PennState
Physical Plant

Office of Physical Plant
Physical Plant Building
University Park, PA 16802-1118

DATE: January 22, 2024

SUBJECT: Request for Proposals - Architecture/Engineering Team Selection
Palmer Repurposing project – University Park Campus
University Park, PA

TO: Annum Architects
Bohlin Cywinski Jackson
DIGSAU and Moody Nolan
GBBN
ikon.5 architects
KSS Architects
Marble Fairbanks Architects
Michael Graves Architecture
Perkins Eastman Architects DPC
ZGF Architects LLP

REQUEST FOR PROPOSALS - PART 1
PROJECT INFORMATION and OWNER REQUIREMENTS

The Pennsylvania State University (PSU) wants to thank the forty-three (43) Architectural/Engineering (A/E) Teams that submitted Letters of Interest for the Palmer Repurposing project. After careful review of the received Letters of Interest, PSU would like to congratulate the above **ten (10) teams** who were selected to continue to the next step in the process - the invitation to respond to this Request for Proposal (RFP).

The A/E Selection process is as follows:

- Proposals from the long-listed teams are due at Noon, Eastern Standard Time (EST), **February 13, 2024.**
- The Screening Committee will choose three firms from the RFP respondents. The short-list results and interview notice will be posted on the OPP website by the end-of-day, **March 1, 2024.**
- On **March 22, 2024**, in-person interviews will occur at University Park campus at the Steam Services Building, University Park, PA. This date will not change, so please plan accordingly. Also, Non-Binding Fees for the entire A/E Team are due just before the in-person interviews.
- The A/E Team selection process results will be posted on the OPP website within the month of **April 2024.** We plan to start immediately after contract negotiation to align with the project schedule.

  Palmer Repurposing A/E Selection link: https://www.opp.psu.edu/project/palmer-repurposing

Participation in this A/E Team selection process is voluntary and at no cost or obligation to PSU. PSU reserves the right to waive any informality in any submissions and reject any submission or portion thereof. PSU reserves the right to modify dates as it deems necessary.

CONFIDENTIALITY AND NON-DISCLOSURE
A/E Teams may not make news releases about this project without prior approval from PSU and then only in coordination with PSU. In addition, all information, documents, and correspondence shared within the A/E selection process are to remain confidential and, as such, are not made public in any manner. Please contact me (information below) or the Facility Project Manager Dave Peck (dlp50@psu.edu or 814-867-2529) with any questions.

A. PROJECT OVERVIEW

The Palmer Museum of Art was originally constructed in 1969 and is named after James and Barbara Palmer. The original building was renovated, significantly expanded, and given a completely new facade and orientation, in 1991 by the architect Charles W. Moore in association with the firm of Arbonies King Vlock. The 1991 project transformed a formerly charmless brick box into what it is today. In spring of 2024, the Palmer Museum of Art will permanently move into a new purpose-built museum, located in the Arboretum of Penn State. The vacating of the museum function(s) is what necessitates the Palmer Repurposing project defined herein.

The existing art museum building is 51,013 GSF and is approximately 19,000 ASF of art galleries, art storage, art holding/prep/conservation, and the office/security/administrative functions of the museum. This project defines a complete change of space/use/function and full renovation/adaptive re-use/transformation of the facility, in addition to building system upgrades and building enclosure upgrades as required and defined herein. **The Palmer Repurposing project has a total project cost of $40.4M, which includes a total construction cost of $28M.**

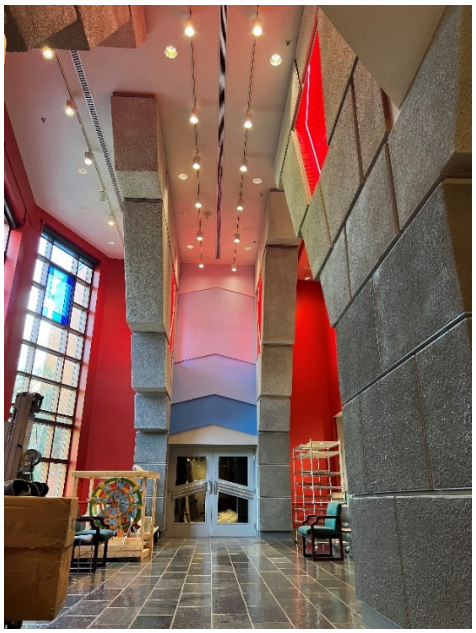
This project aims to transform the use/function of the facility, address deferred maintenance backlog, and preserve and extend the life of the building. The renovated facility will create as many large General Purpose Classrooms (GPCs) and related GPC circulation and support spaces, as possible. As the available budget and space with the building allow, the remainder of the renovated building will be transformed into the following space/room types: art storage; informal learning space (aka open student study space); specialized classrooms and/or art studio spaces for the college of Arts and Architecture.

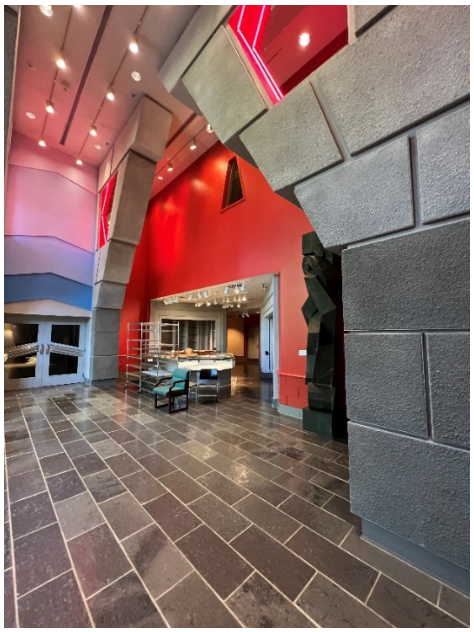
Photo above: Front view of existing building

GPCs are classrooms that are scheduled by the Office of the University Registrar and are allocated to all academic units with the goal of maximizing occupancy and optimizing usage. The reduction of classrooms already leads to classes that cannot be scheduled due to lack of space, a situation which will worsen with growing enrollments. The current GPC inventory includes only 24 rooms with a capacity of over 150, with those classrooms being heavily utilized with no open periods.

Within the GPC inventory are chemistry-physics (CHEM-PHYS) prep classrooms that have a lab bench at the front and reasonable proximity to the prep room, which is currently a temporary trailer adjacent to the Forum Building. Current CHEM-PHYS prep classrooms are large, with capacities around 350, and are in high demand by other departments that also need large classroom spaces; we only have four classrooms with a capacity of over 350. CHEM-PHYS-prep classrooms can be used for any class but are given priority in scheduling chemistry and physics classes, which make it almost impossible for the other departments to get assigned to these classrooms. There are also inefficiencies when smaller sections are given priority in these larger rooms because of the equipment needs. Creating additional CHEM-PHYS prep classrooms, including smaller ones, would allow the GPCs in the Forum Building to be used by other departments and allow chemistry and physics to be in a space that is more suitable to their needs.

One of the challenging aspects of the project is how to accommodate the existing art storage and related art loading/prep spaces that are currently located in the building. The 2,326 ASF existing art storage space, and related spaces, remain required/critical spaces, even with the opening of the new Palmer Art Museum. Keeping the existing art storage space in the repurposed Palmer is complicated by a variety of factors, including: the change of use for the remainder of the building away from art and museum used with different temperature and humidity controls; the existing building enclosure issues; the need to upgrade building systems in the art storage area; the need to keep the art storage up and running during construction; the huge amount of art within art storage; and the cost and logistics of moving art. Regardless of the potential future relocation of the building's loading dock, the museum collections staff will continue to need regular access to a dock and to art storage. The museum's 32' box truck with liftgate will be the primary vehicle accessing the dock. The selected A/E team will need to help drive our decision making regarding the permanent home for this art storage, whether in the repurposed Palmer or elsewhere.





Photos above: Existing lobby space

B. PROJECT OBJECTIVES

See below for the most current Project Objectives that have been fine-tuned since the creation of the "*Palmer Arts Backfill Program*" document. Also, the Project Objectives have been slightly revised since the Request for Letters of Interest. The "*Palmer Arts Backfill Program*", which includes more information on the following topics, is attached as a part of the Request for Proposal (RFP):

- Design to a total project budget of $40.4M. Maximize the building and system renovation/renewal within the budget constraints. While the program defined multiple funding and renovation scenarios, the established budget is now anticipated to cover the reprogramming/repurposing/renovation of the entire facility.
- Develop a space program for the renovation/transformation of the existing building that creates as many General Purpose Classrooms (GPCs) and related GPC circulation and support spaces (including required restrooms, MEP spaces, etc.), as possible, prioritizing large classrooms. Note that 1,000 ASF is the minimum size GPC desired in the project.

  For the remainder of the renovation, as possible within the space and budget available, provide space(s) for the following space/room types:

  - Create the number and size of GPC classroom(s) that support chemistry-physics (CHEM-PHYS) prep, as required by PSU. Also, create a permanent home for CHEM-PHYS classroom prep space

within the repurposed Palmer. The temporary trailer, where this function is currently housed, may be removed from Forum should this project budget support that scope/effort.

  - Art Storage. See subsequent project objective for more info.
  - Informal learning space (aka open student study space), as required to support the new GPC spaces and as required to allow for class changes.
  - For residual spaces remaining within the building: Create specialized classrooms and/or art studio (art creation) spaces for the college of Arts and Architecture (A&A).

- Evaluate cost benefit of the art storage space remaining in the renovated facility versus evaluating alternate (aka off-site) solutions for art storage. The selected A/E Team will work closely with PSU to define the final strategy and location for art storage. Maintaining existing art storage in the renovated building include the following considerations:
  - Ability to maintain the temperature and humidity of the art storage as a part of this renovation, especially as the reminder of the building changes function away from art storage and museum spaces. This needs investigation early in the design process.
  - Access and loading dock. It is possible that leaving the existing art storage in the building will necessitate a loading area be added to the building, opposite of the Stuckman Family Building loading area. The art storage requires delivery access from a 32' box truck with liftgate.
  - Impact to the building envelope deficiencies
  - Cost, logistics, and time for an art move, or multiple art moves.
  - Swing space and/or phasing requirements related to art moving, temporary moves, etc.
  - Security considerations, including considerations related to the remainder of the building changing away from secure museum spaces.
- Maintain existing exterior aesthetic of the building, and entrance plaza, while correcting exterior building envelope deficiencies. Building envelope deficiencies exist unrelated to the existing Art Storage spaces, but the deficiencies are exacerbated by the existence of the Art Storage in the building. More information about the building envelope deficiencies are shared as a part of this Request for Proposal (RFP).
- Honor/respect the overall character of the existing/original lobby interior as a part of this renovation and adaptive re-use of the building. The angled, faux textured stone columns in the lobby are considered an integral part of the building's design and one of several important components that contribute to architect Charles Moore's vision of the space. Similarly, multiple large-scale scalloped blue decorative wall features and mirrored light features adorned with multi-colored tile, are distinctive to the 1991 Charles Moore design. As a part of this project, we will consider a range of design options for the lobby to test the level of transformation for the lobby aesthetic versus the extent of existing building character that should remain. Any changes to key architectural elements will be made in close consultation with the University Architect. As a part of the lobby transformation, it is goal to continue to utilize the lobby space as a publicly available space. So, in the test fit plans, the lobby is shown as open student study use.
- Completely renew and/or replace mechanical and electrical building systems. Replace sprinkler system. System replacements are required both due to the advanced age of systems and the change of use/function of the building. As much as possible within the project budget, completely renew and/or replace plumbing systems, focusing on systems with high probability of failure.
- Make the campus and site improvements related to transformation and change of use of the facility. Site considerations include the following:
  - If art storage remains in the completed building, how to accommodate the loading as the remainder of the building changes use. This could require a new loading area be added. Related: Potential decommissioning of the existing loading area.

- Determine the use of, and improvements required for, the building's entry plaza and the former sculpture garden (to the West and South of the building).
- Provide and/or maintain site pathways to, from, and between the Forum Building and the repurposed Palmer to allow for full movement of CHEM-PHYS teaching prep carts. Consider possible utilization of the Palmer lobby and/or commons spaces to offset the lack of such spaces in the adjacent Forum Building (major GPC building).

Photo above: Former sculpture garden

- Attributes common to most building projects on campus that deserve mention here are as follows:
  - Create a great place for Penn State students and faculty that helps to expand their skills and enhances their experience at the University. We seek an A/E team who can create and test building planning and programming concepts that best support the project and campus goals.
  - Provide flexible, state-of-the-art instructional space(s) that support emerging pedagogies. Develop shared collaboration and instructional spaces to inspire desired connections.
  - The building will be a welcoming place accessible to all and a place where all people are comfortable and not intimidated. In the design, consider strategic use of exterior/interior transparency to showcase unique aspects of the building and/or to entice people into the facility.

C. PROJECT PROGRAM AND SCOPE OF WORK:

The project envisions renovating the entirety of the existing building (51,013 GSF and is approximately 19,000 ASF). The selected A/E Team, along with Penn State stakeholders, will develop a space program for the renovation/transformation of the existing building. The program priorities are as follows:

- Provide as many General Purpose Classrooms (GPCs) and related GPC circulation and support spaces, as possible, prioritizing large classrooms. Note that 1,000 ASF is the minimum size GPC desired in the project. For the remainder of the renovation, as possible within the space and budget available, provide space(s) for the following space/room types:
  - Create the number and size of GPC classroom(s) that support chemistry-physics (CHEM-PHYS) prep, as required by PSU. Also, create a permanent home for CHEM-PHYS classroom prep space within the repurposed Palmer. The temporary trailer, where this function is currently housed, may be removed from Forum should this project budget support that scope/effort.
  - Art Storage

- Informal learning space (aka open student study space), as required to support the new GPC spaces and as required to allow for class changes.
- Specialized classrooms and/or art studio (art creation) spaces for the college of Arts and Architecture (A&A).

The A/E Team's Scope of work includes:

- Develop project program. This will include working with PSU to determine the type/size/seat count of the various classrooms. This effort may include working with the PSU Registrar to perform "classroom scenario scheduling" to help determine the classroom size(s) required.
- Design/documents and construction administration services for the complete renovation of the existing building (as referenced in the University's 1-P Form of Agreement).

  Completely renew and/or replace mechanical and electrical building systems. Replace sprinkler system. As much as possible within the project budget, completely renew and/or replace plumbing systems, focusing on systems with high probability of failure.
- Façade and building envelope improvements, as deemed to be necessary.
- Structural analysis and engineering related to the scope of project, including the code compliance associated with the change of use of the existing building. Of note, replacement of the MEP systems may require a constructability and structural analysis to ensure mechanical systems can be reasonably replaced in existing confined space or may require structural modifications to allow installation of new equipment.
- Consider building entrance and site connections with respect to the renovation. Make improvements to the building and site as required.
- Study and analysis with respect to Art Storage. This will include the development of in building options versus off-site options. Also, this will consider cost, phasing, art relocation, art storage MEP systems, and building envelope.
- Assist in the evaluation of construction phasing and sequencing of the renovation, including impact to Art Storage.
- 3rd party cost estimates (to occur in parallel to Construction Manager cost estimates).
- The A/E Team should fully comprehend, advance, and develop the information contained in this RFP and referenced documents.

D. PROJECT BUDGET

A preliminary Total Project Budget (including escalation) for the project is as follows:

- Construction Cost:	*$30,400,000
- Soft Costs / Contingency:	$ 7,900,000
- FF&E / Audio Visual**	$ 2,100,000
Total:	**$40,400,000**

*Includes cost of any required demolition
** Furniture, Fixtures, and Equipment

E. PROJECT SCHEDULE

PSU will execute the Architect-Engineer contract shortly after the completion of the A/E selection process in March 2024. The programming phase will begin immediately and is anticipated to take 3 months. The

design/documentation phases will follow, taking roughly 12 total months. Final plan approval, bidding and construction phases follow and will take 18 to 20 months. The overall project schedule breaks down as follows:

RFP Issued to Short-Listed Teams (via email):	**January 22, 2024**
Optional Site Tours:	To be determined
Submission of A/E Proposals Due:	**Noon (EST) February 13, 2024**
Interview notice (via email):	by March 1, 2024
A/E Team Interviews (Steam Services Building, University Park, PA)	**March 22, 2024**
Website notice of top-ranked A/E via Appointment Complete Notice	April 2024
Contract Award/Letter of Intent:	**April 2024**
Initiate Design	Mid April 2024
Construction Start	**September 2025**
Construction Completion	December 2025
Building Occupancy	**January 2026**

F. PROJECT DELIVERY

The selected A/E Team will begin the project by finalizing the project objectives and authoring a final program, in conjunction with Penn State. This will include confirmation of the required spaces, sizes (including required classroom seat counts), and room-specific requirements. An initial program document titled "*Palmer Arts Backfill Program*" was created internally by PSU as an initial roadmap for the project. The initial program includes project and existing building conditions, space considerations, and site considerations. Excerpts from that document were used in the creation of this Request for Proposals (RFP) document and the entire "*Palmer Arts Backfill Program*" is included in this package. Additionally, as a part of the initial program, several 'test fit' floor plans were created in order to begin to establish the ideal classroom and room sizes that this renovation can accommodate. The existing floor plans and these 'test fit' floor plans are also attached to this RFP.

