> International Mechanical Code, 2009
> SECTION 403
> MECHANICAL VENTILATION
> **403.2.1 Recirculation of air.** The outdoor air required by Section 403.3 shall not be recirculated. Air in excess of that required by Section 403.3 shall not be prohibited from being recirculated as a component of supply air to building spaces, except that:
> 1. Ventilation air shall not be recirculated from one dwelling to another or to dissimilar occupancies.
> 2. Supply air to a swimming pool and associated deck areas shall not be recirculated unless such air is dehumidified to maintain the relative humidity of the area at 60 percent or less. Air from this area shall not be recirculated to other spaces where more than 10 percent of the resulting supply airstream consists of air recirculated from these spaces.
> 3. Where mechanical exhaust is required by Note b in Table 403.3, recirculation of air from such spaces shall be prohibited. All air supplied to such spaces shall be exhausted, including any air in excess of that required by Table 403.3.
> 4. Where mechanical exhaust is required by Note g in Table 403.3, mechanical exhaust is required and recirculation is prohibited where more than 10 percent of the resulting supply airstream consists of air recirculated from these spaces.
>
> **TABLE 403.3**
> **MINIMUM VENTILATION RATES**
> OCCUPANCY CLASSIFICATION
> **Education**
> Science laboratories[g]
> g. Mechanical exhaust is required and recirculation is prohibited except that recirculation shall be permitted where the resulting supply airstream consists of not more than 10 percent air recirculated from these spaces (see Section 403.2.1, Items 2 and 4).

Based on previous projects and conversations with Bill Dreibelbis, EH&S considers any lab with a fume hood to be a science lab in this regard and are not to be recirculated and need to be kept negative with respect to adjacent spaces. Some other "labs" that have specialized scientific, electronic equipment or computers labs that do not include the use of hazardous gases or chemicals nor include fume hoods may not have to comply with the prohibition against recirculation. It is recommended going forward that those types of clean, low-risk health hazard spaces should preferably be named something else to avoid confusion with regard to these ventilation requirements.

Where the existing facility has recirculating fan-coil units serving lab areas, any renovation in this facility that involves upgrading science labs, and thus needing to meet current building codes and laboratory standards, a complete system redesign is anticipated.

Laboratory Ventilation:

Laboratory Ventilation systems shall comply with current edition of **ANSI/AIHA Standard Z9.5.**
The purpose of this standard is to establish minimum requirements and best practices for laboratory ventilation systems to protect personnel from overexposure to harmful or potentially harmful airborne contaminants generated within the laboratory.

Refer to **2007 ASHRAE Handbook—HVAC Applications, Chapter 6 – Education Facilities and Chapter 14 - Laboratories.**

Perform **Hazard Assessment** and establish **Design Parameters** for the project specific program for **Teaching Laboratories** / **Clinical Laboratories**. One key determination that needs to be made is whether any or all of the teaching labs will be required to operate in 100% outside air mode, and if so whether part-time or full-time.

> It is important to (1) review design parameters with the safety officers and scientific staff, (2) determine limits that should not be exceeded, and (3) establish the desirable operating conditions. For areas requiring variable temperature or humidity, these parameters must be carefully reviewed with the users to establish a clear understanding of expected operating conditions and system performance.
> Because laboratory HVAC systems often incorporate 100% outside air systems, the selection of design parameters has a substantial effect on capacity, first cost, and operating costs. The selection of proper and prudent design conditions is very important.
> **2007 ASHRAE Handbook—HVAC Applications, p. 14.2**

Determine ventilation/makeup system requirements and design associated energy saving equipment and controls to minimize energy consumption. Options could include:

- automated indoor air quality sensing and demand based ventilation control such as Aircuity
- manual switches that enable spaces to be operated at low/high ventilation rate for a user selectable time period.
- Air-to-air heat recovery.

Air-to-Air Energy Recovery Equipment:

In general, apply energy recovery equipment in accordance with current edition of ASHRAE Standard 189.1 Standard for the Design of High-Performance Green Buildings. This supersedes the minimum requirements in International Energy Conservation Code/ASHRAE 90.1. The energy recovery system effectiveness required by Standard 189.1 is also more stringent than the current minimum building code requirements.

Do not apply rotary energy recovery wheels to systems with risk of cross leakage from contaminated air streams such as chemical lab fume hood exhaust or animal facilities. In those cases, use equipment with no potential for cross leakage.

Provisions shall be made to bypass or control the energy recovery system to permit air economizer operation as required elsewhere in the Standard 189.1.

Exhaust fans shall be roof mounted and manifolded if at all possible. Exhaust air heat recovery (fume hood and general exhaust) is recommended and should be considered. Glycol run-around heat recovery is probably the only option available due to the anticipated distances between supply air handlers and exhaust fans.

Fume Hoods:

Shall have controls to operate exhaust and makeup air only when needed. Do not use hoods to store materials and then run 24/7.

Low Flow or Velocity Hoods At a 12" vertical sash height, the minimum face velocity should be 60 fpm.
Existing hoods should not be adapted to function as low flow hoods. Low flow/velocity hoods should be purchased as hoods designed for low flow operation.
Other considerations for fume hoods:

- Fume hoods should not be situated directly opposite occupied work stations
- Fume hoods should not be located within the laboratory to avoid cross currents at the fume hood face due to heated, cooling or ventilation supply or exhaust diffusers
- Note: The 2008 National Institutes of Health (NIH) Design Requirements Manual for Biomedical Laboratories and Animal Research Facilities (DRM), formerly called the NIH Design Policy and Guidelines, is the only detailed design requirements and guidance manual for biomedical research laboratory and animal research facilities in the U.S. Compliance to the DRM, which promulgates minimum performance design standards for NIH owned and leased new buildings and renovated facilities, ensures that those facilities will be of the highest quality to support Biomedical research. The DRM requirement that fume hood face velocity never falls below 80 feet per minute applied to buildings that are constructed using NIH funding, and also applied to NIH funded renovations if the entire building is gutted, or if more than 50% of the building is renovated.

Specialized exhaust systems (Hazardous, Research Lab Fume Hood, Smoke Control, etc.):

Apply variable air volume control wherever practical for optimal energy conservation – beyond code minimum prescriptive requirements.
Refer to Chapter 5 Exhaust Systems of International Mechanical Code for special requirements.
Comply with ANSI/AIHA Z9.5-(current) for Laboratory Ventilation systems.

SPECIAL MECHANICAL SYSTEMS

All special systems required for the programs and processes in the building shall be coordinated with University personnel. Special mechanical systems shall be reviewed with both the building Users and the Office of Physical Plant, Engineering Services.

25 00 00 INTEGRATED AUTOMATION (BUILDING AUTOMATION SYSTEM – BAS)

The existing building automation system (BAS) is a mixture of Staefa Smart2 and Automated Logic Corporation (ALC).

All new BAS work shall be direct digital control (DDC) and shall communicate at the building level using BACnet protocol. Automated Logic Corporation (ALC) control systems shall be used for all control work associated with this renovation. The new BAS shall be integrated into the existing University's Central Control System 'front-end' graphic user interface software. The University's standard BAS guide specification shall be used and edited as appropriate; no other BAS specification is acceptable. All third party equipment that is supplied with an on board controller, such as vfd's, etc shall be specified to have a Bacnet interface supplied by the equipment manufacturer. All aspects of the BAS shall be closely coordinated with the University and approved by the Office of Physical Plant, Engineering Services during the building design.

Provide controls to comply with the most current control sequence guidelines. Coordinate most current version with Office of Physical Plant, Engineering Services. Systems shall utilize control point reset optimization and continuous supervisory monitoring and diagnostic alarming strategies to reduce energy consumption:

The BAS shall provide interval trend data to the campus Enterprise Utility Management System (EUMS) via Bacnet communication. The Emergency and Demand Response Enterprise Utility Management System (EUMS) Equipment Control Strategies shall be extended to any new or reused HVAC equipment that is part of this renovation project.

26 00 00 ELECTRICAL

POWER

Normal power is available at 208V. Capacity is adequate, but any major HVAC equipment addition needs to be investigated further. Provisions exist for PSU digital metering at the main service. This project will fund the installation of that meter to allow monitoring of building power quality and future capacity.

LIGHTING

New luminaires shall be fluorescent or LED in color temperature of 4100K, with a CRI of 80+. Verify with the building occupants the need for saturated "full spectrum" lighting in certain labs due to student experiments. Provide general illuminaion in those labs with LED 2x2 luminaires.

Utilize 48" linear T8 lamps, 28 watt "energy saving extra-long life" version. Ballasts shall be NEMA "premium" efficiency, parallel operation, program-rapid start. Ceiling height permitting, use pendant-mount direct/indirect luminaires for Labs, Offices, etc. Otherwise, specify "volumetric" lensed recessed luminaires. Coordinate luminaire and lamp/ballast selection with the PSU lighting retrofit consultant, Mike Fuller of Keystone Lighting Solutions (mfuller@keystonels.com).

LED source shall be used for decorative and downlight fixtures. Luminaires shall have a minimum efficiency of 60 lumens/watt. Minimum L70 fixture life shall be 50,000 hours.

Provide stand-alone occupancy sensing for all spaces. Sensors to have HVAC output relay to allow for BAS monitoring for unoccupied HVAC setback.

Refer to Design and Construction Standards for further details.

COMMUNICATIONS

Refer to www.opp.psu.edu/planning-construction/design_and_construction_standards/division-27-communications#section-0.

Also refer to the PSU TNS (Office of Telecommunications and Network Services) Minimum Standards for Telecommunications Facilities for requirements.

ELECTRONIC SAFETY AND SECURITY

Refer to www.opp.psu.edu/planning-construction/design_and_construction_standards/division-28-electronic-safety-and-security#section-0.

Penn State requires security access control on all new and renovated buildings. Refer to Penn State's Policy SY 33 ELECTRONIC SECURITY AND ACCESS SYSTEMS and SECURITY ACCESS CONTROL SPECIFICATIONS. Contact Ed Gannon at ejg3@psu.edu for guidance on applying these to the project.

28 31 00 FIRE DETECTION AND ALARM

Any new work associated with this project shall conform to the University Standards.

University Park systems shall be compatible with, and able to report to and be controlled by, the Siemens Pyrotronics CXL Fire Command Center used by University Police Services.

For fire alarm related inquiries please contact PSU Electronics Engineer, Scotty Eble at (814) 865-1627.

33 00 00 UTILITIES

All new construction or renovation projects which necessitate modification of or an addition to existing utility systems must be coordinated with and approved by Engineering Services in the Utilities Division of OPP.

The Utility Demand and Consumption form (See 00 51 00 Miscellaneous Forms) shall be completed by the Professional for every project. The information will be used to evaluate the impact on the existing distribution systems, and to request operating funds for the facility. The consumption data should be estimated as accurately as possible, and provided with the final design submission.

PENNSTATE

1855

NON-BINDING ARCHITECT AND ENGINEER FEE SCHEDULE

Project: Mueller and Whitmore Laboratories Renovation
University Park

Firm Name: _____

	Hours	Fee
Programming/Site Analysis (confirmation)		
Schematics		
Design Development		
Construction Documents		
Bids		
Construction Administration		
Subtotal		
Reimbursements (allowance)		
Total		

Please include a listing of your billable rates that will be used for this project.

Please return completed form by February 21, 2012 @ Noon to:

David Zehngut
University Architect
The Pennsylvania State University
200 Physical Plant Building
University Park, PA 16802-1118
Phone (814) 863-3158, fax (814) 863-7757

Note: Include any costs for consultants within amounts listed, not separately.

Form of Agreement 1-P

THE PENNSYLVANIA STATE UNIVERSITY

OWNER AND PROFESSIONAL

AGREEMENT

THIS AGREEMENT made this _____ day of _____

in the year Two Thousand _____, by and between THE PENNSYLVANIA STATE UNIVERSITY, a non-profit corporation and an instrumentality of the Commonwealth of Pennsylvania, having its principal offices at University Park, Centre County, created and existing under the laws of the Commonwealth of Pennsylvania, hereinafter called the "Owner," and

_____

_____

_____

hereinafter called the "Professional," for the following Project:

_____

_____

_____.

(Title of Project should match the documents, must include project number)

In consideration of the promises set forth herein, and with intent to be legally bound, the parties agree to the terms set forth within this Agreement.

TABLE OF CONTENTS

12.8 Terms/General Conditions

ARTICLE 13: SCHEDULE OF EXHIBITS

DEFINITIONS:

Contract Documents consist of the General Conditions of the Contract, Drawings, Specifications, Addenda issued prior to receipt of Trade Contract bids, Form of Proposal, other documents listed in the Agreement and those modifications to the Contract as follows: Owner's written authorization to the Contractor for changes to the Scope of Work, a Change Order, and a written order for a minor change in the Work issued by the Professional.

Contractor means the person or entity retained by the Owner to perform Work for the project and includes the Contractor's Representative.

Construction Budget means the project construction cost limit established by the Owner.

Construction Cost Estimate means a detailed breakdown of all costs associated with the scope of work required to meet the project requirements projected to the mid-point of construction.

Final Completion means the point at which the project is fully completed in accordance with the Contract Documents (this includes *all* physical/construction obligations, administrative obligations, and punch list obligations).

The **Owner** is The Pennsylvania State University, a non-profit corporation created and existing under the laws of the Commonwealth of Pennsylvania, and an instrumentality of the Commonwealth of Pennsylvania; this term shall include the Owner and/or the Owner's authorized representative.

The **Pennsylvania State University Design and Construction Standards** means those design and construction standards as set forth at: http://www.opp.psu.edu/construction/standards/design_standards.cfm.

The **Professional** is the person lawfully licensed to practice architecture or engineering, or the firm employed to provide architectural or engineering services, for the referenced project. The term "Professional" shall mean the Professional or the Professional's authorized representative.

The **Project** shall comprise the Work defined by the Contract Documents and may include work by the Owner or other Separate Contractors, Trade Contractors, Sub-Trade Contractors or the Professional.

The **Scope of Work** means the work reasonably contemplated, required, implied, or reasonably inferable by the Contract Documents or normal standards of the building trades, whether or not explicitly contained in the Contract Documents.

Services means the services provided by the Professional and/or by consultants retained by the Professional for the Project.

Substantial Completion shall mean that stage in the progression of the Work when the Work is sufficiently complete in accordance with this Contract that the Owner can enjoy beneficial use or occupancy of the Work and can utilize the Work for its intended purpose.

Work means the construction and services necessary or incidental to fulfill the Contractor's or Professional's obligations for the Project in conformance with the agreement between the Owner and Contractor or the Owner and Professional.

ARTICLE 1: PROFESSIONAL'S RESPONSIBILTIES

1.1 General Responsibilities

1.1.1 The Professional shall furnish or provide the architectural and engineering services as outlined herein, and any other relevant data, specifications or documents, as necessary for a complete project. The Professional shall expeditiously perform said services in a manner consistent with professional skill, care, and the orderly progress of the work. In carrying out all obligations pursuant to this Agreement, including the furnishing of Construction Documents, the Professional shall in all respects conform to the applicable professional standard of care.