In parallel to establishing the program, the design team will be aligning scope to the project budget. PSU will require a minimum of three design options and will want the ability to compare/contrast the planning and renovation scenarios. Each option should be within the budget.

After the programming phase, the project will follow the standard design phases – SD, DD, CD and CA Phases in accordance with Penn State's standard 1-P agreement. The project budget and cost estimate(s) must align before advancing to each subsequent phase of the project.

The successful A/E Team will work in conjunction with PSU's selected third-party Construction Manager throughout the design and construction phases. There is the potential for the project to include PA Department of General Services (DGS) funding, therefore the project construction may be delivered with multiple prime contracting. If DGS funding is utilized on the project, PSU will still manage the design/construction process in a manner similar to non-DGS funded PSU projects.

The Owner's "Form of Agreement 1-P" will be used for this project. The prime firm (contract holder) of the awarded A/E Team will sign the 1-P Form of Agreement found at the following link. By submitting a letter of interest, firms pledge to agree to the Agreement's terms and conditions without exception or modification.

G. RFP SUPPORTING INFORMATION AND LINKS

- **Project-Specific documents:**
    - Program document titled "Palmer Arts Backfill Program", dated 8/25/2023.
    - Floor plans in support of the Program document. The plans are labeled "Existing Floor Plans", "Concept 1- Test Fit Plan", and "Concept 2 – Test Fit Plan".

- "An Exploration of Moisture Issues – The Palmer Museum", dated spring-summer 2007.
- Memo titled "UP-Repair building after fire protection system leak", dated 1/14/2021.
- Memo titled "Moisture Investigation, Existing Palmer Art Museum, University Park, PA", dated 4/13/2021.
- PSU will create a project-specific "Building Systems and Utility Scoping Document" for eventual incorporation into the project.

- **Form of Agreement.** Included is the link to our Form of Agreement 1-P: The Owner's "Form of Agreement 1-P"
  Please review this agreement to ensure that your firm accepts all terms and conditions as written. In submitting a proposal for this project, you acknowledge that you concur, without exception, with all terms, conditions, and provisions of Form of Agreement 1-P.

- **Design Phase Deliverables.** Reference this document under the heading *00 51 00 MISCELLANEOUS FORMS* at the following link:
  https://oppwiki.atlassian.net/wiki/spaces/OPPDCS/pages/5409499/Division+00+-+Procurement+and+Contracting+Requirements?preview=/5409499/5407947/OPP%20Design%20Phase%20Deliverables.pdf

- **Office of the Physical Plant (OPP) Standards.** This website provides information regarding specific design submission requirements and standards of the University. The University is willing to consider recommended exceptions to OPP standards due to the project type. Any such exceptions would need to be formally approved, in writing, by PSU OPP.
  https://oppwiki.atlassian.net/wiki/spaces/OPPDCS/overview

- **OPP High Performance Standards.** The University has a commitment to environmental stewardship with a focus on university and campus-wide carbon reduction and total-cost-of- ownership. Our projects require maximum consideration of potential sustainable and energy- efficient designs and specifications for architectural, site, utility, structural, mechanical, electrical, and plumbing disciplines. Refer to the following link for the University's high-performance standards that exceed building code minimum requirements:
  https://oppwiki.atlassian.net/wiki/spaces/OPPDCS/pages/5409436/01+80+00+PERFORMANCE+REQUIREMENTS

  A part of this is PSU's High-Performance Building Design Standards: Building projects shall comply with ASHRAE Standard 90.1 Energy Standard for Buildings 2010 version AND as superseded by more stringent requirements of ASHRAE Standard 189.1 Standard for the Design of High-Performance Green Buildings, 2011 version. This standard defines a minimum requirement of LEED Certified for this project. The project will consider additional sustainability or high-performance measures and innovations.

H. SITE TOURS AND PRE-PROPOSAL SUBMISSION CONTACT

PSU hopes to schedule tours of the inside of the existing building for the long-listed or short-listed A/E Teams. We will provide an update once available. If tours happen, the tours will not be mandatory.

Separately or related to the tours, all A/E Teams are welcome on their own to spend as much time as needed on campus. The building site and exterior are fully observable.

Contact Greg Kufner, University Architect, for any questions related to campus planning, design, or general questions on the A/E selection process questions.

Please do not wait until the tours to ask any questions that may be time-sensitive to the A/E Team's Proposal submission.

REQUEST FOR PROPOSALS - PART 2
PROPOSAL REQUIREMENTS

Deliver eight (8) hard copies of your Proposal to:

Shipping Address (Note that this address has changed):
Greg Kufner, AIA, AUA, NCARB
The Pennsylvania State University
135 Physical Plant Building
University Park, PA 16802

Deliver one (1) electronic PDF copy of the Proposal to:

Greg Kufner, AIA, AUA, NCARB - GAK21@psu.edu

and

Dave Peck, Facility Project Manager - dlp50@psu.edu

Hard copy and electronic submissions of the A/E Team's Proposals are due by Noon Eastern Standard Time on February 13th, 2024. Proposals received after this date and time may be automatically rejected. Proposals shall be provided in an 8.5"x 11" format. Limit submission to thirty-eight (38) single-sided pages maximum (19 double-sided), plus a two-page maximum cover letter. Double-sided printing is encouraged—10-point font type minimum.

A cover letter shall be provided from the proposed leader of the Prime (contract holding) A/E Team. The cover letter should be two-page maximum. The cover letter should include at least the following:

A. Legal name of the Prime A/E Team. If separate, legal name of the Architect of Record (stamping).
B. Primary office location of Prime A/E Team and Architect of Record, if applicable.
C. Contact information for the A/E team's primary point of contact (name, address, phone, and email).
D. A concise summary as to why the Team is best suited for this project.
E. Statement of certification that all information provided in the submittal is accurate.

Collate and bind proposals according to the following Proposal Sections:
Proposals shall follow the below format, in the order stated, to ensure that all pertinent information necessary for evaluation is included and easily comparable by the Selection Committee. The cover letter, table of contents, and divider pages will not count towards the RFP page limitation. **We encourage teams to be as brief as possible without sacrificing accuracy and completeness.**

Please refer to this re-occurring note throughout the RFP. This note applies to the entire Proposal submission:

*** Note 1: As applicable throughout the Proposal, provide professional credit to architectural partners (including design architect, architect of record, academic/planning partners) for all projects discussed within the Proposal and for all project images shown.**

PROPOSAL SECTION 1 – TEAM STRUCTURE

A. Identify the entire proposed A/E design team, including Prime (Contract Holding) firm, Lead Design firm (if different), architectural partners (as applicable), building system engineering firms, lab/academic planning consultants, and proposed specialty consultant firms. **If the Team proposes an architectural partner – either as an Architect of Record (stamping architect) or Associate Architect (where the Prime firm remains the lead designer and Architect of Record) – identify the roles and split/ sharing of project responsibilities for all firms involved.** A Pennsylvania registered architect must stamp the final construction and bidding documents.

Provide insights into the firm's unique qualifications/ characteristics, firm personality, design ethos/ philosophy, client notations of previous project success, etc.

For each firm, identify the firm differentiators, size, qualifications, and experience on similar projects, and identify each firm's role in this project. Identify past collaboration between prime firm and key engineers/consultants, including the number/ value of projects and the key consultants' added benefit to the Team. It is encouraged to create A/E teams that demonstrate previous successful collaboration and execution of projects like this one. While we appreciate firms with experience at PSU, we do not have a preferred vendor list and encourage the selection of high-quality engineers and specialty consultants. If proposed architectural/engineering/consultant firms do not have PSU experience, convey how the Team has previously incorporated the Owner's design standards similar to the Penn State Design and Construction Standards.

B. **Provide team organizational chart.** Include all firms and consultants and provide the name and role of key team members. Clearly identify which team members are designated for leadership positions on the Team. Please highlight Diverse Business Enterprise Program (DBE) representation on the Team. Refer to RFP Section 2.F., below.

C. **Provide role descriptions and resumes of key team members identified in the Organizational Chart**. Include registrations/ certifications, educational background, years of experience, and relevant project experience. Relevant project experience should include project size/cost, program type, project overview, and define each team member's role on each project listed on their resume. Emphasize each team member's most relevant experience and ideally highlight that the team member has had comparable roles on similar projects. Include at least two client references for each key team member. If possible, please avoid using Penn State employees as references. **Include resumes for at least the following key team members. If individuals serve multiple roles, identify multiple roles on Organization Chart and resumes.**

1. Principal in Charge (Project Team Lead)
2. Lead Design Architect (Lead Designer)
3. Project Manager (PSU's day-to-day point of contact)
4. Project Architect (Architectural Technical Lead)
5. Construction Administration Leader (Construction oversight leader)
6. Classroom designer | Academic programmer/planner | Lead interior designer
7. Lead landscape architect
8. Sustainability Leader and/or energy modeler
9. Lead Mechanical, Electrical, Plumbing/FP, Structural, Civil, design engineers
10. Cost Estimator

PROPOSAL SECTION 2 – TEAM QUALIFICATIONS

A. Provide a summary of qualifications and expertise of the firms with specific emphasis on:

1. Design Excellence, including national recognition. Distinguishing factors of team differentiation.
2. Experience delivering programs and/or projects of similar scope, scale, and complexity. **(See Note 1 above)**
3. Expertise in the renovation and/or adaptive re-use of existing buildings.
4. Expertise planning, designing and delivering state-of-the-art classrooms and lecture halls, teaching prep spaces, open student study space, specialized classrooms and/or art studios. Highlight team experience and/or insights into the building-specific programs. **(See Note 1 above)**

5. Knowledge/expertise with respect to the art storage component of the project and ability to perform the various analysis and studies with respect to art storage (façade and/or vapor barrier improvements, MEP systems, comparison of off-site storage, etc.).

B. **Identify a maximum of <u>ten (10) example projects</u> within approximately the last ten (10) years, that BEST exemplify the qualifications and expertise listed above for the proposed Team.** Include a brief description of each project, project gross square feet, project budget, final project cost, project completion date, and a client reference(s). **Show illustrative representation of the example projects, particularly those highlighting the work of the Team's proposed Lead Design Architect. Highlight projects that incorporated historical sensitive existing conditions or context, transformations of existing facilities, and/or projects with a similar mix of programs/uses. Captions of photos encouraged. (See Note 1 above)**

(Optional) If necessary, discuss any of the example project(s) that are highly relevant to our project in more detail. Include insights into what made these project(s) successful, including how those design intentions were translated into a meaningful and synthesized/successful solution.

C. **Project Relevancy Matrix.** Develop a matrix that illustrates the similarities between the example projects and this project. Please be as specific to our project as possible.

D. **People-Projects Matrix.** Develop a matrix to show the participation of key individuals on the proposed Team from the example projects. List individual's role on example projects.

E. **Diverse Business Enterprise.** The Pennsylvania State University is committed to and accountable for advancing diversity, equity, and inclusion in all its forms. Therefore, we encourage the participation of Minority Business Enterprises, Women Business Enterprises, Veteran Business Enterprises, Service-Disabled Veteran Business Enterprises, and LGBT Business Enterprises (collectively referred to as Diverse Business Enterprise (DBE) for Design Professionals.

A/E Teams are encouraged to include at least one (1) certified DBE design professional firm as part of their Team. In addition, if the proposing firm itself is a current Diverse Business Enterprise, the firm should state that fact in its Proposal. Below is a partial list of acceptable certifying agencies:

1. * Department of General Services Bureau of Small Business Opportunities (DGS BSBO)
2. Federal Department of Transportation
3. National Minority Development Council (NMSDC) or its affiliates
4. Southern PA Transportation Authority (SEPTA)
5. Women Business Enterprise National Council (WBENC)
6. Pennsylvania Unified Certification Program (PA UCP)
7. National Women Business Owners Corporation (NWBOC)
8. Minority Business Enterprise Council (MBEC)
9. National Gay and Lesbian Chamber of Commerce (NGLLC)
10. U. S. Department of Veteran Affairs (VOB/SDVOB)

* Or comparable state agencies or regulating bodies in other states or local jurisdictions.

F. List the Errors & Omissions insurance coverage limits of the lead/ prime entity of the A/E team. In addition, provide information on errors and omissions claims in the last (7) seven years.

G. Provide a historical breakdown of project performance for Prime Firm and Architect of Record (as applicable). Include a list of projects, delivery method, history of project budgets compared to completed construction cost, history of change orders, average response time to RFIs, and any other key metrics the Team deems most relevant to this project.

H. Acknowledge the review and acceptance of the attached 1-P Form of Agreement, ensuring that the A/E Team accepts all terms and conditions as written. In submitting a proposal for this project, the A/E Team concurs, without exception, with all terms, conditions, and provisions of this Form of Agreement.

PROPOSAL SECTION 3 – PROJECT APPROACH AND SCHEDULE

A. **Describe the A/E Team's proposed design approach for this project.** Be as specific to our project as possible. Discuss, at the least, the A/E Team's approach to the following:

1. Project visioning and project mission/goal setting. And the Team's approach to establishing a design process that works to achieve the project vision and goals.
2. Program validation and knowledge of the project brief. Additionally, describe any programming/building planning tools, benchmarking tools, and/or other firm-specific methodologies to assist in the design of our project.
3. How the initial programming project phase leads into the Concept Design and/or Schematic Design Phase of the project.
4. Developing building planning options and/or overall building design schemes. Approach to developing programmatic 'blocking and stacking' options that explore programmatic adjacencies.
5. Working with PSU to analyze, compare/contrast different design options.
6. Developing the interior/exterior "look and feel" of the transformation of the existing building, particularly the level of design advancement to expect at various project phases.
7. Use of BIM, "predictive modeling," analytical/ digital tools, and other technologies.

B. **Approach to project delivery.** At least, describe the A/E Team's overall approach to:
1. Achieving the project schedule.
2. Identifying key risks to the project schedule and strategy for mitigating such risks.
3. Planning, managing, and executing the project.
4. Building consensus and guiding stakeholders through decision-making processes.
5. Creating a collaborative environment between architects, building/site planners, engineering consultants, and PSU/OPP stakeholders.
6. Working with PSU's third-party Construction Manager throughout the design and construction phases. Describe previous success delivering projects with a CM. Identify potential innovative strategies to implement during the design, procurement, and construction of the project, while maintaining quality and uncompromised project goals.

C. **Approach to Cost Control.** Delivering our project on budget is critical. So, provide the A/E Team's approach to managing costs through all design and construction phases, especially considering escalating construction costs. Additionally, provide the following:
1. Highlight the Team's cost estimating process, scope/budget alignment, and cost/quality control through the design and construction phases.
2. Define critical factors concerning the project budget.
3. Provide the Team's impression of the project budget.
4. Identify key risks to the project budget and strategy for mitigating such risks.

D. **Approach to MEP and building system design.** A narrative approach to MEP planning/ design/ delivery of facility that will contain programs and space types as noted herein. Be specific with the Team's experience and highlight its project type expertise.

Discuss the building enclosure issues and/or vapor issues with respect to art storage. Discuss your approach to consider such improvements.

E. **Approach to Sustainability.** After reviewing PSU's High-Performance Standards, describe the Team's approach to driving toward PSU's sustainability goals on the project, including exceeding our standards. Highlight experience meeting similar high-performance standards and represent overall team commitment to sustainable design (including the number of completed LEED projects). Among other applicable topics, discuss the Team's approach and experience applying advanced sustainability measures, applying best practices in sustainable design, applying creative innovations to obtain the optimum performance for projects, and experience using energy models to drive design thinking.

F. **Approach to Penn State reviews, PSU design reviews**, and jurisdictional reviews. Anticipated jurisdictional reviews will include State of PA Labor & Industry. Local municipal reviews/ permits may be required, and the professional shall be responsible for securing these permits with the assistance of the University. Any fees associated with permits shall be paid for by the Professional and will be reimbursed by the University.

G. **Approach to Prevention through Design (PtD).** Safety is essential to the University during the facility's construction and post-occupancy maintenance/operation. Therefore, the University is stressing the implementation of Prevention through Design in this project. Share thoughts, experiences, and approaches to PtD. The LEED v4 Pilot credit for PtD will be mandatory for this project.

H. **Project Staffing/Workload.** Verify the entire A/E Team's availability to successfully staff the project immediately, given our project schedule and other team members' workloads.