1.1.2 By executing this Agreement, the Professional represents to the Owner that the Professional possesses the requisite skill, expertise, and credentials to perform the required services, and that Professional is licensed to practice by all public entities having jurisdiction over the Professional and the Project. The Professional further represents to the Owner that the Professional will maintain all necessary licenses, permits, or other authorizations necessary to act as Professional for the Project until the Professional's remaining duties hereunder have been satisfied. The Professional assumes full responsibility to the Owner for the negligent acts and omissions of the Professional's consultants or others employed or retained by the Professional in connection with the Project.

1.1.3 Execution of this Agreement by the Professional constitutes a representation that the Professional has become familiar with the Project site and the local conditions under which the Project is to be implemented.

1.1.4 The Professional shall provide the services required by this agreement in conformance with the most recent project schedule approved by the Owner.

1.1.5 The Professional shall provide Professional Services, per Exhibit A and per this agreement, in accordance with The Pennsylvania State University Design and Construction Standards referenced in Exhibit C.

1.1.6 The Professional is responsible for additional submission and presentation requirements as outlined for Board of Trustee approval or other administrative approval.

1.1.7 If a Construction Manager is hired by the Owner it will be the responsibility of the Professional to collaborate and work in concert with the Construction Manager throughout the duration of the project. Furthermore, the Professional shall reconcile all cost estimates with the Construction Manager.

1.1.8 Payment of the Professional's fees, as per in Article 9, is contingent upon completion of the documents per the attached schedule.

1.1.9 Adherence to Time Schedule. The Professional shall strictly adhere to submission schedules as set forth in this Agreement. Should the Professional become aware that he will be unable to meet any of the dates set forth in this Agreement, the Professional shall immediately notify the Owner in writing.

- The Professional shall include in the notice the reason(s) for the Professional's inability to meet the date(s) and a request that the Owner amend the time schedule.
- The Owner shall review the Professional's notice and determine whether or not to amend the time schedule.

If the Owner determines that the delay is **due to the fault of the Professional**, the Owner may amend the schedule and direct the Professional to expeditiously proceed with the design of the project, in which case **the Owner may hold the Professional responsible for any costs attributable to the delay**, or

terminate the Agreement for default of the Professional, in accordance with the provisions of this Agreement.

If the Owner determines that the delay is not due to the fault of the Professional, the Owner may amend the time schedule. The Professional agrees that such an amendment of the time schedule is his exclusive remedy for a delay and that he may not make any claims against the Owner for increased costs due to the delay.

1.1.10 Building Information Modeling (BIM). The project will be designed using Building Information Modeling (BIM). Professionals shall use BIM application(s) and software to develop project designs. Digital modeling information shall be provided to the Owner and Construction Manager for the following building systems: ALL DISCIPLINES. This may include, but is not limited to, architectural, site, civil, structural, mechanical, electrical, safety and security, controls, fire suppression and alarms, building automation and other systems. This includes relevant model element information to be used for future integration into the Owner's facilities management system. This may include, but is not limited to, hyperlinks to O&M manuals, preventative maintenance schedules, and analysis data. The Professional shall develop the Facility Data consisting of a set of intelligent elements for the Model (e.g., doors, air handlers, electrical panels). This Facility Data shall include all material definitions and attributes that are necessary for the Project facility design and construction.

Professional shall use the Model to derive accurate Construction Documents. All submitted BIM Models and associated Facility Data shall be fully compatible with Autodesk Revit 9.0 or higher. The Professional shall be responsible for updating the model during design, pre-construction, construction and post-construction record documentation (including change orders, RFI and submissions). A read-only, coordinated model shall be delivered to the Construction Manager for pre-construction coordination services and as required during construction. Collaboration with the Construction Manager is of utmost importance and attendance (co-location or web teleconference) at periodic coordination meetings will be required.

The level of detail, model content, information exchange format, and party responsible for modeling and information input will be decided upon during contract negotiations. The basis for these negotiations will be the Penn State BIM Project Execution Plan template (PSU BIM Template), which is available on the OPP website.

The Professional shall develop a project specific BIM Execution Plan (BIM Plan) documenting the collaborative process in which BIM will be implemented throughout the lifecycle of the project. The BIM Plan shall utilize the requirements identified here and in the PSU BIM Template. It shall be submitted for approval by the Owner and Construction Manager prior to the schematic design phase.

Implement quality control (QC) parameters for the Model, including the procedures described in section I of the PSU BIM Template. As a minimum, provide the following: model standards checks, CAD standards checks, and other parameters.

The following uses of BIM are required: design authoring, design reviews, 3D design coordination, energy analysis, building envelope analysis, and architectural renderings. Reference Section D.2 of the PSU BIM Template.

The Professional shall perform design and construction reviews at each submittal stage to test the Model to ensure the design intent has been followed and that there are no unintended elements in the Model.

The Professional shall locate conflicting spatial data in the Model where two elements are occupying the same space. Log hard interferences (e.g., mechanical vs. structural or mechanical vs. mechanical overlaps in the same location) and soft interferences, (e.g., conflicts regarding equipment clearance, service access, fireproofing, insulation) in a written report and resolve.

The Professional shall implement a process in which BIM software uses the model and energy attributes to determine the most effective engineering methods based on design specifications. These analysis

tools and performance simulations can significantly improve the energy consumption during lifecycle operations.

The Professional shall provide submittals in compliance with BIM Plan deliverables at stages as described in section B.8 of the PSU BIM Template.

At each Design Stage, The Professional will provide PSU with the following:

- The Model (Revit) and Facility Data (various).
- A 3-D interactive review format of the Model in Autodesk Navisworks, Adobe 3D PDF 7.0 (or later), or other format per Plan requirements. The file format for reviews can change between submittals.
- A list of all submitted files. The list should include a description, directory, and file name for each file submitted. For all CAD sheets, include the sheet title and sheet number. Identify files that have been produced from the submitted Model and Facility Data.

All costs associated with BIM, including model updates during construction, shall be included in the base contract price (contract Article 9.1.1). An as-built BIM model shall be submitted by the Design Professional to the Owner upon Final Completion of the Work for the agreed upon building systems listed in this agreement. The BIM digital information is to be considered the Architect's work product and as such, under Article 7 of the contract, is ultimately the Owner's property.

Any questions or variations from this shall be discussed and agreed upon with the OPP BIM Manager or Manager of Design Services.

~~1.1.11 Contractor Design Assist. The Owner anticipates utilizing contractor/vendor design assist on some aspects of the project. If utilized, the Professional will assume the responsibility for incorporation of the design assist information into the overall design.~~

1.1.12 LEED Responsibility for Project. The Professional shall design the project to meet the LEED target certification level and shall undertake all reasonable and necessary efforts to bring about implementation of the design specifications in a manner that will meet the LEED target certification level, including coordination with the Contractor(s) and subcontractors. The Professional shall be primarily responsible for identifying the listing of credits to be achieved during the project in an effort to meet the certification level. The Professional shall also be responsible for preparing all documentation required for submission. The Professional shall use as a guide The Pennsylvania State University LEED Policy to be provided by the Owner.

1.2 Schematic Phase

The Professional shall review and comply with the Project program and The Pennsylvania State University Design and Construction Standards, both as furnished by the Owner, and shall conduct appropriate visits to the Project site. The Professional shall then provide to Owner a preliminary evaluation of the program and schedule and a preliminary construction cost estimate. The Professional shall review with the Owner alternative approaches to project design and construction, as may be required.

After the Owner has approved the Project scope, cost estimate and schedule as submitted by the Professional, the Professional shall prepare and submit to the Owner, for approval, Schematic Design Documents and any other documents required by the Owner. Refer to the Design Phase Submittal Requirements document available on the Office of Physical Plant web page for a listing of submission requirements for the Schematic Phase.

Following approval of Schematic Design Documents and any other documents required at such phase by the Owner, The Professional shall submit a Construction Cost Estimate. The estimate shall be determined by the Professional using the most accurate means available.