I. **Graphic Schedule.** Create a graphic project schedule showing phase durations, owner engagement, review periods, and identify critical path items, milestones, and schedule drivers. This can be formatted on an 11x17 (fold-out) and will only count as a single page.

PROPOSAL SECTION 4 – PROJECT-SPECIFIC KEY DRIVERS AND IDEAS

A. **Project Understanding and Drivers.** Demonstrate the Team's understanding of the project. For example, provide observations of the project program, goals, or other information.

Describe key project drivers, critical design elements, and potential constructability considerations the Team has identified as a priority for this project. Discuss how the Team addressed similar issues on other projects.

B. **Project Insights.** Provide thoughts specific to the design of facilities as described in this RFP. Provide the Team's vision of what, beyond purely functional issues, constitutes the essence of the project. Discuss potential key issues in the design of this project.

C. **Program and Programmatic Goals.** Delivering a facility that successfully accommodates the various Departments and programs within state-of-the-art facilities is of the utmost importance. Describe the Team's programming, planning, benchmarking tools, and methodologies that the Team will use to test and ultimately achieve the stated project goals.

Provide firm-specific core values, design principles, etc., regarding key space types, including the following. Feel free to reference precedent project examples. **(See Note 1 above)**

1. State-of-the-art classrooms, including large lecture halls. As possible, discuss classroom prep spaces and/or high tech classrooms.
2. Instructional Laboratories
3. Specialized classrooms and/or art studios
4. Informal Learning spaces (student working and study space)

5. Art Storage and related components

D. **Provide initial design ideas, thoughts, or considerations regarding our specific project.** We are not seeking design solutions. We would rather see the Team convey its "design thinking" or unique insights regarding our project. Considerations may include thoughts/opinions related to:

1. The project site and/or campus linkages to consider with this project.
2. Point-of-view with respect to leveraging the existing architectural character versus the level of transformation that we should consider with this project. This can be focused on the building interior, exterior, or both.
3. Any other design considerations and/or inspirations

(OPTIONAL) PROPOSAL SECTION 5 – ADDITIONAL PROJECT IMAGERY

A. **(Optional) Additional Project Imagery.** Please feel free to include additional project images if pages remain within the Proposal. Photo captions are strongly encouraged.

Thank you for participating in this exciting project's A/E Team Selection process. We understand the commitment that each Team puts into their submissions. The Screening Committee reciprocates this effort in our detailed review and analysis of each Proposal.

We look forward to learning more about the Long-Listed A/E Teams and their project-specific approaches to determine which three (3) Short-Listed teams continue to the In-Person Interviews.

Kindest Regards,

Greg Kufner, AIA, NCARB

University Architect
The Pennsylvania State University (Note: shipping address for Proposals listed above)

CC: Palmer Repurposing Screening Committee

Palmer Arts Backfill Program

University Park

Palmer Backfill Committee
8/25/23

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INTRODUCTION

EXECUTIVE SUMMARY

This document has been prepared by a committee charged by William Sitzabee, Vice President of Facilities Management and Planning, to develop the preliminary program to backfill the existing Palmer Building following the museum move to the new facility. The committee membership is included in the attached charge letter. The charge included the guidance that "the best future use of the building is to convert former galleries into general and possibly also specialized classrooms." It was understood that these specialized classrooms would focus on instructional needs for teaching courses in the College of Arts & Architecture. Additionally, the committee was asked to consider how to accommodate existing art storage for museum operations and a chemistry preparation (chem-prep) facility to support chemistry and physics teaching in the Forum Building and possibly Palmer building. Given the proximity of any new chem-prep space, the committee also considered the need for classrooms that would include a lab bench necessary for teaching chemistry.

There are currently 373 General Purpose Classrooms (GPCs) on the University Park campus, a number that has been declining over the last decade and will continue to decline with upcoming capital plans that will decrease the number of classrooms over the next few years. GPCs are those classrooms that are scheduled by the Office of the University Registrar (OUR) and are allocated to all academic units with the goal of maximizing occupancy and optimizing usage. The reduction of classrooms already leads to classes that cannot be scheduled due to lack of space, a situation which will worsen with growing enrollments if more inventory is not added. The current GPC inventory includes only 24 rooms with a capacity over 150. These classrooms are heavily utilized with no open periods to accommodate additional classes.

Within the GPC inventory are CHEM-PHYS-prep classrooms that have a lab bench at the front and reasonable proximity to the prep room, which is currently a temporary trailer adjacent to the Forum Building. Current CHEM-PHYS prep classrooms are large, with capacities around 350, and are in high demand by other departments that also need large classroom spaces; we only have four classrooms with a capacity of over 350. CHEM-PHYS-prep classrooms can be used for any class but are given priority in scheduling chemistry and physics classes, which make it almost impossible for the other departments to get assigned to these classrooms. There are also inefficiencies when smaller sections are given priority in these larger rooms because of

the equipment needs. Creating additional CHEM-PHYS prep rooms, including smaller ones, would allow the GPCs in the Forum Building to be used by other departments and allow chemistry and physics to be in a space that is more suitable to their needs. It is particularly important to accommodate courses in the introductory chemistry and physics sequence because these are foundational to many high-demand majors, and students can face increased time to graduation if they are not able to access these classes in a timely manner to continue their sequence of classes in their programs. Alleviating some of the pressure on the Forum Building rooms would allow other departments to offer classes that are in high demand, but currently cannot accommodate more students due to the lack of large classroom spaces.

It is the nature of art instruction that their classroom/studio needs cannot be accommodated by GPCs because of the intensive use of materials, much higher sf/student requirements, and the need to have works in progress remain in the rooms for students to access at other times. These department rooms are scheduled by the departments and are not part of the GPC inventory for general use. A detailed analysis of the space needs of the College of Arts and Architecture (A&A) was beyond the scope of this committee and its expertise, but we did rely on several detailed documents (details below) going back to a 2011 A&A Master Plan. This included proposals to address space needs of the School of Visual Arts (foundational art studios; Digital Art and Media Design computer lab/studios; and additional studio space), Architecture and Landscape Architecture in the Stuckeman School (undergraduate studio courses, graduate research and offices and research centers), and a potential student services and advising center to serve A&A students. The college also faces its own challenges in securing large-lecture GPC space.

Executive Summary Recommendations

The committee recommends the selection of an Architecture and Engineering firm for program validation and design services. The initial stage of design will further evaluate and develop a program that meets the university budget of $27M total project costs. The below priorities shall be used as guiding principles in the program validation phase and are listed with highest priority starting first. Detailed information regarding each priority can be referenced within this document.

1. Design to a total project budget of $27M. Two space options have been provided, Option 1 indicating reprogramming of the entire facility and Option 2 indicating scope reductions to meet the budget. The future of space not reprogrammed as part of the project will be determined by the University Space Committee.
2. Correct building envelope deficiencies.

3. Replace sprinkler system.
4. Create GPC spaces prioritizing large classrooms. 1000 SF is the minimum size GPC.
5. Maintain existing exterior aesthetic of the building, and entrance plaza, while correcting exterior building envelope deficiencies. Maintain overall character of the existing/original lobby interior.
6. Create Specialized A&A classrooms and support spaces.
7. Renew mechanical, electrical, and plumbing (MEP) systems focusing on renovated areas and those with high probability of failure.
8. Create a permanent home for CHEM-PHYS-prep within Palmer or Forum. The temporary trailer may be removed from Forum should the budget support the effort.
9. Evaluate cost benefit of alternate solutions for art storage loading.
10. Maintain existing art storage in the building. Considerations include:
    a. Ability to maintain the temperature and humidity of the art storage, as/if the rest of the building changes function, as defined herein. This needs investigation early in the design process.
    b. Security considerations.
    c. Access and loading dock.

EXISTING FACILITIES/CONDITIONS

User-identified Existing Conditions

Stair tower

Accessibility legislation requires that stairs have graspable handrails on both sides, that rails have specific end geometry and that handrails continue horizontally at landings. Although stairs in Palmer were code compliant with the code enforced at a previous time, a major renovation may trigger replacement of handrail, guardrail, and infill of risers.

Sculpture Garden

The sculpture garden shall be reimagined as part of the project, though the project budget will dictate scope to be performed. Internal Stakeholders from OPP/PDP and Arts and Architecture (A&A) met to explore what the options exist for this space. In each option, the desire to eliminate backlog and maintain a pathway for CHEM-PHYS-prep carts to and from Forum and Palmer is required.

- Refresh the existing sculpture garden and create an inviting outdoor study space. Install steps through the existing Palmer retaining wall creating a pathway from Forum.
    - May include opportunity to incorporate donated art to maintain feel of A&A district.
- A&A student sculpture garden use for temporary art displays while maintaining the existing quiet and inviting setting.
- Potential to extend the Mckee St. bike route. There is currently a route through the garden and front entrance of Palmer, but it requires navigating steps or the ADA ramp.

Art Storage

In consultation with Charles Harrison and underwriters representing Huntington Block, the art Insurer for the Museum, the Director and Registrar at the Palmer Museum of Art, and in compliance with current Palmer Museum standards and practices, we created the following requirements for the Art Storage space that is to remain in the existing Palmer building on Curtin Road.

1. Environmental systems must be at least equal to those provided at the museum's art collection facilities for temperature and RH controls. (70 deg Fahrenheit, 50 % relative humidity)
2. Planned utility interruptions affecting temperature and RH systems should not exceed 6 hours in duration during spring and fall seasons or 4 hours in duration during summer and winter seasons.
3. The art storage room must have burglar and fire alarms reporting of the same type of central station as those used at all other art collections facilities, i.e., it must be a fully staffed and monitored central station.
4. The facility should meet all standards and professional best practices of the American Alliance of Museums (AAM).
5. The secure path from the loading area to Art Storage needs to be a minimum of 74" wide x 108" high. (Please note the path through the stairwell, as identified on several sketches, does not have the clearances required. Art must be moved through Lobby)
6. The Underwriters will require on-going security measures as follows:
    a. Must have a secure perimeter for the storage room and path to/from the loading dock with only Museum personnel having access.
    b. Non-Museum employees should not have access to the art storage room without Museum personnel escort under any circumstances.
    c. The Palmer will control access and pre-approve all individuals who can have access to the storage space.
    d. Maintain video surveillance of the storage in the existing Palmer building from the security office located in the new museum (cameras at all entrances and perimeter). Currently the security personnel can see video feed from the off-site storage facility at CATO Park. We need the same capabilities for the storage in the existing Palmer building.
    e. Underwriters are very concerned about the idea that a chemistry lab may be situated in the same building with the museum's collections. Regarding the chemistry lab that may be in the same building, Underwriters have concerns especially due to, but not limited to, potential fire exposure. Underwriters would need to know the following:
        i. The total Fine Art value of works that will be in the art storage room.
        ii. Details on the size of the proposed lab.
        iii. Types of chemicals that would be used.
        iv. Where the lab will be located in the building.
        v. Will there be fire doors separating the lab from the museum's storage room/area?

vi. A copy of the proposed floor plan.

f. Chemicals used in the building must not off-gas into any air ducts that are shared with art storage spaces.

g. The building must have a robust Integrated Pest Management program (IPM) including:
   1. No food/drink in spaces adjacent to the art storage room (currently 1st and 2nd floor galleries of 1993 building).
   2. No composting receptacles near art storage, preferably none in the building; if composting receptacles are in the building, they must have lids and be emptied nightly. Spaces where food and drink are permitted in the building must be cleaned daily.
   3. Defined protocol for monitoring the space for pests and reporting results to Palmer staff.

Relocation of Art

There are 2,400 objects that will remain in the art storage room in the museum building on Curtin Road, valued at around $14 million. For comparison, Cato Park currently holds about 1,100 objects, and the new museum will hold and display about 800 objects plus all the works of art on paper (about 6,000 works). Should art need to be temporarily relocated out of the current Palmer building it would be about 3 times the scale of our move to Cato Park. The order of magnitude is akin to the move to the new museum; although we are moving many more works on paper to the new museum, the packing of them is not quite as demanding as packing 3D objects.

Works to remain at the current Palmer Museum of Art storage room:

Approximate numbers:	Works to remain in current building	Works going to new museum
Framed 2D works	600	270
Miscellaneous 3D works	540	320
413 coins, 175 jades, 106 weights	700	
Boxed textiles	50	
Works on paper in drawers	175	6000+

Fountain	1	
Bench	1	
Works on loan (not analyzed)	340	90

Overall, this move would be about 3 times the number of objects we are moving to the new museum (excluding the works on paper storage vault). A mitigating factor is that the coins, jades, weights, and textiles (about a third of the total number of objects to be moved) are already partially packed and would need minimal additional packing for a move.

For the new museum move, we are allowing about 6 – 8 months for 4 preparators to pack about 750 works; registrar staff and interns are helping to pack the works on paper storage vault contents (6,000 works).

To pack 3 times the number of works, and taking into consideration that about a third of the works are already semi-packed, a timeline might be 12-18 months for 4 preparators and 1 registrar working on this full time to pack the works, with contractors coming in to move the works off-site at the end of that period. We would need to increase the prep staff by at least 3 full time (while retaining the current 2 fixed-term positions) and the registration staff by 1 (while retaining the current fixed-term position).

Chemistry and Physics Preparation Space

Forum building has been upgraded to better support Chemistry and Physics instruction with a temporary prep space in the form of a lab trailer. Forum and Palmer are adjacent buildings and will require permanent programming for CHEM-PHYS-prep, a pathway to each building, and appropriate classroom will be maintained. A cart is used to transfer chemicals and other materials to each classroom from the prep space. The program validation phase should determine best options in creation for the prep room – creating space within Palmer or an addition to Forum seem logical. The CHEM-PHYS-prep program is to accommodate two 6' fume hoods, two flammable storage cabinets, acid cabinet, eye wash and shower, two sinks, two desks and storage. If this space is programmed into the Palmer building, it would require HVAC separation from Art Storage and should budget support; the existing chemistry prep in Forum should be removed.

Other Known Existing Conditions

Sculpture Garden

While the sculpture garden is used regularly, there are existing conditions needing to be addressed. The large trees creating a private shaded feel, which are remnants of the original Hort woods, are in good condition, but the roots are causing trip hazards in multiple areas. Under the existing pea gravel, a deteriorating asphalt surface exists and is exposed where gravel is not maintained; the ground surface should be restored to modern technology and plantings. The retaining wall adjacent to Forum, which matches the finish of Palmer building, shows signs of efflorescence and spalling; restoration should occur as part of the renovation. Overgrown evergreens provide screening of an existing transformer and should be replaced as part of the project. The garden is ADA compliant but could use some enhancements depending on the new layout of the garden.

Building Exterior and Envelope

Vapor Barrier

The 1990 addition employs an interior-facing, foil-faced gypsum vapor barrier system with taped seams. Below the roof, the vapor barrier system is a separate layer of construction located above the finished ceilings but below the metal roof deck. The original design intent was for a cold attic with naturally ventilated, unconditioned air between the roof plane and vapor barrier plane. At exterior walls, the vapor barrier is an inward-facing 5/8" insulation board located between the interior finishes and exterior finishes. The air barrier in the attic has leaks allowing moist conditioned air into the attic that resulted in condensation and damage to interior finishes. To help with the remediation, some of the natural ventilation paths at the roof ridge were intentionally blocked.

Additional commentary/recommendations:

1) The current HVAC system and building envelope is designed to maintain interior humidity levels at 50% year-round. The vapor barrier above the gallery ceilings (foil-faced GWB) has many penetrations and has delaminated in some areas, allowing leakage and condensation. Recent repairs were made but not all conditions were corrected. Even if the HVAC systems are replaced, the project should strive to provide continuous air, moisture and thermal barrier layers.
2) Removal of existing gallery ceilings will expose more of the vapor barrier conditions which may allow repair.
3) Unlike adjacent gallery spaces that may be reconfigured into occupancies that will not require dedicated humidity controls, the Art Storage (Room 116) will continue to require interior humidity levels at 50% with constant temperature year-round. The exterior wall in RM 116 has a vapor barrier but the interior walls and ceilings may not. If the conditioning of air in spaces adjacent to, and above, Rm 116 is no longer humidified similarly, then an

interior vapor barrier may be needed to separate humidified art storage air from non-humidified air in adjacent interior spaces. Connection to existing air and/or vapor barriers in the wall will be critical.

Masonry

The brick face overall is in good condition though there is spalling, staining and dampness in several areas, with some cracks and damaged precast elements.

Windows are original to the construction dates of 1970/1990 and should be evaluated for condition. Many windows in the 1971 building are blocked by interior wall construction. Insulated glazing units at 1990 West Stair tower are discolored/fogging.

Exposed concrete at foundations and cheek walls, which receive a coating periodically, are in good condition. There is minor concrete spalling/delamination at 1990 loading dock.