1.3 Design Development Phase

After approval by the Owner of the Schematic Design Documents, and any Owner-authorized changes in Project scope or construction budget, the Professional shall prepare and submit, for approval by Owner and any government authorities, Design Development drawings and any other documents required by the Owner for said approval. These drawings and other documents shall fix building size, delineate and describe the various construction materials to be used, and indicate the structural, mechanical, and electrical systems upon which the design is based. Refer to the Design Phase Submittal Requirements document available on the Office of Physical Plant web page for a listing of submission requirements for the Design Development Phase (noted as Preliminary and Design Phase in the document).

The Professional shall provide an update of the Construction Cost Estimate and schedule and advise the Owner immediately of any adjustments.

1.4 Construction Document Phase

After approval by the Owner of the Design Development Phase documents, and any further Owner-authorized changes in Project scope or construction budget, the Professional shall prepare and submit to the Owner, for approval, Construction Drawings and Specifications/Project Manual (hereinafter referred to as the "Construction Documents") required by the Owner for said approval. These Construction Documents shall delineate, detail, and completely specify all materials and equipment required to fully complete construction of the Project in every respect, consistent with current standards of the profession. The Construction Documents shall completely describe all work necessary to bid and construct the Project. Refer to the Design Phase Submittal Requirements document dated August 2006 (or any subsequent updates), available on the Office of Physical Plant web page, for a listing of submission requirements for the Construction Document Phase.

Any review and approval by the Owner of the Construction Documents shall not be deemed to diminish the Professional's obligations under this Agreement.

The Professional shall provide an update of the Construction Cost Estimate and schedule and shall advise the Owner immediately of any adjustments.

The Professional shall be responsible for completing all of the appropriate planning modules, soil and erosion control plans, and other documents which may be required.

The Professional shall be responsible for obtaining, on behalf of the Owner, whatever approvals are necessary to connect to non-Owner-owned utility lines.

The Professional shall coordinate the Construction Documents for all of the separate Prime Contracts or trade packages, as required, to protect against omissions, conflicts, overlaps, or duplications of any items of work or materials on the Project.

The Professional shall coordinate the services of all design consultants for the Project, including those retained by the Owner.

1.5 Bidding Phase

After approval by the Owner of the Construction Documents, the Professional shall prepare and distribute all necessary bidding correspondence and documents, evaluate bid proposals, attend pre-bid or pre-award meetings, clarify the scope or intent of the Construction Documents, evaluate proposed subcontractors, and assist in the preparation of construction contracts.

1.6 Construction Phase

The Professional shall issue a set of construction documents that incorporate all bidding documents and revisions per addenda prior to the start of construction.

The Professional's responsibility under this Agreement for Construction Phase services commences with the execution of the Contract(s) between the Contractor(s) and the Owner and terminates no earlier than the expiration of the Contractor's one-year guarantee period against defective materials, equipment, and/or workmanship. This paragraph is not intended to, and shall not be construed as, affecting in any way the calculation of any applicable legal statutes of limitation.

Administration, by the Professional, of the construction contract(s) shall be as outlined below and in accordance with the General Conditions of the Contract for Construction. The Professional agrees to perform all of its obligations under this Agreement consistent with said General Conditions. The extent of the Professional's duties and responsibilities and the limitations of its authority as specified thereunder shall not be modified without written agreement between the Owner and the Professional.

The Professional shall not be responsible for the Contractor's construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the work. However, if the Professional has actual knowledge of safety violations, the Professional shall immediately alert the relevant Contractor or Subcontractor and shall give prompt written notice to the Owner.

The Professional shall not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Professional shall not be deemed to have control over or charge of acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons performing portions of the Work. However, the Professional shall provide all required assistance to the Contractor, Subcontractors and/or agents and employees in order to facilitate the appropriate and timely performance of the Work. Furthermore, Professional is responsible for notifying the Owner and the Contractor of the Contractor's failure to carry out the Work in accordance with the Contract Documents upon observing such failure by the Contractor.

1.6.1 Schedule of Values. Upon receipt, the Professional shall carefully review and examine the Contractor's Schedule of Values, together with any supporting documentation or data which the Owner or the Professional may require from the Contractor. The purpose of such review and examination will be to protect the Owner from an unbalanced Schedule of Values which allocates greater value to certain elements of the Work than is indicated by such supporting documentation or data or than is reasonable under the circumstances. If the Schedule of Values is found to be inappropriate, or if the supporting documentation or data is deemed to be inadequate, and unless the Owner directs the Professional to the contrary in writing, the Schedule of Values shall be returned to the Contractor for revision or supporting documentation or data. After making such examination, if the Schedule of Values is found to be appropriate as submitted or, if necessary, as revised, the Professional shall sign the Schedule of Values thereby indicating the Professional's informed belief that the Schedule of Values constitutes a reasonable, balanced basis for payment of the Contract Price to the Contractor. The Professional shall not sign such Schedule of Values in the absence of such belief unless directed to do so, in writing, by the Owner. The Professional shall provide the Owner with a signed copy of the Schedule of Values after approval.

1.6.2 Access to Work. The Professional and its authorized representatives shall have full and safe access to the work at all times.

1.6.3 Visits to the Site/Inspection. The Professional and any consultants retained by the Professional, or an authorized and qualified representative, shall visit the Project periodically as required by the Owner during periods of active construction in order to review the progress of the work, and take such actions as are necessary or appropriate to achieve the requirements of the Construction Documents in the work of the responsible Contractors, including advising the Owner's representatives as to particular matters of concern. It shall also be the duty of the Professional to have its Consultants visit the site periodically as required during their respective Phases of the work, at such intervals as may reasonably be deemed

necessary by the Owner and the Professional, to review their respective Phases of the work in order to achieve the requirements of the Construction Documents.

The purpose of such site visits and reviews will be to determine the quality, quantity, and progress of the Work in comparison with the requirements of the Construction Documents. In making such reviews, the Professional shall exercise care to protect the Owner from defects or deficiencies in the Work, from unexcused delays in the schedule, and from overpayment to the Contractor. Following each such review, the Professional shall submit a written report within (5) calendar days of such review, together with any appropriate comments or recommendations, to the Owner.

Whenever, in the Professional's opinion, it is necessary or advisable, the Professional shall require special inspection or testing of the Work in accordance with the provisions of the Construction Documents whether or not such Work is fabricated, installed, or completed. The Professional shall advise the Owner of all such occurrences requiring special inspection or testing of the Work and shall obtain prior approval from Owner before any funds are committed for inspection, beyond what has already been budgeted.

1.6.4 Approval of Payment to Contractors. Based on the Professional's review of the Project, the Professional will recommend, within seven (7) calendar days after receipt, approval or rejection of payment on the Application-Certificate of Payment. Approval of the Certificate of Payment shall constitute a representation by the Professional to the Owner that the work has progressed to the point indicated on the Application, and that to the best of the Professional's knowledge, information, and belief, the quality of the work is in accordance with the Contract Documents.

The Professional shall make recommendations to the Owner for the withholding of any payment, or portion thereof, due to inadequate progress and/or performance of the Contract.

The Professional agrees that time is of the essence with respect to this provision.

1.6.5 Interpreter. The Professional will be, in the first instance, the interpreter of the requirements of the Contract Documents. The Professional will, within a reasonable time as determined by the Owner, render such interpretation as it may deem necessary for the proper execution or Progress of the Work. All interpretations by the Professional shall be defined in writing and/or by drawing and shall be consistent with the intent of the Contract Documents.

In addition to the above, the Professional shall be required to attend, at the determination of the Owner, any and all Project site conferences dealing with interpretation of the Contract Documents.

The Professional's decisions, with Owner's prior approval, shall in matters relating to aesthetic effect be final if consistent with the intent of the Construction Documents.