Entrance Plaza

The colored coating was removed at the plaza around 2014 possibly due to slips and maintenance concerns.

Interior Building Considerations with respect to re-purposing the building

Building Entrance

Originally styled and programmed as a museum, the building has a strongly defined front and only one public entrance. One entrance was necessary for control and security. But, given the change of use of the building, it may be ideal to provide a second main entrance into the building. This would have to consider the original character of the exterior and interior of the building and would have to be done in consultation with the University Architect.

Building Lobby

The entry sequence and link to the Lobby would have to be looked at with respect to the number of students/people in the building, especially related to the general-purpose classrooms. The existing lobby space could be constricting.

Existing loading dock and Art Storage

The existing loading dock and art storage spaces, whose functions will remain in the building, are not directly adjacent to one another. The "art path" that connects them currently goes through the Reception, Lobby and public toilet corridor spaces and would typically be used when the museum is closed or after hours.

a) Although the museum staff won't be in the building every day, if the building is open 7 days per week and/or has extended operating hours for students, this could create a conflict with moving art.

b) Changing the art path for a more direct connection between these existing program elements might be feasible but would require reconfiguration of some of the existing spaces.

Summary of Existing Sprinkler System

The existing fire protection system within the Palmer Art Museum is a dry pipe pre-action fire suppression system. There are two risers that serve the building, a 4" and a 6". The 4" serves first and second floor galleries on the northwest side of the building. The 6" serves second floor galleries and third floor offices on the southeast side of the building. The system does not contain nitrogen and does not contain water normally but fills with water upon detection of a fire.

Issues with the Existing Sprinkler System

A common issue with dry pipe pre-action systems is that small amounts of water can collect in the piping over time. During 2020, there was an incident where the existing dry sprinkler system experienced a pin hole leak caused by corrosion. During an alarm event, the pipes filled with water and flooded lobby and galleries, which caused significant damage. Rhino Fire Protection Engineering was brought on-board to investigate the issue. They determined that the leak was caused by both Microbiologically Induced Corrosion (MIC) and oxidation and stated that more leaks may form in the future.

Recommendation of Wet System

Rhino provided three different solutions to the sprinkler pipe corrosion issue, which include: supply the pre-action system with nitrogen instead of air to minimize MIC-causing bacteria from proliferating; replace the pre-action system piping either partially or entirely; and replace the pre-action system with a wet system that has black steel piping, which is less susceptible to corrosion as compared to galvanized piping. They recommended the third option be pursued because it is least likely to fail in the future and the piping could be replaced in phases.

Wet System - Cost for Replacement

An ISES (Intelligent Systems & Engineering Services) analysis of the Palmer Art Museum was made in August 2022. Based on the issued ISES report, escalation, design fee, and other factors, the estimated cost for replacement of the existing dry pipe pre-action system with a wet pipe system is about $900,000.

Building Envelope Improvements

The University invested in a temporary fix to remediate condensation issues within the building, which was suggested by Simpron Gumpertz & Heger (SGH) consultants. The project should develop a cost/benefit analysis to determine an appropriate path forward.

Hazardous Materials

Previous renovations within the facility have abated hazardous materials when discovered. Due to the scope and scale of the proposed interior renovations, it is suspected that hazardous materials will be discovered, and abatement will be required. The original roof is suspect for ACM with potential for PCB caulks and should be abated as part of the project. Exterior masonry caulk is suspect for ACM or PCB; once the project scope is determined the caulks should be tested, which may then require abatement.

Roof, Roof Drains and Fall Protection

The original 1971 facility contains a large portion of ballasted roof that was replaced in 1999. This section is projected to be at the end of its life in 5-8 years. This section also contains an exhaust fan within a few feet of an unprotected roof edge. The 1971 original building includes four separate lower sections of unballasted roof whose drains are often blocked due to lack of safe access. The 1990 addition features sloped metal roofs that are original to the construction and should be evaluated for condition and color fading. Snow guards at these roofs should be inspected for condition. Roof edge metals on the 1990 addition are showing discoloration at seams. Although the sloped roofs are accessible by lift from adjacent grade, there is a flat section of roof concealed by the sloped metal roofs that is accessed from a roof hatch and surrounded by 42" high walls. The roof hatch and access to it needs to be reworked due to safety concerns. Roof access and fall protection for the entire building should be assessed and improved.

Vertical Transportation

A three-stop, 2,000-pound passenger and three-stop, 6,000-pound freight elevator exist in the facility and are reportedly modern and in good working condition. Due to the change in program and floor plate, it is likely that a larger-sized elevator will be needed.

Existing Electrical system

The service entrance equipment (480V switchboard and 208V MDP) is fed from two normal feeder breakers at the 480V Siemens service entrance switchgear within the main electrical room of the adjacent Visual Arts Building. The 208V service steps down at a transformer within the Visual Arts main electrical room.

Most of the existing main electrical distribution equipment is at or past its expected service life and should be replaced. This aging equipment includes one fusible 480V main switchboard in room P002, two 208V distribution panels in room M104, the emergency automatic transfer switch (ETS 300), and several sub-panels.

The MCC in the mechanical room, M002, should also be considered for demolition and removal. Replacement should be with a comparable (600A, 480V) distribution panel dedicated to serve mechanical equipment. This work is recommended to coincide with mechanical equipment upgrades that include the installation of VFDs.

Dedicated electrical equipment space that is easily accessible should be provided for the equipment in M104. Alternatively, the electrical service could be reduced to one 480V feeder from Visual Arts with transformation to 208V on the load side of a single service entrance equipment lineup. This electrical space would need to be coordinated and designed, whether it could all be located in P002 or spread between P002 and another new electrical room.

The Palmer Art Museum has two normal electrical service entrance points. One is in the original building mechanical room (M104) at ground level, and the second is in electrical room P002, located at the west corner of the basement (part of the addition footprint). The emergency electrical service entrance point is in mechanical room M104 at a disconnect switch that feeds the automatic transfer switch ETS300. The emergency source is Panel NEDP in Visual Arts, which is supplied by the campus emergency distribution system.

The original building is supplied by a 208V feeder from a dedicated low voltage transformer in the Visual Arts Building. The service entrance equipment in M104 is original to the Palmer Building, circa 1973. It consists of main distribution panel SDG, which is 1200A, 3P 4W 208Y/120V and manufactured by Federal Pacific (FPE). It serves several panelboards throughout the original building, adjacent panel PG, and the normal source to ETS300. Panel PG is a FPE distribution panel rated 400A, 3P 4W 208Y/120V. It serves an elevator, hot water pumps, and air handling units.

The emergency automatic transfer switch is an ASCO 7000 series rated 70A. Age needs to be determined.

The service entrance equipment in room P002 consists of a GE AV Line fusible switchboard, rated 1200A 3P 4W 480Y/277V. This service entrance equipment is fed from the main switchgear in Visual Arts. The GE equipment was installed with the building addition around 1993. This switchboard serves the MCC in the adjacent basement mechanical room and several branch panelboards.

The MCC in mechanical room M002 is a GE 8000 line rated 600A 480V 3P 3W. It serves AHU's 1-12, FAHU-1, pumps 3-7, Chiller 2, and several fans.

Panelboards in the shop area appear to be about 30 years old, but in good condition. They can remain in use for the next 5-10 years. Types and ages of branch panelboards throughout the facility have not been documented in this report.

Electrical Systems: Conditions and Recommendations

Room M104

The FPE equipment is past its useful life and obsolete. Replacement parts cannot be reliably sourced for repairs. Therefore, panel SDG and PG should be replaced. Any other FPE panelboard discovered throughout the building should also be replaced. Consider, as part of this work, removal of the original 208V service.

The emergency ATS is in acceptable condition based on the most recent maintenance records. However, the controller (and related support) is being phased out by the manufacturer. It is recommended that this ATS be replaced with this project or in the next 5 years.

The space within M104 is inadequate for working clearances and for servicing electrical equipment. It is recommended that replacement equipment be relocated to a new electrical room or collocated with the 480V service entrance equipment. The emergency equipment should stay as close to the existing service entry point as possible, but be installed in a separate, rated room.

Potential Consolidation of Electrical Services

Remove existing 208V service from Visual Arts. Provide new 208V distribution equipment fed from a new transformer off the 480V service within the Palmer Art Museum building. Design is required to evaluate this option and the associated equipment layouts.

Room P002

The GE Fusible switchboard is recommended for replacement due to age and condition of equipment. Preventative maintenance records indicate this equipment is showing signs of corrosion and rust and is not considered reliable. It is recommended that this equipment be replaced with a new 480V 1200A switchboard, with circuit breakers. Service entrance equipment ratings should be evaluated based on historical load data, programming, and potential consolidation of Palmer services.

Conduits, pull boxes, and wire troughs at the entry point of the service should be inspected for moisture. All conduit entry points should be confirmed to be sealed and corrected as necessary.

The door to this room does not have panic hardware. This should be provided.

Emergency lighting needs to be provided at existing overhead fixtures and a supplemental wall pack should also be installed.

Rm M002

The MCC is recommended for replacement in conjunction with VFD installation. PSU does not perform maintenance on MCC's and replacement VFD's are not recommended for installation within MCC buckets. Therefore, this equipment should be phased out and replaced with distribution equipment containing circuit breakers. There are no evident issues with the MCC, but it should be replaced with a distribution panel as the majority of its mechanical loads are renewed.

Existing HVAC Systems Summary:

The primary Heating, Ventilation, and Air-Conditioning (HVAC) system consists of 16 belt-driven, constant-volume, air handling units utilizing heating hot water and chilled water coils. AHUs 4-12 are supplied with conditioned outside air from FAHU-1 in fixed quantities and a common relief fan. The remainder have direct connection to OA with economizer dampers and direct relief to outside.

A recently installed rooftop package unit utilizes DX cooling and electric heating of the mechanical loft/attic space to pressurize and prevent condensation due to wintertime humidification of museum spaces.

Axial and propeller exhaust fans handle restroom and general exhaust.

Supplemental perimeter and space heating is handled by hydronic unit heaters and baseboard heaters.

A dust collection system serves the workshop and is likely original. It is not required for future programming.

Campus chilled water (43^{0}F Summer, 48^{0}F winter "free cooling") enters the building in Mechanical Room M002 and is circulated via four base-mounted pumps, two 15 hp primary building pumps and two 3 hp branch pumps to air handlers and fresh-air intake unit.

High pressure (100 psi) steam from the central plant is reduced to low pressure (< 15psi) at a pressure reducing valve to serve steam to water heat exchangers for domestic and heating hot water, as well as direct steam humidifiers at the air handlers.

Heating hot water is generated via three shell-and-tube heat exchangers utilizing low-pressure steam and circulated throughout the building via two main 5-hp, base-mounted pumps with additional support via five inline, branch, heating hot water pumps. Hot water is supplied to air handler coils, unit heaters, convectors, and baseboard heaters.

The majority of the HVAC distribution network consists of insulated ductwork, insulated mechanical piping, valves, etc. Much of the distribution network is original but should remain viable for the next ten years.

The HVAC controls are direct digital (DDC) manufactured by Automated Logic and were updated around 2015.

HVAC Conditions and Recommendations

Much of the existing HVAC equipment is at, or past, their expected service life and should be evaluated for replacement. This aging equipment includes 12 of the 16 AHUs, the fresh-air-handling unit (FAHU), chilled-water, and hot water pumps, and at least one of the steam-to-water heat exchangers (HTX-1).

Newer units AHU-13, -14, and -15 in room M104 were installed in 2002 and could remain for reuse if space occupancies and use d not change, or if appropriate for reprogrammed spaces. These units currently serve non-gallery spaces in the original three-story section of the building.

While all existing air handlers are currently operational, their suitability for the reprogrammed spaces with respect to current mechanical and energy codes, and Penn State's commitment to

energy reduction should be considered. It would be difficult to meet current energy efficient operating requirements with the existing systems, which are largely single-zone, constant-volume and constant-volume reheat systems, most without economizer, and none with energy recovery capabilities.

Air-handlers and air distribution ductwork should be designed to best serve new spaces according design load conditions, required ventilation, zoning, and occupancies. Existing ductwork and piping may be reused where possible with the new HVAC systems.

Existing HVAC DDC control system components can be reused as appropriate but should be evaluated for replacement due to technical obsolescence.

To the greatest extent possible new/replacement HVAC equipment shall be located in existing, indoor, mechanical equipment spaces. If new mechanical space is required, it must be incorporated into the building programming during the schematic design phase of the project.

Existing Plumbing Systems

Potable water supply, sanitary sewer, and stormwater handling systems serve this facility. The supply piping is rigid copper with soldered connections. The drain piping is cast-iron with hub-less connections. The majority of the supply and drain piping are original and in overall good condition. A sewage ejector pump system in the basement mechanical room is likely original. A backflow preventer serves the fire suppression system. Installed in 2013, it should remain viable for the next ten years.

Restroom plumbing fixtures include wall-hung lavatories, tankless water closets, and urinals. All of these fixtures, as well as the kitchen sinks, are in satisfactory working condition.

Plumbing Systems Conditions and Recommendations

Plumbing fixtures, including restroom fixtures and water coolers, should be evaluated for compliance with the International Plumbing Code and ADA requirements. Replacement and/or additional fixtures shall be provided where required based on anticipated occupancies.

Budget Information

The anticipated cost to renew the facility to the anticipated program was estimated at $40M. Due to limitations of Capital funding availability, the total project funding is $27M. The design and construction team shall work to deliver a program that balances the budget and considers the prioritized guiding principles.

Total Project Budget	$27.5M
Construction	$19.3M
Soft Costs / Contingency	$4.09M
FF&E	$1.1M
Escalation	$3.0M
Swing Space	$0M

Funding Sources:

Capital FY 25-26	$21M
Reserves	$6M

Schedule

USC preliminary submission: 8/25/23

USC final submission: 9/15/23

USC committee meeting: 9/20/23

PDRB Gate 1 (programming): TBD

PDRB Gate 2A (schematic design): TBD

PDRB Gate 2B (design development): TBD

PDRB Gate 3 (construction document) TBD

PDRB Gate 4 (construction): Target 6/1/25 - 11/1/26

SITE CONSIDERATIONS

SITE

The building sits along Curtin Road between the Forum and Visual Arts buildings. It is essentially at a crossroads where many pedestrians and bikes travel north/south from Park Avenue (to the north) to College Avenue to the south. Curtin Road, which runs east/west, is one of the significant connector corridors on the campus, which accommodates many cars, CATA busses, the Campus Shuttle, and many pedestrians and bicyclists.

A large concrete plaza in front of the building seems underused and acts as a plaza one walks through to get to a destination rather than a destination spot. The existing outdoor sculpture garden is between this building and the Forum and could provide a unique, private experience for the campus community. The back of the building is another undefined space with loading areas for neighboring buildings, including the Stuckeman Family Building, Visual Arts, and the Ceramics Building.

PEDESTRIAN AND VEHICULAR ACCESS AND PARKING

This building is in a campus area with some of the highest traffic and pedestrian counts. A main pedestrian route next to the building connects facilities to the north and the College Heights neighborhood on the other side of Park Avenue, with central campus buildings such as the HUB to the south. The sidewalks along Curtin Road are also very busy with pedestrians, bikes, and people using scooters. It is important to consider future design options that help improve pedestrian safety and mobility options.

Similar to other buildings on campus, parking is planned for wholistically, with parking garages servicing areas of campus. There is service vehicle parking for Physical Plant trucks and ADA parking nearby.

The existing loading dock is accessed off Curtin Road. This area is small, and turning movements are limited, requiring trucks to back into the loading area from Curtin Road. This can be dangerous to pedestrians and problematic for buses and cars on Curtin Road. This loading area also contains ADA and service vehicle parking, which further complicates turning movements and may increase the risk to safety.

ZONING AND PERMITTING

This building is in the University Planned District Zone (UPD) Subdistrict 5. This subdistrict encompasses the core campus area, allowing for the tallest buildings and most intense development. The permitted building height is 90 feet. Impervious surface and open space measurements are not counted on a building-by-building or project-by-project account. Instead, it is measured in the entire subdistrict, allowing some areas to have more impervious surfaces. The allowed impervious area for the subdistrict is 50 percent.

A traffic study may not be required for this renovation project. To be exempt from a Traffic Impact Study, it will be necessary to write a memo from a traffic engineer to the Borough to verify if this new use for this building will generate no more than 75 new vehicle trips during the peak hour on the adjacent roadways and no more than 750 new trips in an average day. Include a comparison of the trip generation between the existing and proposed use based on the latest edition of the ITE Trip Generation Manual and a summary statement of the traffic impact the project will have.

SPECIAL SITE CONSIDERATIONS

Because the back of the building shares a service driveway with other facilities, it is possible to relocate the art storage loading dock to the back. This will create internal building efficiency by eliminating the need for long hallways to move art securely. It will also allow the loading dock removal from the front of the building along Curtin Road, which could cause traffic issues and potential pedestrian conflicts. There are a few site options to consider when relocating the loading dock to the back of the building.

OPTION 1

Pros

- Retains existing ADA and service parking
- Retains direct pedestrian connection to Visual Arts Building
- Bridges over existing steam line
- Minimizes the visibility of the loading dock with added vegetation
- Avoids stormwater infrastructure

Cons

- Pedestrian conflicts at loading dock driveway
- Drivers may need to back into area from existing service parking and negotiate turns

OPTION 2

Pros

- Retains direct pedestrian connection to Visual Arts Building
- Minimizes open space loss
- Consolidates loading dock access points
- Provides additional ADA and service parking

Cons

- Pedestrian conflict at loading dock driveway
- Truck operators will need to back in from existing parking lot
- Direct visual of loading dock from parking lot
- Existing steam line is no longer covered by concrete – vegetation will most likely die
- There is need to be a structural support over the stormwater infrastructure

OPTION 3

Pros

- Consolidates loading dock access points
- Provides additional ADA and service parking
- Retains cover over steam line
- Provides loop drive for dock access
- Retains ADA and service vehicle count

Cons

- Pedestrian conflict at loading dock driveway
- Direct visibility of loading dock from parking lot
- There is need to be a structural support over the stormwater infrastructure

APPENDICES

Appendix A: Site Plan with Utilities

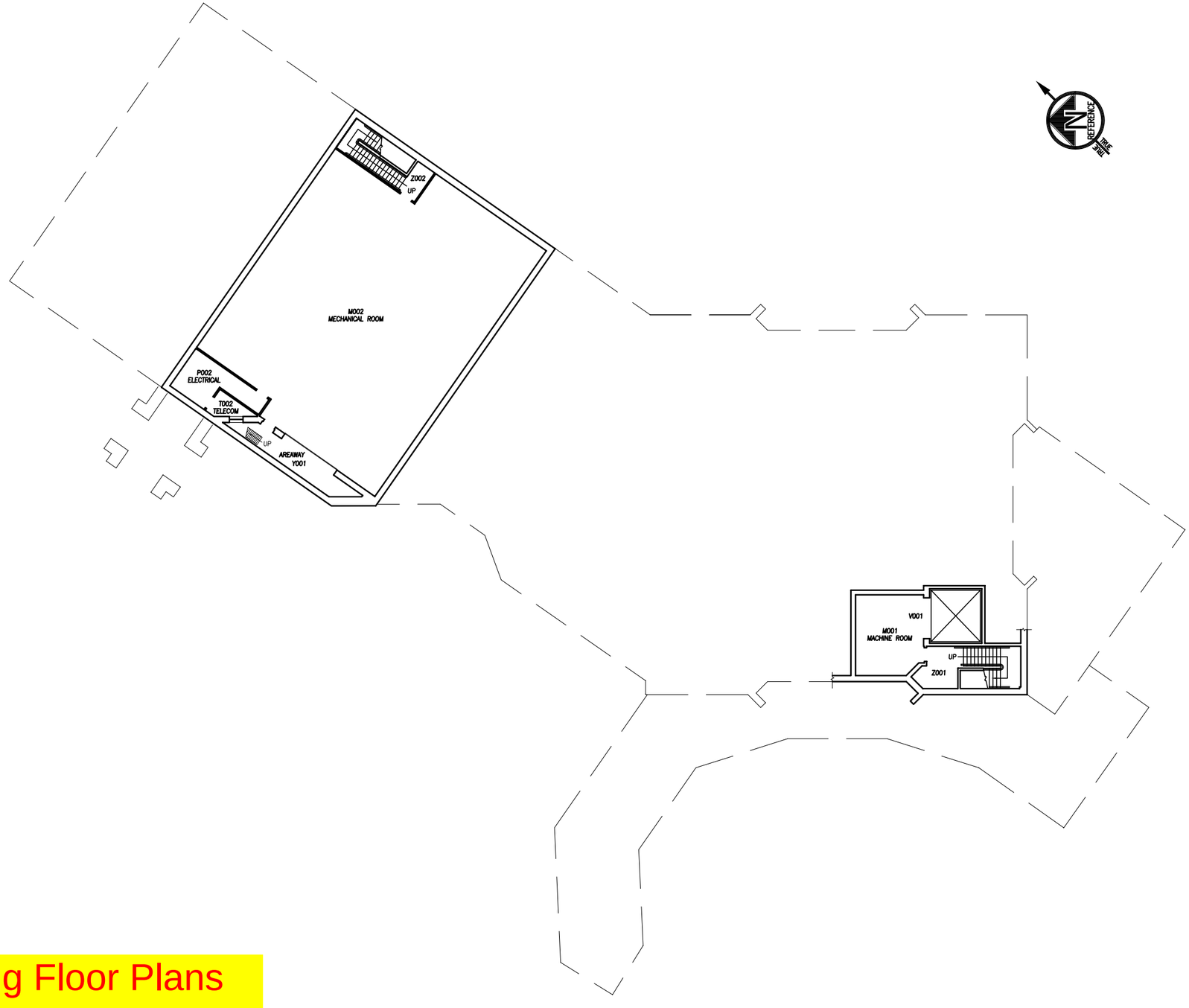
This will be provided as an additional supporting document - contact Project Manager

Appendix B: Building Plans / Schematic Drawings

Drawings are available in .pdf upon request.

Appendix C: ISES Facility Condition Analysis

This will be provided as an additional supporting document - contact Project Manager



Existing Floor Plans

PALMER MUSEUM OF ART
PSU BUILDING NAME

BASEMENT PLAN
BUILDING FLOOR LEVEL

UNIVERSITY PARK CAMPUS, UNIVERSITY PARK, PA
PSU CAMPUS LOCATION

PENNSTATE
FACILITIES RESOURCES AND PLANNING
THE PENNSYLVANIA STATE UNIVERSITY
BENEDICT HOUSE
UNIVERSITY PARK, PA 16802
OFFICE: 814.865.1595
FAX: 814.865.1610
www.facilities.psu.edu

SCALE 0 4' 8' 12' 16' 32'

06/23/92
CREATION DATE

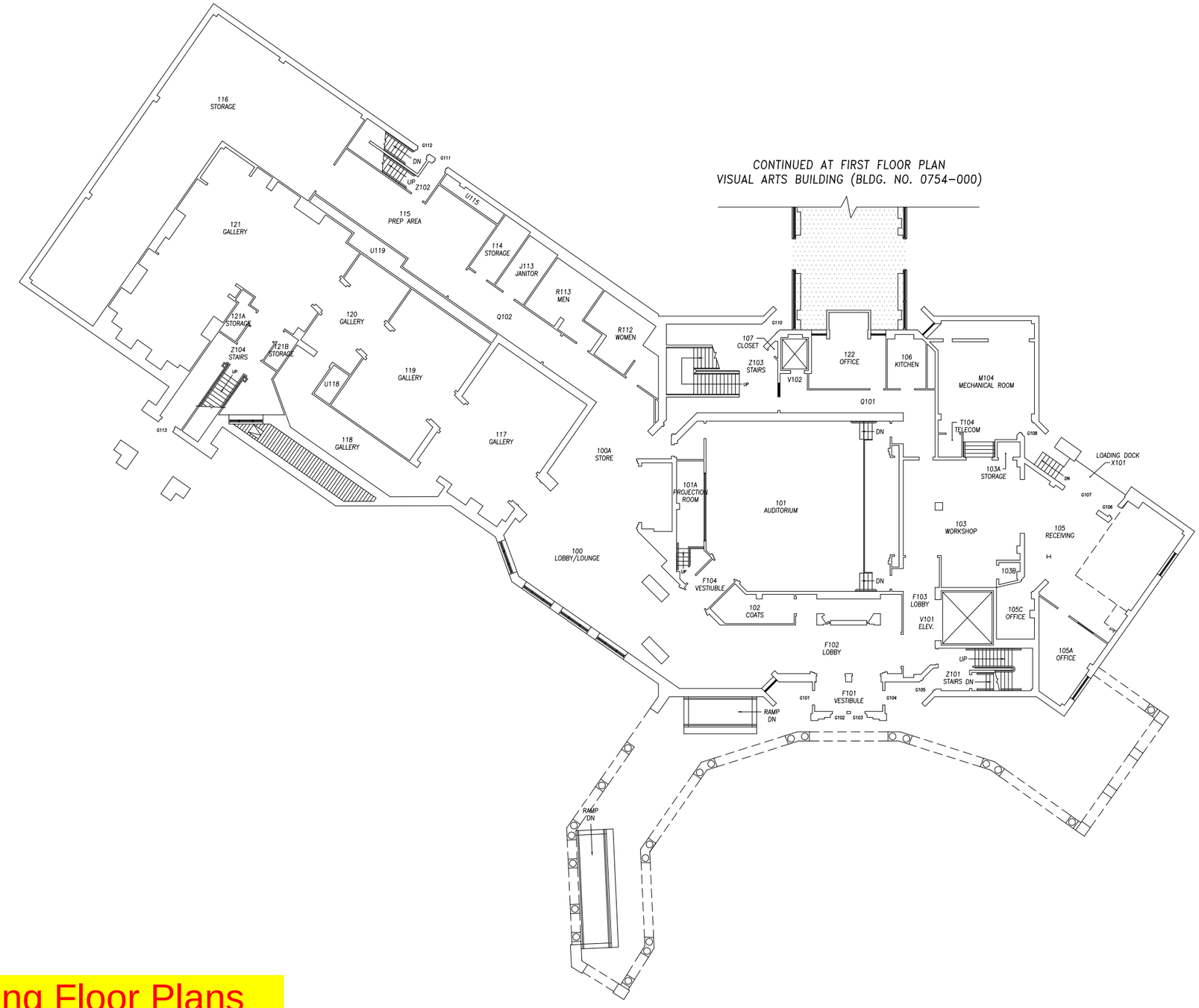
11/22/11
REVISED DATE

Campus block plans are for referential use only. Drawings are not to be used for architectural or engineering purposes.

0755-000
BUILDING NUMBER

1 OF 6
SHEET NUMBER

BS
FLOOR LEVEL



Existing Floor Plans

PALMER MUSEUM OF ART
PSU BUILDING NAME

FIRST FLOOR PLAN
BUILDING FLOOR LEVEL

UNIVERSITY PARK CAMPUS, UNIVERSITY PARK, PA
PSU CAMPUS LOCATION

PennState
Physical Plant

PLANNING | DESIGN | PROPERTIES

SCALE 0 8' 16' 32' / 4' 12'

6/23/92
CREATION DATE

12/13/18
REVISED DATE

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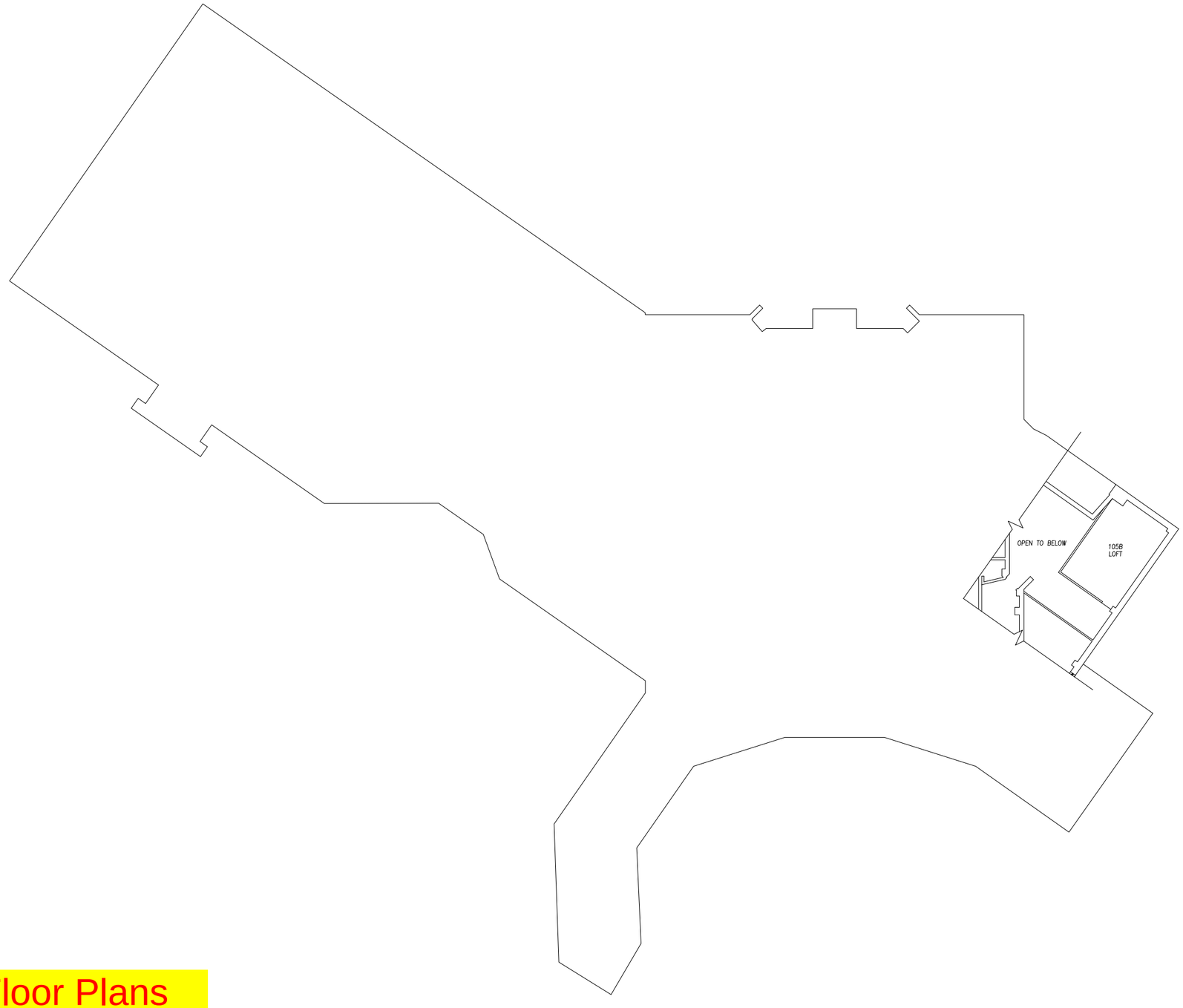
0755-000
BUILDING NUMBER

2 OF 6
SHEET NUMBER

1
FLOOR LEVEL



Existing Floor Plans

PALMER MUSEUM OF ART
PSU BUILDING NAME

LOFT PLAN
BUILDING FLOOR LEVEL

UNIVERSITY PARK CAMPUS, UNIVERSITY PARK, PA
PSU CAMPUS LOCATION

PennState
Physical Plant

PLANNING | DESIGN | PROPERTIES

SCALE 0 4' 8' 12' 16' 32'