1.6.6 Review of Contractor's Shop Drawings and Materials. The Professional shall review, approve, and process, subject to the right of review by the Owner, Shop Drawings to verify compliance with the Contract Documents and all product data, samples, materials, and other submissions of the Contractor required by the Contract Documents for conformity to and in harmony with the design concept of the Project and for compliance with the requirements of the Contract Documents. The Professional shall not approve any substitution of specified materials and/or equipment without first obtaining the Owner's consent. Approval by the Professional of the Contractor's submittal shall constitute the Professional's representation in accordance with Article 5 of the General Conditions of the Contract for Construction to the Owner that such submittal is in conformance with the Contract Documents.

When the Contractor is required by the Contract Documents to provide professional certification of performance characteristics of materials, systems, or equipment, the Professional shall be entitled to rely upon such certification to establish that the materials, systems, or equipment will meet performance criteria required by the Contract Documents.

Based on the priorities of the construction schedule, the Prime Contractor(s) shall submit a shop drawing submittal schedule on or before the Second Regular Job Conference. The Professional shall review and check the shop drawing submittal schedule within fourteen (14) calendar days of receipt from the Contractor.

The Professional shall return the approved shop drawings, or detailed notation for resubmission, if required, within fourteen (14) calendar days after receipt from the Contractor unless mutually agreed otherwise by the Professional, Owner, and Contractor. The Professional shall act on any resubmissions within seven (7) calendar days of receipt thereof unless mutually agreed otherwise by the Professional, Owner, and Contractor. A detailed log shall be maintained by the Professional as to time of receipt of the shop drawings and time of return, with adequate notes as to their disposition.

Refer to 1.6.12 for electronic scanning and submission requirement of approved project shop drawings at the completion of the project.

The Professional is responsible to incorporate into the shop drawings comments by the Owner or Owner's authorized representative prior to the shop drawings being returned to the Contractor.

The Professional agrees that time is of the essence of this provision.

1.6.7 Job Conference Reports. The Professional shall take and retain an accurate and complete record of the biweekly Job Conference meetings and shall prepare and distribute summary minutes in a format approved by the Owner of each meeting within five (5) calendar days to the Owner, the Contractors, and all other interested parties.

1.6.8 Change Orders. The Professional shall review all Change Order requests within seven (7) calendar days and shall advise Owner, in writing, with respect to the necessity or advisability of same. The Professional shall also determine whether the cost is fair and reasonable for the additional work associated with the Change Order. In so doing, Professional shall provide all pertinent documents and data to the Owner, who shall make all decisions regarding approval or rejection of Change Order requests. The Professional shall maintain an appropriate Change Order log. The Professional may, after consultation with the Owner, authorize minor changes in the Work which do not involve an adjustment in the Contract sum or an extension of the Contract time and which are consistent with the intent of the Contract Documents.

1.6.9 Rejection of Work. The Professional is authorized and obligated to reject work which does not conform to the Contract Documents and shall immediately notify the Owner to stop a Contractor's work whenever, in the Professional's reasonable opinion, such action is necessary for the proper performance of the Construction Contract Work. The Professional shall not be liable to the Owner for the consequences of any recommendation made by the Professional in good faith, and in the exercise of due care in recommending to stop or not to stop the work.

1.6.10 Substantial Completion, Final, and One-Year Guarantee Inspections. The Professional and its consultants shall participate in Substantial Completion and Final Inspections to affix the dates of Substantial and Final Completion and shall concur in the report of Final Completion to the Owner prior to approving the Contractor's application for Final Payment. The Professional shall produce the punch list document and provide any direction, coordination or follow-up that may be necessary to correct any deviation from the specifications and requirements set forth in the Contract Documents and Construction Documents. The Professional shall also acquire for Owner the Certificate of Occupancy.

The Professional and its consultants shall participate in an inspection prior to the expiration of the one (1) year guarantee period against defective materials, equipment, and/or workmanship to determine any defects in materials, equipment, and/or workmanship since the date of Substantial Completion. The Professional shall produce the (1) year guarantee period punch list document for distribution to the Contractor(s) and provide follow-up to verify all items are completed to the satisfaction of the Owner.

1.6.11 Operations and Maintenance Data. At the time of Substantial Completion of the Project, the Professional shall review and approve all required close-out documentation required per the Specifications including, but not limited to, manufacturers' operating instructions, maintenance instructions, certificates, warranties, guaranties, and other pertinent operating and maintenance data.

The Professional shall electronically scan all reviewed and approved Operation and Maintenance data being returned to the Contractor and provide a complete set of Operation and Maintenance data for the Project in electronic .pdf format (organized by building system) to the Owner within (1) month after receipt from the Contractor.

1.6.12 Record Drawings. At the time of Final Completion of the Project, the Professional shall collect from the Prime Contractor(s) their complete sets of as-built drawings and will, within 30 days after receipt from the Contractors, transpose all the changes recorded by the Contractors, onto a full set of reproducible drawings which shall become the record (as-built) drawings of the Project. The record drawings must also be put on electronic media compatible with the Owner's ACAD system. The Professional shall submit the as-built drawing set to the Owner in both ACAD dwg format and electronic pdf format (if project is utilizing Building Information Modeling an additional record drawing format shall be required and approved by the Owner).

The Professional shall electronically scan all approved shop drawings being returned to the Contractor and provide a complete set of the approved shop drawings for the Project in electronic pdf format (organized by CSI division) to the Owner within (1) month after Substantial Completion of the project.

1.6.13 Corrections. The Professional shall, without additional compensation, promptly correct any errors, omissions, deficiencies, or conflicts in its work product.

1.6.14 Errors and Omissions. If it becomes necessary during the course of construction to issue change orders which increase the cost of the Project and which are due to an error or omission by the Professional in providing plans, drawings, specifications or coordination for the Project, the Professional shall be assessed in an amount equal to the difference between the amount of the change order and what the Owner would have paid had the error or omission not occurred. Where applicable, the assessment shall include any administrative costs incurred by the Owner and costs associated with removal or replacement of work necessary in order to implement the change order. An omission change order is one which results from the Professional's breach in the applicable professional standard of care, resulting in a failure to include required features, items or design elements in the plans, drawings or specifications. An error change order is one which results from the Professional's breach in the applicable professional standard of care, resulting in mistakes or deficiencies in the plans, drawings or specifications.

At the completion of the project, the parties shall exercise good faith in seeking to amicably resolve any disputes that may exist regarding change orders. In the event that the parties are unable to reach an amicable resolution, the dispute resolution provision of Article 12.1 shall apply.

ARTICLE 2: ADDITIONAL RESPONSIBILITIES OF PROFESSIONAL

2.1 Compliance

The Professional is responsible for the compliance of the Construction Documents with all applicable permits, laws, regulations, and ordinances of all commissions, agencies and governments, federal, state and local, insofar as they are applicable to, and have jurisdiction over, the Project. The Professional shall make all required submittals with the advance knowledge of the Owner to, and shall obtain all required approvals from, the applicable agency in a timely manner so as not to cause delays to the Project. The Professional shall also attend all hearings/meetings required for securing necessary approvals and permits.

The Professional shall be responsible for producing a submission document set for approval by Labor and Industry as required by the Commonwealth of Pennsylvania to obtain the necessary building permit.

The Professional shall also be responsible for additional submissions as required by the Labor and Industry Building permit processes and procedures throughout the project design and construction.

2.2 Cooperation With Local Bodies

During the design of the Project, the Professional shall keep informed and comply with the requirements of all local zoning, planning, and supervisory bodies. Should these requirements substantially increase the cost of the Project, or should any required approvals be withheld by the local bodies, the Professional shall immediately notify the Owner.