06/23/92
CREATION DATE

01/21/19
REVISED DATE

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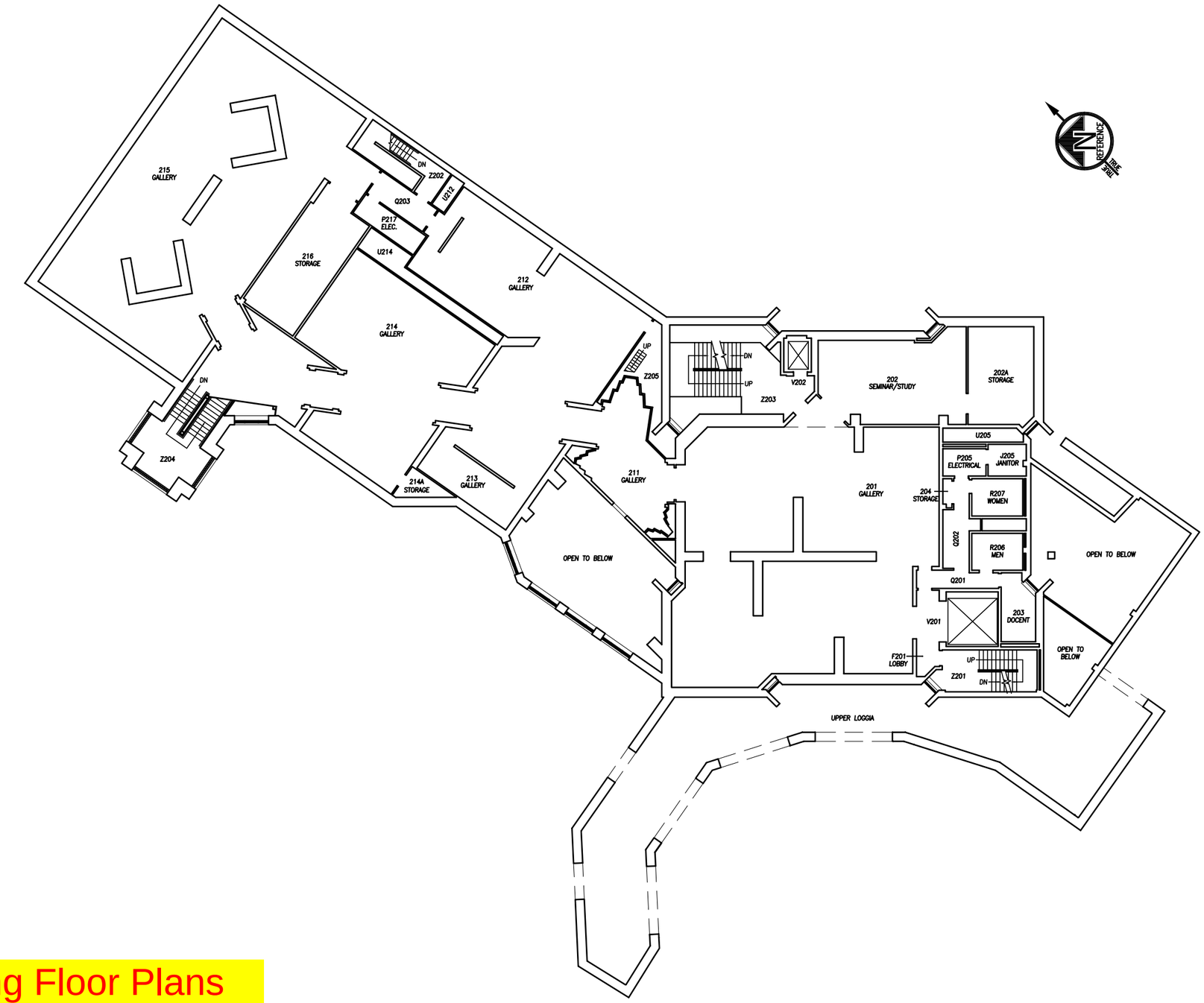
0755-000
BUILDING NUMBER

3 OF 6
SHEET NUMBER

LF
FLOOR LEVEL



Existing Floor Plans

PALMER MUSEUM OF ART
PSU BUILDING NAME

SECOND FLOOR PLAN
BUILDING FLOOR LEVEL

UNIVERSITY PARK CAMPUS, UNIVERSITY PARK, PA
PSU CAMPUS LOCATION

PENNSTATE

FACILITIES RESOURCES AND PLANNING
THE PENNSYLVANIA STATE UNIVERSITY
BENEDICT HOUSE
UNIVERSITY PARK, PA 16802
OFFICE: 814.865.1595
FAX: 814.865.1610
www.facilities.psu.edu

SCALE 0 4' 8' 12' 16' 32'

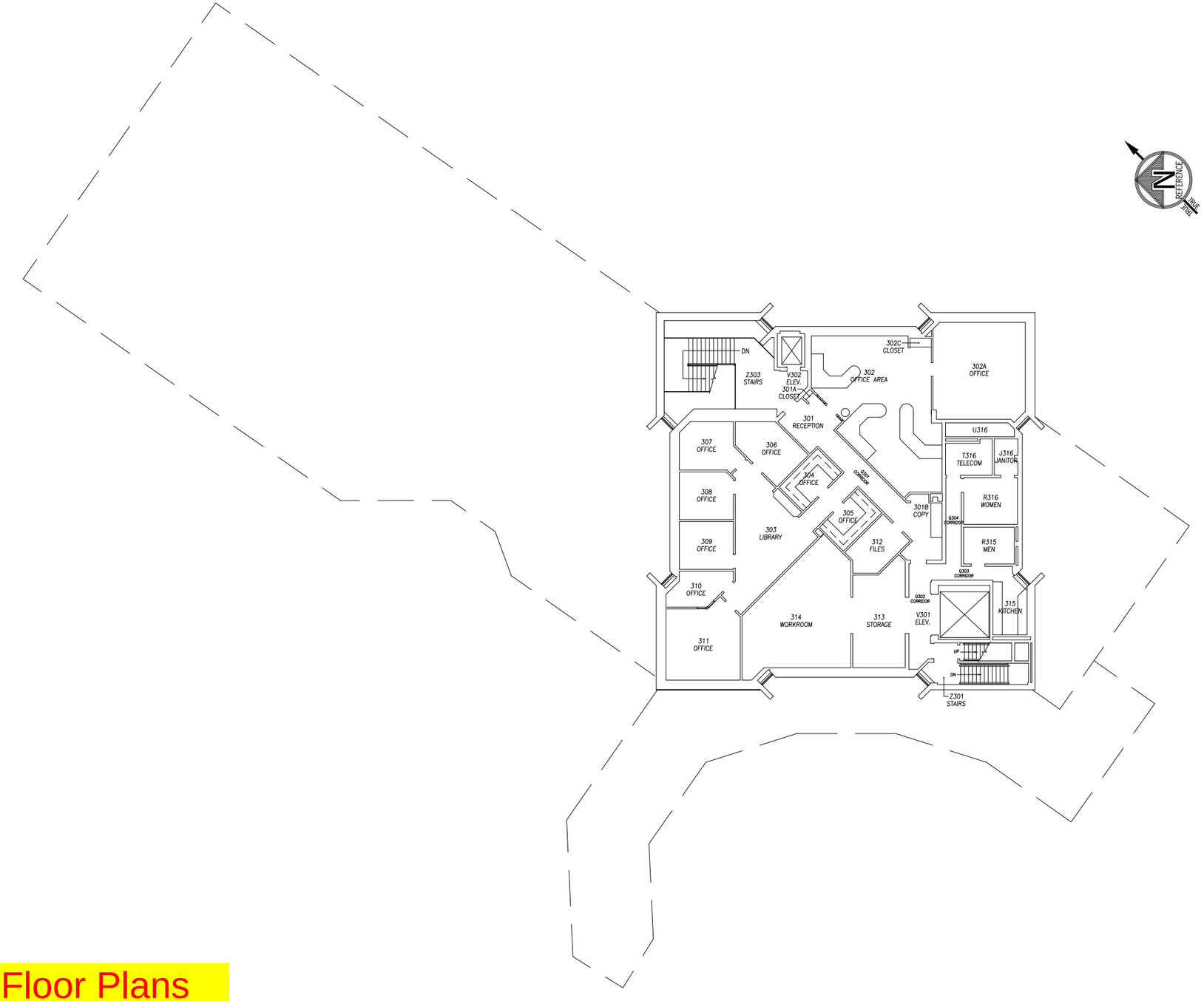
06/23/92 CREATION DATE
11/22/11 REVISED DATE

Campus block plans are for referential use only. Drawings are not to be used for architectural or engineering purposes.

0755-000
BUILDING NUMBER

4 OF 6
SHEET NUMBER

2
FLOOR LEVEL



Existing Floor Plans

PALMER MUSEUM OF ART
PSU BUILDING NAME

THIRD FLOOR PLAN
BUILDING FLOOR LEVEL

UNIVERSITY PARK CAMPUS, UNIVERSITY PARK, PA
PSU CAMPUS LOCATION

PennState
Physical Plant

FACILITIES RESOURCES
& PLANNING

Benedict House
University Park, PA 16802

Phone: (814) 865-1595
Fax: (814) 863-1475

www.facilities.psu.edu

SCALE 0 4' 8' 12' 16' 32'

06/23/92
CREATION DATE

09/08/17
REVISED DATE

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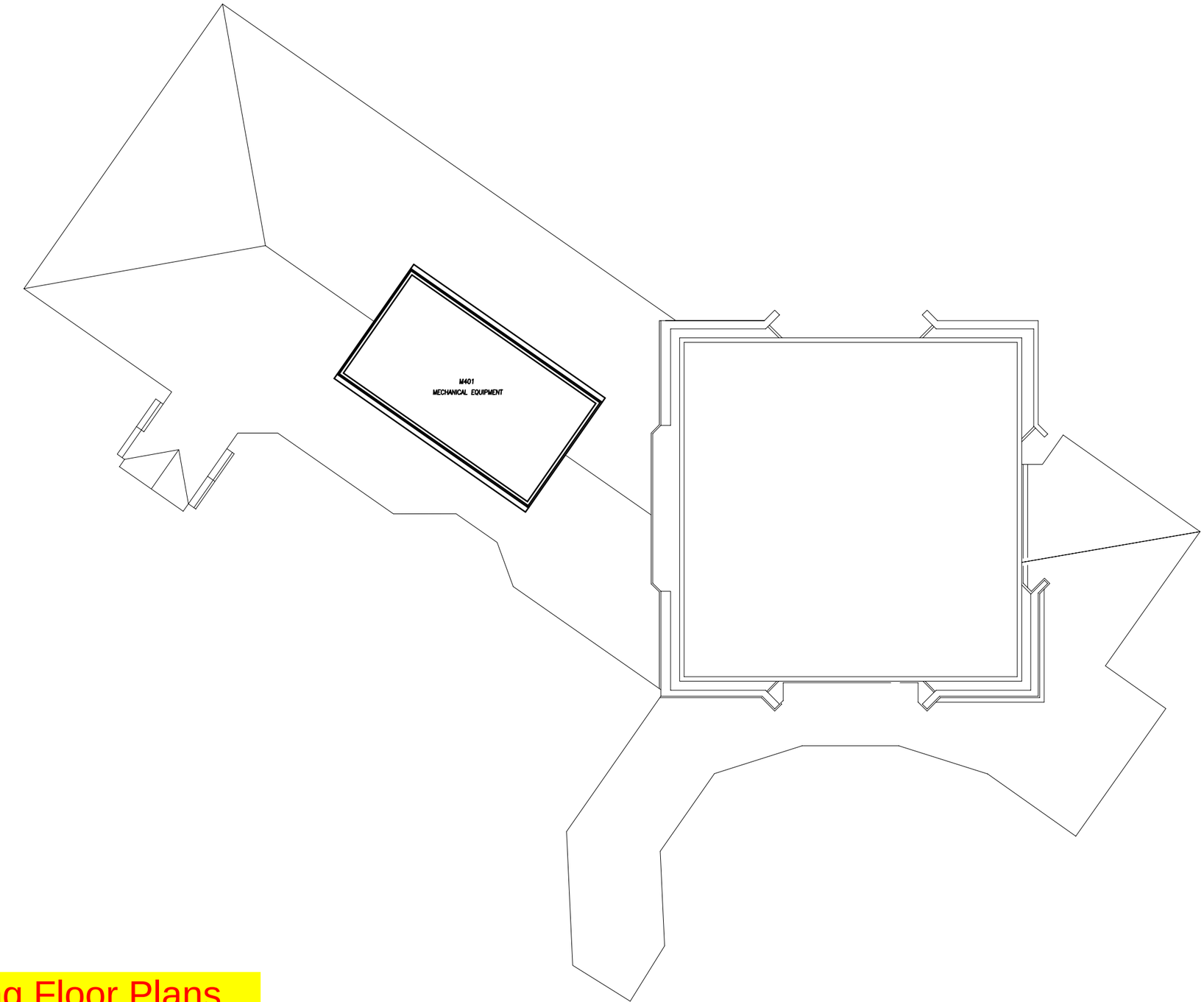
0755-000
BUILDING NUMBER

5 OF 6
SHEET NUMBER

3
FLOOR LEVEL



Existing Floor Plans

PALMER MUSEUM
PSU BUILDING NAME

ROOF PLAN
BUILDING FLOOR LEVEL

UNIVERSITY PARK CAMPUS, UNIVERSITY PARK, PA
PSU CAMPUS LOCATION

PENNSTATE
FACILITIES RESOURCES AND PLANNING
THE PENNSYLVANIA STATE UNIVERSITY
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UNIVERSITY PARK, PA 16802
OFFICE: 814.865.1595
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www.facilities.psu.edu

SCALE 0 4' 8' 12' 16' 32'

06/23/92 CREATION DATE
11/22/11 REVISED DATE

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0755-000
BUILDING NUMBER

6 OF 6
SHEET NUMBER

RF
FLOOR LEVEL

EXISTING ART STORAGE
2326 sf

CLASSROOM
1088 sf
46 seats

CORRIDOR

ART PREP AREA

U119

STORAGE

U115

Z102

DN

UP

ART RECEIVING LOADING AREA

JANITOR

MEN

WOMEN

EXISTING CORRIDOR

NEW CORRIDOR

NEW ELEVATOR

COMMONS
558 sf

STAIRS

U118

CLASSROOM
682 sf
38 seats

G113

BASEMENT WALL BELOW

STUDENT ART
530 sf

COMMONS
560 sf

HISTORIC ARCHITECTURAL ORNAMENTATION

HISTORIC ARCHITECTURAL ORNAMENTATION

VISUAL ARTS BUILDING

ART GALLERY

CAFE

HVAC

KITCHEN/SERVING

STAIRS

ELEV.

SECURITY OFFICE
319 sf

OFFICE

M104
MECHANICAL ROOM

CORRIDOR

G108

CLASSROOM
101
1818 sf
139 seats

DN

CORRIDOR

ART & ARCH
1646 sf

LOADING DOCK

103
WORKSHOP

105
RECEIVING

103B

105C
OFFICE

105A
OFFICE

SERVICE ELEVATOR

UP

STAIRS

DN

COATS

RECEPT.

LOBBY

RAMP DN

VESTIBULE

CURTIN ROAD

N
REFERENCE
TRUE

Concept 1

Test Fit Plan - With Art Storage remaining in building

PALMER BUILDING - Backfill Program
PSU BUILDING NAME

FIRST FLOOR PLAN
BUILDING FLOOR LEVEL

UNIVERSITY PARK CAMPUS, UNIVERSITY PARK, PA
PSU CAMPUS LOCATION

PennState
Physical Plant
PLANNING | DESIGN | PROPERTIES

8/7/23
CREATION DATE

12/6/2023
REVISED DATE

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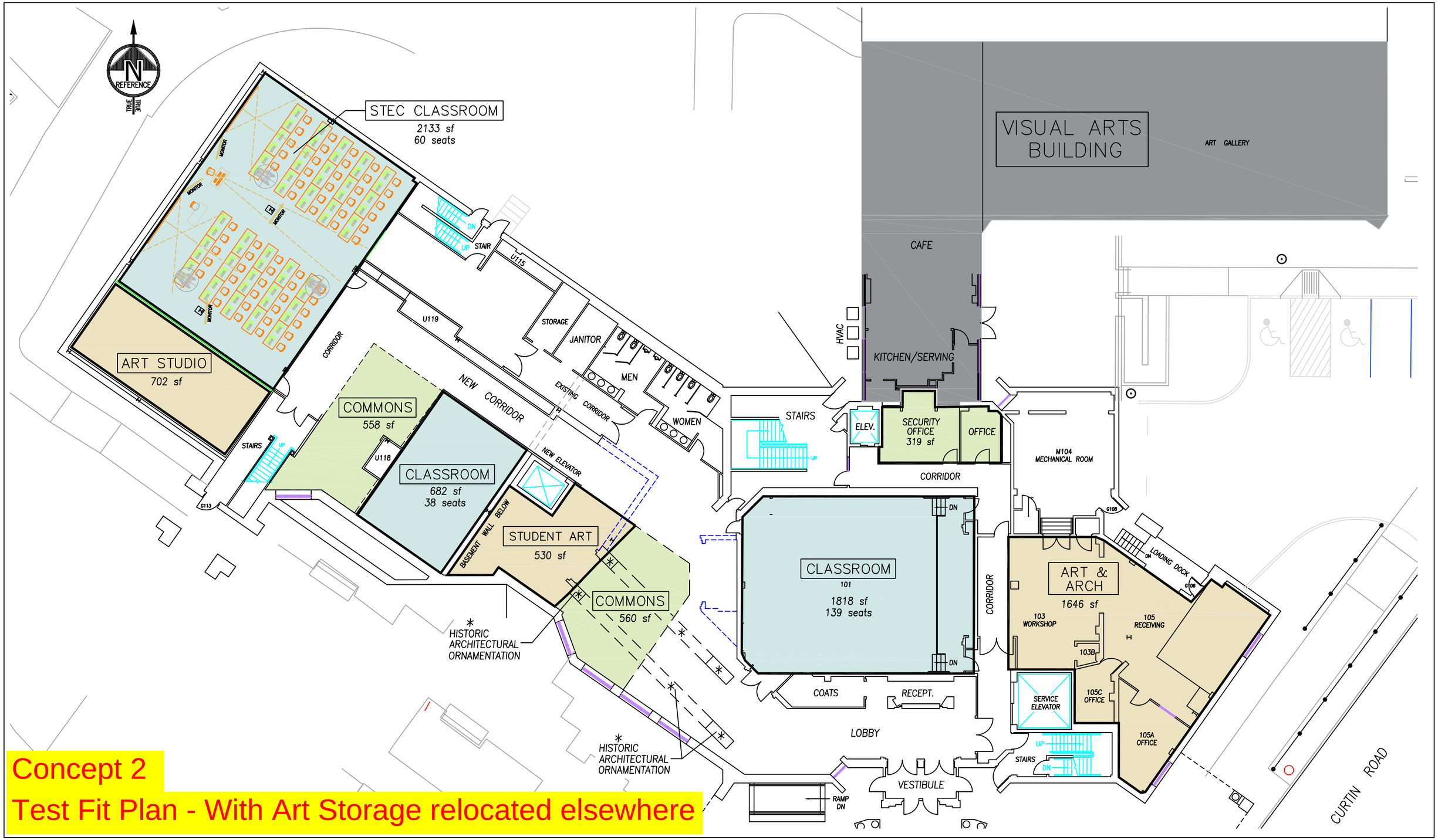
0755-000
BUILDING NUMBER