2.3 Proprietary Items, Copyrights, Patents

The Professional shall not include in the design of the Project unless directed by the Owner any equipment, material, or mode of construction which is proprietary or which contains a copyright or patent right relating to designs, plans, drawings, or specifications, unless the equipment, material, or mode of construction is different and fairly considered superior in quality and performance. If the Professional includes in the design of the Project any equipment, material, or mode of construction which is proprietary, it shall have prior approval by the Owner and it shall only be because the item is different and fairly considered superior in quality and performance, and not for the purpose of preventing or restricting competitive bidding.

2.4 Steel Products Procurement Act

The Professional is responsible for compliance with the Pennsylvania Steel Products Procurement Act, 73 P.S. § 188, *et. seq* ("the Act'). In the event that Professional selects and/or approves any steel products (as defined in the Act) for use in the Project, Professional shall delineate, list and approve as acceptable only steel products that are in compliance with the Act. If Professional determines that any steel products are not produced in the United States in sufficient quantities to meet the requirements of the Project or Contract Documents, Professional shall notify the Owner.

ARTICLE 3: OPTIONAL ADDITIONAL SERVICES

Unless required by the Project Scope, the services performed by the Professional, Professional's employees, and Professional's consultants as outlined in this Article are not included in Basic Services and shall be paid for by the Owner as provided in this Agreement in addition to the compensation for Basic Services.

None of these services shall be provided by the Professional, whether they are requested by the Owner or required due to circumstances unknown at the time of the execution of the Agreement, until approval in writing has been given by the Owner.

3.1 Project Representation

If more extensive representation at the site by the Professional is required by the Owner than is provided for under Basic Services, Paragraph 1.6, Construction Phase, the Professional shall provide one or more Project representatives to assist in carrying out such additional on-site representation.

Additional Project representative(s) shall be selected, employed, and directed by the Professional with the approval of the Owner, and the Professional shall be compensated therefore as mutually agreed, in advance, between the Owner and the Professional. Such supplemental agreement letter shall also delineate the duties and responsibilities of the additional Project representative(s).

3.2 Revisions to Approved Drawings and Specifications Prior to Construction Phase

3.2.1 Making revisions to the drawings and specifications requested by the Owner subsequent to the Owner's approval of the Construction Documents as outlined in Paragraph 1.4, Construction Document Phase, unless required to keep the estimated Construction Costs within the amount budgeted for same.

3.2.2 Making revisions to the drawings and specifications required by the enactment or revisions of codes, laws, or regulations subsequent to the completion of the Construction Documents as approved by the Owner.

3.3 Preplanning

Providing special analysis of the Owner's needs such as selection, planning, and development of the site; economic, demographic, and/or financial feasibility; preliminary design criteria and budget estimates; or other special studies except as herein provided as part of Basic Services.

3.4 Specialized Consultants

Providing unusual or specialized Consultant services other than those consistent with the inherent requirements of the Project scope and required to meet the functional needs of the Project.

3.5 Surveys

Providing a complete topographic survey and/or related aerial photography, ground control, photogrammetric plotting, property boundary survey, and the preparation of a metes and bounds legal description and a related plot.

3.6 Special Studies

Providing services related to the preparation of Environmental Assessments and/or Environmental Impact Statements, Energy Impact Statements, Analysis, or Feasibility Studies as may be required by local, state or federal government agencies, provided such services are in addition to the Project scope requirements.

3.7 Other Services

Providing services mutually agreed to that are not otherwise included in this Agreement.

ARTICLE 4: INDEMNIFICATION

To the fullest extent permitted by law, The Professional shall indemnify and hold harmless the Owner and the Owner's respective officers, directors, trustees, agents, servants, and employees from and against any and all liability, claims, losses, costs, expenses or damages, including reasonable attorneys' fees, costs and expenses, for property damage, bodily injury or death, that may arise as a result of the performance or failure to perform services and duties pursuant to this Agreement, but only to the extent caused by a failure to conform to the applicable professional standard of care by the Professional or Professional's agents, employees or consultants, or anyone employed directly or indirectly by any one of them or by anyone for whose acts any of them may be liable. Nothing in this indemnity section shall be construed to limit the insurance obligations agreed to herein.

ARTICLE 5: OWNER'S RESPONSIBILITIES

5.1 Basic Information

The Owner shall provide the Professional all information available at the time regarding requirements for the Project. Such information shall include:

5.1.1 A Project Program setting forth the Owner's objectives, space requirements and relationships, special equipment, and systems and site requirements.

5.1.2 A Project Budget including the amount allocated for the Construction Cost and all other anticipated costs and expenses.

5.1.3 A Project Schedule setting forth the times allotted for the Design and Construction Phases of the Project.

If the information furnished is not sufficient for the process of initiation of design solutions, the Professional shall notify the Owner immediately.

5.2 Surveys

The Owner shall furnish to the Professional, as available, surveys describing (as applicable) grades and lines of streets, alleys and pavements; the location of all rights-of-way restrictions, easements, encroachments, zoning classification, boundaries and contours of the site; location, dimensions and other necessary data pertaining to any existing buildings, other improvements and trees; information concerning existing utilities throughout the site, including inverts and depth; and shall establish a Project benchmark.

5.3 Geotechnical Engineering Services

The Owner shall pay the costs of all geotechnical engineering services required for the Project and requested by the Professional and Owner. Such services shall include, but are not limited to, tests borings, samples, field and laboratory reports, final soil reports and logs, and foundation engineering evaluations and recommendations.

5.4 Miscellaneous Tests, Inspections, and Reports

The Owner shall furnish, at the Owner's expense, air and water pollution, hazardous material, environmental, and any other miscellaneous laboratory tests, inspections, and reports as may be required.

5.5 Approval or Disapproval of Design Work

Any approval or failure of the Owner to disapprove or reject design work submitted by the Professional shall not constitute an acceptance of the work such as to relieve the Professional of his full responsibility to the Owner for the proper and professional performance of all design work on the Project.

5.6 Owner Response

The Owner shall act with reasonable promptness on all submissions from the Professional, which require action by the Owner, in order to avoid unreasonable delay in the progression of the Project through the various Phases outlined in Article 1.

5.7 Notice of Nonconformance

The Owner shall notify the Professional immediately if the Owner becomes or is made aware of any fault or defect in the Project or nonconformance by any party with the Contract Documents.

5.8 Copies of Owner's Documents

The Owner shall supply the Professional with copies of the Owner's Form of Agreement between Owner and Contractor and General Conditions of the Contract for Construction for inclusion, by the Professional, in the Bidding Documents. It shall be the Professional's responsibility to access, review, and implement The Pennsylvania State University Design and Construction Standards information provided by the Owner on the Office of Physical Plant web page. Refer to web page content listing in Exhibit C.

5.9 Preconstruction Services

The Owner intends to independently retain a Construction Management firm to provide preconstruction and construction services. The Professional will assist the Owner in reviewing proposals and allow for two full days of meetings to interview and rank prospective construction management firms.

ARTICLE 6: CONSTRUCTION COST

6.1 Project Cost Determination

The Construction Cost for all work described in the Construction Documents, as approved by the Owner shall be determined as outlined below, with precedence in the order listed:

6.1.1 For completed construction, the total cost to the Owner for such construction work less the amount of any change order work necessary because of errors or omissions on the part of the Professional as defined in Subparagraph 1.6.14 Errors and Omissions.

6.1.2 If the Project is not constructed, the sum of the lowest bona fide bids(s) received for all of the work, providing said bids do not exceed the fixed limitation of Construction as defined in Paragraph 9.1.4 or as amended by written agreement by the Owner and Professional as the basis for design. If such bids exceed the limitation previously agreed upon, said limitation shall become the basis of cost.

6.1.3 If bids are not received, the latest Construction Cost Estimate prepared by the Professional, provided such estimate does not exceed the fixed limitation of construction as defined in Paragraph 9.1.4 or as amended by written agreement by the Owner and Professional as the basis for design.