1 OF 1
SHEET NUMBER

1
FLOOR LEVEL



Concept 2

Test Fit Plan - With Art Storage relocated elsewhere

PALMER BUILDING - Backfill Program
PSU BUILDING NAME

FIRST FLOOR PLAN
BUILDING FLOOR LEVEL

UNIVERSITY PARK CAMPUS, UNIVERSITY PARK, PA
PSU CAMPUS LOCATION

PennState Physical Plant
PLANNING | DESIGN | PROPERTIES

8/23/23
CREATION DATE

12/6/23
REVISED DATE

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0755-000
BUILDING NUMBER

1 OF 3
SHEET NUMBER

1
FLOOR LEVEL

260 – SEAT CLASSROOM LAB
2732 sf

60–SEAT CLASSROOM LAB
1055 sf

COMMONS
352 sf

CHEM PREP
760 sf

A&A
514 sf

CLASSROOM
1226 sf
110–120 seats

ART STUDIO.
915 sf

ART STUDIO.
932 sf

LAB BENCH
LAB BENCH
DN
STAIR
U212
P217 ELEC.
U214
NEW CORRIDOR
NEW CORRIDOR
NEW ELEVATOR
MECHANICAL ACCESS
UP
MECH
DN
UP
STAIR
ELEV.
NEW CORRIDOR
U205
ELECT
JANITOR
R207 WOMEN
R206 MEN
Q202
Q201
OPEN TO BELOW
MECHANICAL LOFT
NEW CORRIDOR
ELEV
203 DOCENT
OPEN TO BELOW
UP
STAIR
DN
DN
STAIR
ADD NEW WINDOWS
CORRIDOR
MECH. MEZZ ABOVE
OPEN TO BELOW
REFERENCE TRUE
TRUE

Concept 2

Test Fit Plan - With Art Storage relocated elsewhere

PALMER BUILDING - Backfill Program
PSU BUILDING NAME

SECOND FLOOR PLAN
BUILDING FLOOR LEVEL

UNIVERSITY PARK CAMPUS, UNIVERSITY PARK, PA
PSU CAMPUS LOCATION

PennState
Physical Plant
PLANNING | DESIGN | PROPERTIES

06/01/23
CREATION DATE
8/7/23
REVISED DATE

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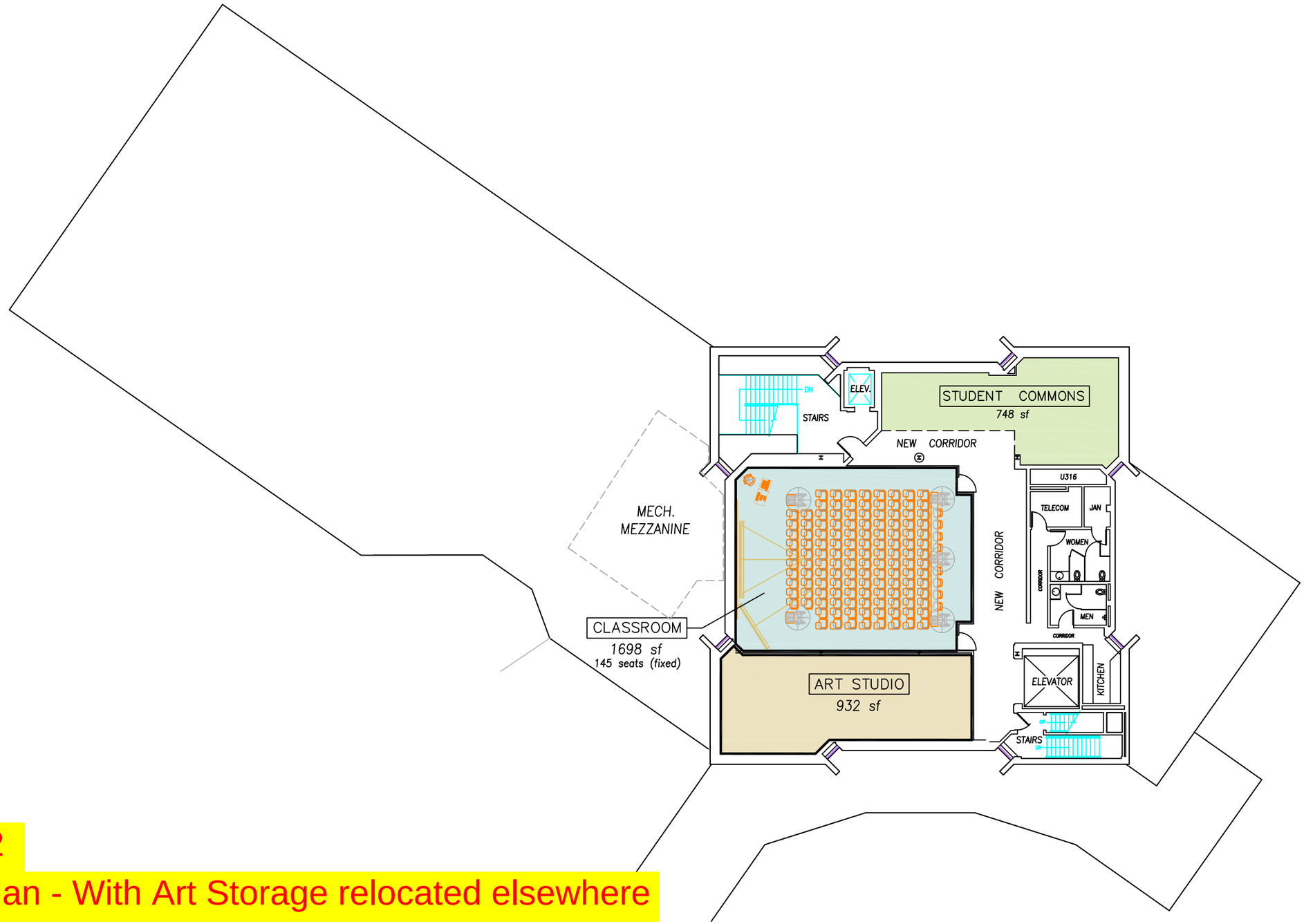
0755-000
BUILDING NUMBER
2 of 3
SHEET NUMBER
2
FLOOR LEVEL



Concept 2

Test Fit Plan - With Art Storage relocated elsewhere

PALMER BUILDING - Backfill Program
PSU BUILDING NAME

THIRD FLOOR PLAN
BUILDING FLOOR LEVEL

UNIVERSITY PARK CAMPUS, UNIVERSITY PARK, PA
PSU CAMPUS LOCATION

PennState
Physical Plant
PLANNING | DESIGN | PROPERTIES

6/1/2023
CREATION DATE
12/6/23
REVISED DATE

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0755-000
BUILDING NUMBER
3 of 3
SHEET NUMBER
3
FLOOR LEVEL

Penn State

Memo

To: Dave Will w/ attachment, Jan Muhlert w/attachment

From: Tim Heltman

CC: Kathy Bamat, Don Partsch, Bob Hoffman, Bob Mulhollem, Ian Salada, Harry Gearhart, Ron Perttu, File

Date: Dec. 11, 2007

Re: Palmer Museum of Arts Humidity Study

I am attaching a copy of the final report received from Robert Hoffman Architecture entitled "An Exploration of Moisture Issues the Palmer Museum. The report outlines several recommendations with associated estimates. The recommendations are categorized in tier levels in the professional's opinion of importance and value.

Physical Plant has decided to move forward by identifying projects for most of the recommendations. The following list of projects, identified by the tier and item numbers outlined in the report:

Project 07-71460	Tier 1 – Item nos. 2 & 3
	Tier 2 – Item nos. 3&4
	Tier 3 – Item no. 2
Project (TBD)	Tier 1 – Item no. 5
Project (TBD)	Tier 2 – Item nos. 1 & 2
Project 07-73113	Tier 3 – Item 1

For a complete description and estimate of the work items please refer to the report.

Additionally, Physical Plant is continuing to review the control of the chilled water service to the building.

If there are any questions please call.

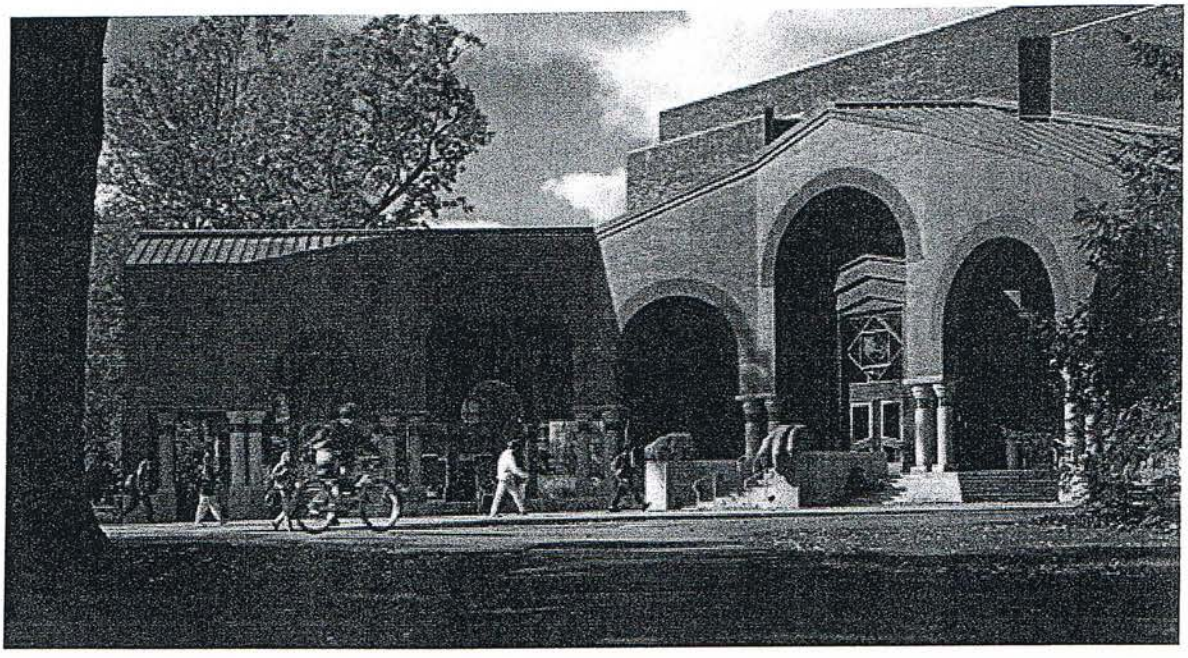
Tim Heltman

AN EXPLORATION OF MOISTURE ISSUES

THE PALMER MUSEUM

THE PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY PARK CAMPUS

SPRING – SUMMER 2007



REESE ENGINEERING

HOFFMAN ARCHITECTURE

OCTOBER, 31 2007

*t*able *o*f *c*ontents

REESE ENGINEERING

HOFFMAN ARCHITECTURE

introduction

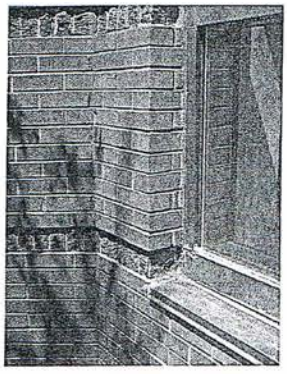
In the winter of 2006, Hoffman Architecture was asked by the Office of Physical Plant to conduct a study of a recognized humidity problem at the Palmer Museum located at the Pennsylvania State University – University Park Campus.

Hoffman Architecture initially formed a design team comprised of Reese Engineering, a mechanical/electrical engineering firm in State College with experience in multi-use and sensitive air systems, plus Michael Norris Associates, a mechanical/electrical engineering firm in State College. Mr. Norris was apart of Gary Johnson Associates – engineers for the original museum building's mechanical system design.

With the design team assembled, a joint meeting with this team and the Office of Physical Plant's Environmental Services Department was scheduled so as to fully understand the perceived problem/issues and modifications and or testing that was performed to the buildings MPE systems. In addition, the design team was given a tour of the museum so as to experience in person the buildings flow and construction. Additional walkthrough were conducted so as to explore both general construction and HVAC conditions.

Based upon this initial effort the design team with the help of the original construction documents began to address the users primary concern:

> "Sudden shifts in humidity levels are making the operation of the museum impossible to control thus limiting their potential to offer many interesting and unique programs."



The following people were important to the formation of this study and are hereby recognized:

The Palmer Museum	Jan Muhlert, Director
	Jeremy Warner
The School of Arts and Architecture	David Will
The Office of Physical Plant	Tim Heltman, Project Manager
	Rick Ricardo
	Don Partsch
	Ian Salada
	Mark Bodenschatz
	Ray Beam
Participating Contractors	Harris Masonry
	Veornesi Builders

REESE ENGINEERING

HOFFMAN ARCHITECTURE

executive summary

The moisture issue at the Palmer Museum was first identified, soon after the building was opened, a number of studies, evaluations, and reports have been formulated and reviewed. Unlike previous reports this study explored the situation from somewhat a different angle or perspective as follows:

1. An attempt was made to ascertain if the vapor barrier design and installation was appropriate and well executed.
2. We had the benefit of input from the Office of Physical Plant with respect to recorded base data and alterations to the HVAC system.
3. Through the guidance of Reese Engineering, Office of Physical Plant, and Mike Norris (associate with the original engineer, Gary Johnson Associates) we were able to compare the initial HVAC design concepts with actual present day equipment and operations.

Based upon our investigations and analysis, we can state the following:

1. Although a "double vapor barrier design" would have been more desirable so as to manage moisture entering or leaving the structure, the single barrier installed is of proper design and installation. Thus, in this authors opinion, not contributory to the moisture issues.
2. The glazing and window frame system at the west gallery stairwell "A" is in poor condition and is contributing not only to interior damages but possibly under proper conditions to the interior moisture events. It is strongly recommended that this situation be corrected.
3. At no time during our observations was condensation or condensation damage observed in any areas of the facility other than Stairwell 'A'. Watermarks from condensation within the un-tempered attic space were present but from staff reports they occurred prior to the installation of the attic supply air fan.
4. The mechanical systems in general are in good repair with some observed operational problems associated with the humidifiers, controls and chilled water supply to the building.
5. There is a single vapor barrier located at the exterior wall assembly. The vapor barrier is located in the correct position.

REESE ENGINEERING

HOFFMAN ARCHITECTURE

6. The client's ideal operating criteria is an acceptable temperature range of 68 to 72 degrees and an acceptable relative humidity range of 48 to 52%. The temperature should not change more than 2 degrees per hour and the humidity should not change more than 2% per hour.

Exploratory investigation was used in an attempt to ascertain if the vapor barrier design and installation was appropriate and well executed. This approach enabled us not only to view the apparent "exposed" construction techniques but also allowed us the opportunity to explore the inner wall construction to definitively record the existing exterior wall and vapor barrier assembly.

This same exploratory approach was expanded to the mechanical systems and through the guidance of Reese Engineering, Office of Physical Plant, and Mike Norris (associate with the original engineer, Gary Johnson Associates) we were able to compare the initial HVAC design concepts with actual present day equipment and operations. This process was accompanied by review of recorded operational data and alterations to the HVAC system provided by the Office of Physical Plant.

It is important to note that during most of the operating hours of the facility the client's ideal operating criteria is achieved. It is the minority of the operating hours when the space conditions are outside the acceptable range. With this in mind there is certainly room for improvement of the space conditions. The recommendations within this report will allow the facility to function at an improved level but will not necessarily provide complete remediation of the conditions. Instead, a tiered approach of improvements will "tighten" the performance of the space and its' systems.