6.2 Notification

It shall be the Professional's responsibility to promptly notify the Owner if, in the Professional's opinion, the Project cannot be designed and constructed within the fixed limitation on the cost of construction as authorized by the Owner. It is the Professional's responsibility to so notify the Owner as soon as such a situation becomes, or should have become, apparent to the Professional.

6.3 Owner Options

If, without written acknowledgment by the Owner, the Professional permits the Construction Contracts to be bid, and if the fixed limitation on the cost of Construction is exceeded by the lowest bona fide bid(s) or negotiated proposal, the Owner may: (1) give written approval of an increase in such fixed limit; (2) authorize rebidding or renegotiating of the Project; (3) terminate the Project and this Agreement in accordance herewith; or (4) cooperate in revising the Project scope or quality, or both, as required to reduce the construction cost. In the case of (4), the Professional, without additional charge to the Owner, shall consult with the Owner and shall revise and modify the Construction Documents as necessary to achieve compliance with the fixed limitation on construction cost. Absent negligence on the part of the Professional in making its estimates of probable construction cost, such modifications and revisions shall be the limit of the Professional's responsibility arising from the establishment of such fixed limitation of construction costs, and having done so, the Professional shall be entitled to compensation for all other services performed, in accordance with this Agreement.

If, after notification to the Owner by the Professional that the Project cannot be designed and constructed within the fixed limitation on the cost of construction, the Professional is by written authorization by the Owner instructed to proceed without a change in the Project program, design, or in the fixed limitation on the cost of construction, the Professional shall not be responsible for the cost of any subsequent redesign.

ARTICLE 7: OWNERSHIP AND USE OF DOCUMENTS

All preliminary studies, Construction Documents, as-built documents, record drawings, special requirements, cost estimates, and all other data compiled by the Professional under this Agreement shall become the property of the Owner and may be used for any purpose desired by the Owner except to use for the construction of an identical facility not covered by this Agreement. The Professional shall not be liable for any reuse of these documents by the Owner.

ARTICLE 8: PROFESSIONAL'S EXPENSES

8.1 Billable Hourly Rates

8.1.1 Direct personnel expense is defined as the direct salaries of the principals, associates, and employees of the firm who are assigned to and are productively engaged on the Project, including clerical employees.

8.1.2 Billable hourly rates for this project are included in the personnel listing in Exhibit B. Billable hourly rates shall be the direct personnel expense rate for any principal's time and a multiple of a maximum of (2.5) times the direct personnel expense per hour for the Professional's employees which shall include mandatory and customary benefits such as employment taxes, statutory employee benefits, insurance, sick leave, holidays, vacations, pensions, and similar contributions and benefits.

8.1.3 The billable hourly rates set forth in Exhibit B may be adjusted annually, subject to the Owner's approval, in accordance with generally accepted salary review practices of the profession. Payroll certification shall be provided by the Professional to the Owner upon demand.

8.2 Reimbursable Expenses

Reimbursable expenses are in addition to compensation for Basic and Additional Services and include those expenses as follows for which the Professional shall be reimbursed a not-to-exceed amount for his direct "out-of-pocket" costs (no mark-up allowed on reimbursable expenses). Reimbursable expenses shall be submitted with supporting documentation. Where requested or authorized by the Owner, the following shall be reimbursable:

8.2.1 Out-of-town and out-of-state travel expenses and any necessary fee or permit payment required and paid to any governing body or authority having jurisdiction over the Project. Air travel expenses shall be approved in advance by the Owner. Maximum individual per diem expenses for travel to the job site shall be based on the Owner’s allowable per diem for lodging and meals for that location.

8.2.2 Expense of reproductions including reproductions of record drawings, postage and handling of Drawings, Specifications, and other documents including the preparation and distribution of all necessary bidding correspondence and documents, receipt of bid proposals, and construction contract preparation. Reproductions made for the Professional’s own use or review shall not be included.

8.2.3 Expense of renderings, models, mock-ups requested by the Owner, and/or discs for electronic format submissions of record drawings.

8.2.4 Expenses of specialized consultants identified as optional additional services in Article 3 of this Agreement.

8.2.5 Reimbursable expenses for individual travel, meals, and lodging expenses are limited to individuals under the direct employ of the Professional or their approved consultants.

8.3 Cost for Consultants (consultants not included in the Basic Services proposal/procured after award)

The Professional shall be reimbursed on a multiple of one and one-tenth (1.1) times the amounts billed to the Professional for such services.

ARTICLE 9: COMPENSATION AND PAYMENT

9.1 Compensation and Payment

9.1.1 The Owner agrees to pay the Professional as compensation for those Basic Services described in Article 1, Article 2, and any other agreed upon services described in Article 3:

an amount not-to-exceed _____ Dollars ($_____)
for the Professional's Personnel Expense as defined in Paragraph 8.1 and cost for Consultants.

9.1.2 Payment for Basic Services will be made monthly by the Owner in proportion to the service actually performed, but not to exceed the following percentages at the completion of each Phase.

Schematic Phase	15%
Design Development Phase	20%
Construction Document Phase	35%
Bidding Phase	5%
Construction Phase/Close-Out	25%

The close-out portion of the project refers to the development of the punch list and required follow-up, the submission of the as-built documents and other close-out document requirements, ongoing commissioning support, ongoing support of design-related project issues, and the performance of the (1) year bond inspection and punch-list development.

9.1.3 Reimbursable Expenses

The Owner agrees to pay the Professional as compensation for the Professional's Reimbursable Expenses, as defined in Paragraph 8.2, an amount not-to-exceed _____ Dollars ($_____).

9.1.4 Cost of Construction

The fixed limitation on the cost of construction as defined by this Agreement shall be _____.

9.2 Optional Additional Services Compensation

If approved, the Owner agrees to compensate the Professional for Optional Additional Services beyond Basic Services, as defined in Article 3 in accordance with the rates defined in Exhibit B and as approved by the Owner.

9.3 Payment Procedures

9.3.1 Payments are due and payable forty-five (45) days from the date that the Professional's invoice is approved by the Owner.

9.3.2 Submission of the Professional's invoice for final payment and reimbursement shall further constitute the Professional's representation to the Owner that, upon receipt from the Owner of the amount invoiced, all obligations of the Professional to others, including its consultants, incurred in connection with the Project will be paid in full.

9.3.3 Documentation accurately reflecting the time expended by the Professional and its personnel and records of Reimbursable Expenses shall be maintained by the Professional and shall be available to the Owner for review and copying upon request.

9.4 Owner's Right to Withhold Payment

In the event that the Owner becomes credibly informed that any representation of the Professional provided pursuant to Articles 8 or 9 is wholly or partially inaccurate, the Owner may withhold payment of sums then or in the future otherwise due to the Professional until the inaccuracy, and the cause thereof, is corrected to the Owner's reasonable satisfaction.

ARTICLE 10: INSURANCE

10.1 Professional Liability Insurance

The Professional shall secure and maintain, at its sole cost and expense, Professional Liability Insurance to protect against loss resulting from design errors and omissions, failure to coordinate the Construction Documents of the Project, and failure to execute the construction administration duties for the Project.

10.1.1 Unless otherwise specifically provided in this Agreement, the Professional shall secure and maintain Professional Liability Insurance with limits not less than $1,000,000, or the total of the Professional's fee, whichever is greater.

10.1.2 The Professional shall secure and maintain Professional Liability Insurance, as required above, up to and including one year after the date of the (1) year guarantee inspection of the contracts under the Project.

10.2 General Liability Insurance

The Professional shall secure and maintain, at its sole cost and expense, adequate General Liability Insurance to protect the Owner and the Owner's respective officers, agents, servants, and employees against claims arising out of the Professional's services during the design and construction of the Project for damages in law or equity for property damage and bodily injury, including wrongful death. The Owner shall be named as an additional insured in the policy, and the Professional shall submit a Certificate of Insurance to the Owner prior to execution of the Agreement. The limits of coverage shall be not less than $1,000,000, or the total of the Professional's fee, whichever is greater. The Professional is required to secure and maintain General Liability Insurance, up to and including one year after the date of the (1) year guarantee inspection of the contracts under the Project.

10.3 Certificate of Insurance

The Professional shall furnish to the Owner annually, unless otherwise requested, during the active terms of this Agreement, a Certificate from an Insurance Carrier authorized to do business in Pennsylvania indicating: (1) the existence of the insurance required under this Article; (2) the amount of the deductible; and (3) the amount of coverage of such insurance. The Professional shall submit a Certificate of Insurance covering the Professional Liability Insurance requirement up to and including one year after the date of the (1) year guarantee inspection of the contracts under the Project.

10.4 Failure to Comply with Insurance Requirements

During any period in which the Professional is not in compliance with the terms of this Article, no compensation shall be paid by the Owner to the Professional.

ARTICLE 11: TERMINATION, ABANDONMENT, SUSPENSION, REACTIVATION

11.1 Termination by Owner

The Owner shall have the right at any time, for any reason, to terminate this Agreement upon not less than seven (7) calendar days' written notice to the Professional. The Professional shall comply with all reasonable instructions of the Owner then or subsequently given relating to such termination, including but not limited to: instructions concerning delivery of drawings, sketches, and other architectural/engineering data to the Owner; discontinuance of the work on outstanding contracts; and furnishing to the Owner information concerning all actions to be taken respecting outstanding agreements with consultants, contracts, awards, orders, or other matters.

Copies of Construction Documents and any other materials in existence as of the date of termination will be furnished to the Owner as requested.

11.2 Compensation in the Event of Termination

In the event of termination, the Professional shall be compensated for its services to the termination date based upon services performed on any Phase to the termination date in accordance with the Compensation and Payment schedule contained herein at Article 9.1.2.

Such compensation shall be the Professional's sole and exclusive remedy for termination.

11.3 Suspension of Work

The Owner may, at any time, direct the Professional to suspend all work on the Project, or on any part thereof, pending receipt of further notice from the Owner. In all such cases the Owner and the Professional shall agree upon an appropriate phasing-out of the work in such a manner that the work may be resumed with a minimum of added cost to the Owner, but in no event shall the work be continued beyond the completion of the portion of the project then in progress. The Professional shall be compensated as if the Agreement had been terminated at the completion of the agreed Phase. If work is suspended during the Construction Phase, compensation shall be paid for all Professional services provided to the date of suspension, but no additional compensation shall be paid during the period of suspension.

11.4 Reactivation Compensation

When a Project has been suspended or terminated for a longer time than six (6) months and is subsequently reactivated using the same Professional, the Owner and the Professional shall agree, prior to the beginning of the reactivation work, upon a lump sum, or other basis, of reimbursement to the Professional for its extra start-up costs occasioned as a result of the work having been suspended or terminated.

ARTICLE 12: MISCELLANEOUS PROVISIONS

12.1 Dispute Resolution / Applicable Law

After Final Completion of the Project, any and all claims, disputes or controversies arising under, out of, or in connection with this Agreement, which the parties shall be unable to resolve within sixty (60) days of the time when the issue is first raised with the other party, shall be mediated in good faith. The party raising such dispute shall promptly advise the other party of such claim, dispute or controversy, in writing, describing in reasonable detail the nature of such dispute. By not later than five (5) business days after the recipient has received such notice of dispute, each party shall have selected for itself a representative who shall have the authority to bind such party, and shall additionally have advised the other party in

writing of the name and title of such representative. By not later than ten (10) business days after the date of such notice of dispute, the parties shall mutually select a Pennsylvania-based mediator, and such representatives shall schedule a date for mediation, not to exceed one (1) day in length, and less where applicable. The mediation session shall take place on the University Park Campus of The Pennsylvania State University, or upon the campus where the Work was performed, at the option of the Owner. The parties shall enter into good faith mediation and shall share the costs equally.

If the representatives of the parties have not been able to resolve the dispute within fifteen (15) business days after such mediation hearing, the parties shall have the right to pursue any other remedies legally available to resolve such dispute in the Court of Common Pleas of Centre County, Pennsylvania, jurisdiction to which the parties to this Agreement hereby irrevocably consent and submit.

Notwithstanding the foregoing, nothing in this clause shall be construed to waive any rights or timely performance of any obligations existing under this Agreement.

In all respects, this Agreement shall be interpreted and construed in accordance with the internal laws (and not the law of conflicts) of the Commonwealth of Pennsylvania.

12.2 Successors and Assigns

This Agreement shall be binding on the successors and assigns of the parties hereto.

12.3 Assignment

Neither the Owner nor the Professional shall assign, sublet, or in any manner transfer any right, duty, or obligation under this Agreement without prior written consent of the other party.

12.4 Extent of Agreement

This Agreement, including any and all schedules, proposals and/or terms and conditions attached hereto, represent the entire and integrated agreement between the Owner and the Professional and supersedes all prior negotiations, representations, or agreements, either written or oral. This Agreement may be amended only by written instrument signed by both the Owner and the Professional. In the event of a conflict between the provisions of this Agreement and those of any other document, including any that are attached hereto, the provisions of this Agreement shall prevail. Furthermore, any provision, terms or conditions contained within any documents attached as exhibits hereto are void and lacking in any force or effect, with the exception of entries which define the Professional's scope of work for the Project, Professional's billable hourly rates, and project schedule.

12.5 Third Party

Nothing contained in this Agreement shall create a contractual relationship with or a cause of action in favor of a third party against either the Owner or the Professional.

12.6 Hazardous Material

Unless otherwise provided in this Agreement, the Professional and its consultants shall have no responsibility for the discovery, presence, handling, removal, or disposal of, or exposure of persons to hazardous materials in any form at the Project site, including but not limited to asbestos, asbestos products, polychlorinated biphenyl (PCB), or other toxic material.

If the Professional encounters or suspects hazardous or toxic material, the Professional shall advise the Owner immediately.

12.7 Promotional Material

The Professional shall not issue or disclose to third parties any information relating to the Project without prior written consent of the Owner, except to the extent necessary to obtain necessary permits or governmental approvals**,** coordinate the Work with the Owner's agent, Contractors, Subcontractors, etc. The Professional may, with written consent of the Owner, include design representation of the Project, including interior and exterior photographs, among the Professional's promotional and professional materials.

12.8 Terms/General Conditions

Terms contained in this Agreement and which are not defined herein shall have the same meaning as those in the Owner's Form of Agreement between Owner and Contractor and the Owner's General Conditions of the Contract for Construction, current as of the date of this Agreement.

ARTICLE 13: SCHEDULE OF EXHIBITS

The attached Exhibits are part of this agreement:

Exhibit A: Professional's proposal dated _____ **NOTE:** Professional's proposal is attached solely for purposes of defining Professional's scope of work. As per Article 12.4 of this Agreement, additional terms and conditions that may be included in the Professional's proposal, beyond those relating to scope of work, are void, without effect, and not considered to be part of this Agreement.

Exhibit B: Professional's Billable Hourly Rates.

Exhibit C: The Pennsylvania State University Design and Construction Standards listing (screen print from the Office of Physical Plant web page).

Exhibit D: Project Schedule outlining design submission dates to be followed per Article 1, Section 1.1.9.

THE PENNSYLVANIA STATE UNIVERSITY
OWNER

_____ _____
Title ATTEST, Secretary

(PROFESSIONAL COMPANY NAME)
PROFESSIONAL

_____ _____
Title ATTEST, Secretary

Attachments