In order to gauge the level of performance of the facility we discussed expectations with the Palmer staff. The client's ideal operating criteria is an acceptable temperature range of 68 to 72 degrees and an acceptable relative humidity range of 48 to 52%. The temperature should not change more than 2 degrees per hour and the humidity should not change more than 2% per hour. With the information from our exploratory investigation and the knowledge of performance expectations we are able to make the following statements.

At no time during our observations was condensation or condensation damage

observed in any areas of the facility other than in the west gallery Stairwell 'A'. Watermarks from condensation within the un-tempered attic space were present but from staff reports they occurred prior to the installation of the attic supply air fan. The glazing and window frame system at the west gallery Stairwell "A" is in poor condition and is contributing not only to interior damage but under certain conditions to the interior moisture events. It is strongly recommended that this situation be corrected.

There is a single vapor barrier located at the exterior wall assembly. The dew point calculations indicate that the vapor barrier is located in the correct position. Although a "double vapor barrier design" would have been more desirable to manage moisture entering or leaving the structure, the single barrier installed is of proper design and installation. Thus, in this authors opinion, not contributory to the moisture issues.

The mechanical systems in general are in good repair with some observed operational problems associated with the humidifiers, controls and chilled water supply to the building. The various mechanical issues individually do not constitute the entire problem within the space or the entire solution. Instead each item is a contributing factor to an overall performance issue. There are two primary items that were discovered during our observations of the mechanical systems which have been directly connected to the fluctuations of space conditions through the Campus Control System.

First, is the inconsistency in the temperature of chilled water delivered to the building from the campus system. The mechanical equipment within the facility was originally designed to use chilled water at a constant, low temperature for control of humidity levels within the space. The current sequence of operation of the system assumes that chilled water of a consistent temperature is provided at the equipment. With variations in chilled water temperature by as much as 8 to 10 degrees above the original design conditions the equipment and controls can not perform to the level required for consistent space conditions. This condition should be corrected at the campus level to provide the temperature that is required at the facility. If it can not be corrected at the campus level it will need to be addressed by system changes at the museum. Until more information is available it is premature to speculate what, if any, changes may be required within the museum. Currently the Office of Physical Plant is reviewing the situation to determine the cause and solution.

The second item of significance is the performance of the system serving the original building Gallery 201. Review of the system design and measurement of space conditions indicate that, while the system components were sized with adequate capacity, they are underperforming. Space relative humidity readings were as low as 35%. This condition manifests itself in observed problems at the systems within the adjacent galleries. Since there is a direct connection between the original gallery and the galleries in the addition they directly affect each other. The systems within the addition attempt to passively compensate for the underperformance of Gallery 201 by transferring moisture through the opening between the spaces. This is a natural process that attempts to equalize a humidity difference that can vary by as much as 15% between the two areas. In the evening hours when the opening between the spaces is closed the control system in the addition is still attempting to compensate for this transfer of moisture. Closing the opening when the system is compensating results in a spike in the humidity level of the galleries in the addition. The condition is further exacerbated when the space humidity spike is concurrent with elevated campus chilled water temperature delivery and the ability to dehumidify the space is limited. Success in eliminating this problem will require corrections to the Gallery 201 equipment to ensure proper operation and air balancing of all galleries to ensure an equal pressure relationship between the spaces.

In addition to the primary items listed above there are a host of smaller mechanical issues that are also contributory to the performance issues. The discovery of minor component issues is not uncommon in mechanical systems of this age. Of the component issues discovered some are normal maintenance items and others stem from original installation of components that could have been placed in more appropriate locations. Opportunities for improving these items are outlined in the following sections of this report.

One additional observation of note is the lack of ventilation in the interstitial space between the inner gallery wall system and the exterior wall assembly. A lack of ventilation of this space, in and of itself, is not necessarily problematic. However, the space does provide the opportunity for improved air circulation to avoid stagnant air pockets which can lead to moisture problems and would provide one more barrier between the gallery space and the exterior wall where condensation is most likely to occur.

In conclusion, the investigation team offers "multi tiered" corrective recommendations and associated costs for University reference. The implementation of the proposed remedial actions are strongly recommended to begin immediately – noting that at the completion of each tiered event, an evaluation be conducted and recorded with the investigation team.

methodology

In order to understand the current physical facility, initial building design, and current operating conditions, the design team obtained information and verification in the following ways:

- Examination of construction drawings and verification of building systems to ascertain the type of vapor barrier and to verify its location as part of the buildings' "skin".
- Investigate the building skin by looking at exploratory openings in the building's exterior wall produced by contractors.
- By removing portions of the window wall at the western stair tower so as to observe the inclusion of a vapor barrier in the window detail and to determine how well the window well was constructed in preventing moisture transfer.
- By walking through all accessible paths so as to observe items such as moisture damage and vapor barrier location/installation.
- The following reports and observations were reviewed and evaluated:
    - Prior Report Published by Arbonies King Vlock and Donal Baerman, AIA.
    - PSU Air Handler Test Reports from October 2003 to June 2004. Refer to Appendix item 'A'.
    - Space Condition Trending Performed and Logged by the CCS in July 2007. Refer to Appendix item 'B'.
    - Space Humidity and Temperature Readings Performed by Reese Engineering and OPP in June 2007.
    - Review of the Current Sequence of Operation Performed by Reese Engineering and OPP in February 2007. Refer to Appendix item 'C'.
    - Palmer Staff Observations.

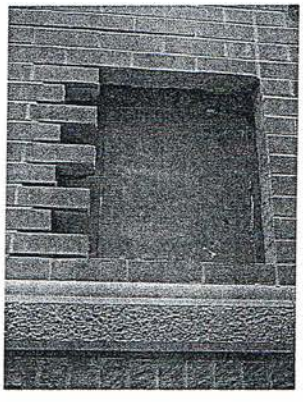
observed conditions

General Construction Systems:

The aluminum faced insulated vapor barrier as designed and installed appears to be tight and continuous throughout the structure. Attachments and joints are professionally taped. We did not observe any area where the vapor barrier was not continuous but we did observe that at intersections of different materials caulking was not in good condition and required reinstallation.

Wall Construction:

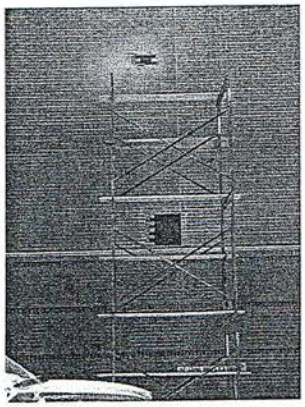
The results of opening up a portion of the exterior North facade wall indicated that although the exterior sheathing was not moisture resistant and joints taped, as one would expect. The air cavity and sheathing did not appear wet or water damaged. This would indicate that moisture is not entering into the building's environment due to wall construction. Thus, not contributing to the experienced moisture issue.

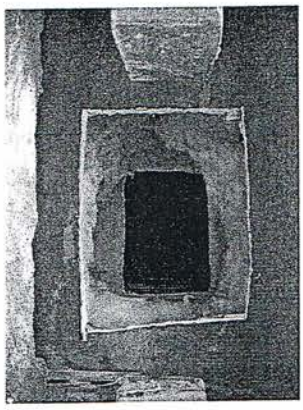


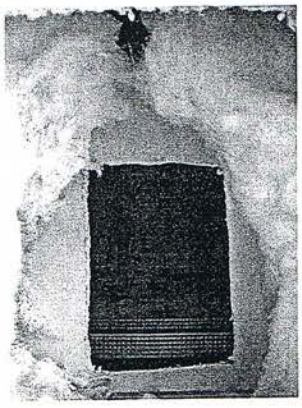
Untaped Regular Gypsum Board Sheathing

Interior Metal Frame Wall and Fiber Insulation

Interior Vapor Barrier, Plywood, and Gypsum Board







Interior Wall Construction:

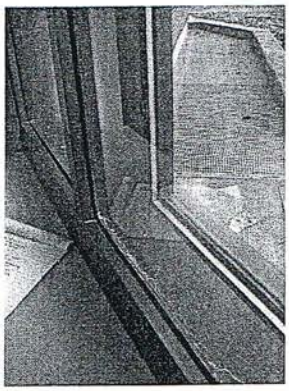
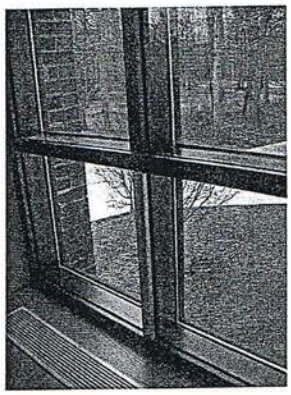
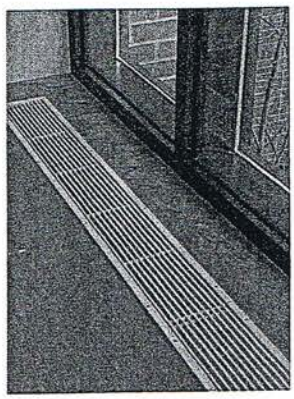
The results of opening up the interior wall system at the 2nd floor north gallery indicated that the vapor barrier had indeed been installed thus eliminating the theory that a vapor barrier was not installed at the North section of the building where moisture issues were and are being experienced. This lead to the conclusion that the moisture issues are not the result of an improper or inadequately installed vapor barrier and that the vapor barrier is installed continuous from wall to the roof.

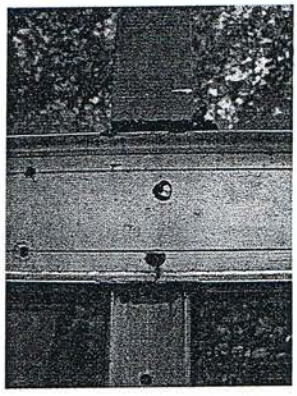
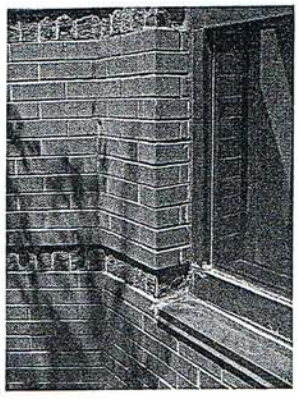
The following components reflect the exterior wall construction findings:

5/8" interior gypsum board painted interior finish
5/8" plywood panels
1/4" air space
5/8" vapor barrier insulation board
6" metal stud wall with fiber insulation
5/8" gypsum board sheathing untaped
2" air space (dry)
4" brick veneer

West Gallery Stairwell 'A':

General observations of the window well indicate water presence and resulting damage of wood sills, gypsum board, and carpet. The introduction of water into the interior environment appears caused by two factors: (1.) glazing caulking issues and (2.) inadequate thermal break in the window frame.

The fact that water is being introduced into the building's environment at this point suggests that interior moisture levels possibly are influenced by this situation.

Mechanical Systems:

Conditioning of each gallery and storage area within the 1993 museum addition is achieved with the use of eight ducted air handling units (AHU) located in the basement Mechanical Room. Each AHU is provided with a hot water preheat coil, direct steam humidifier, chilled water cooling coil, hot water reheat coil and electronic humidifier for space conditioning. Outside air is pre-conditioned for temperature and humidity control via a dedicated 100% outside air unit that distributes air directly to each AHU for ventilation of the space. All of the equipment currently installed is from the original construction.

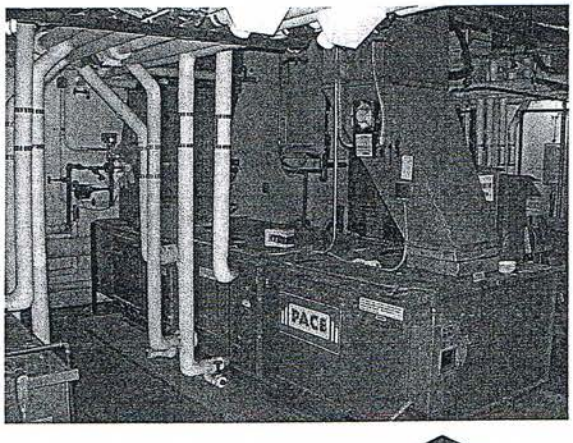
The mechanical system which conditions the original Gallery 201 was replaced in 2001 with a new AHU. The AHU is provided with a steam preheat coil, chilled water cooling coil and direct steam humidifier. Un-conditioned outside air is directly connected to this system.

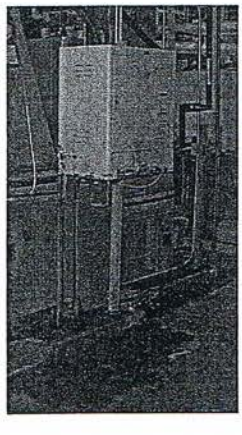
Each of the systems is generally in good condition and operating properly.

There are several components that were identified as inoperable or improperly installed at the time of observation. In the 1993 addition they include inoperable electric humidifiers and a malfunctioning or improperly installed steam humidifier control valve on AHU-8. In addition several of the electric humidifiers were installed improperly; either too near a change in direction of the ductwork or with the dispersion tube in a location that did not allow proper absorption of steam into the air stream. Each of these items will contribute to both control issues of space humidity levels and operating inefficiencies of the system.

In the original gallery 201 the relative humidity levels have been recorded to be significantly lower than the desired operating range of 48 to 52%. Readings within the gallery were as low as 35% during our observations. The current equipment was designed to maintain the desired space conditions; however, the inadequate humidity control performance may result from improper airflow rates of outside air and total air in the system as identified in the commissioning report from 2004. The dispersion tube for this system is also located in a position within the ductwork that is limiting the absorption of steam.

Space sensors for both temperature and humidity within several galleries are placed in locations that prevent them from accurately reading conditions within the space and therefore provide readings which do not represent the actual space conditions. This prevents the mechanical systems from responding to changing spatial conditions in a timely manner and thereby a greater degree of variability to the space temperature and humidity levels. Ultimately the systems respond but with a slight delay.





Campus Chilled Water System:

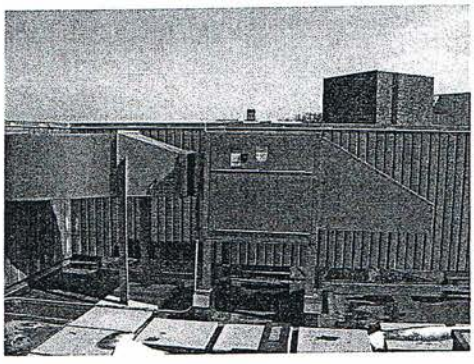
Chilled water was originally produced with an air-cooled chiller that was dedicated for use solely by the museum equipment. The chiller was removed in 2006 and the museum was connected to the campus chilled water system. This change has caused several issues with the chilled water availability to the building. Under normal conditions the campus system delivers 44 to 47 degree water to the museum and the equipment was originally designed to receive 42 degree chilled water. This causes a slight reduction in the cooling capacity and dehumidification ability of the systems.

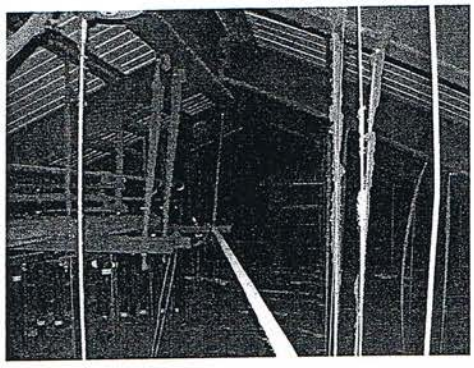
More important is the recent discovery that the campus system is delivering chilled water at a temperature above 50 degrees at certain times. Mr. Ray Beam is currently working with the OPP staff to determine the cause and length of time that this has been occurring. Chilled water temperatures at these levels would significantly reduce the ability of the system to cool and dehumidify the space and is certainly a contributing factor to the variations in humidity levels seen within the space. This is consistent with the reports that the problems within the space are primarily spikes in humidity as opposed to inadequate humidity. It is also likely that as the campus load diminishes in the evening, when the cooling load reduces, that the campus system is delivering higher temperature water throughout the night since some of the centralized chillers will shut down upon reduced demand. This is directly related to the spikes in humidity seen in the evening hours throughout the galleries. Further investigation will be required to determine the extent of the impact on the space and the opportunities for improvement at the campus level.

Attic Supply Air System:

The construction of the vapor barrier is consistent in type and location throughout each gallery with the exception of Gallery 217 in the 1993 addition. Above this space is an attic area which is un-tempered and utilizes a vapor barrier which is located directly below insulation placed at the bottom chord of the roof truss assembly. Shortly after the opening of the addition a supply air fan was added to pressurize the attic space with 100%, unconditioned outdoor air. This was done to elevate the air pressure within the attic and minimize the migration of the moist air from the gallery, through the vapor barrier and into the attic where it was condensing. Under most of the operating hours this system

has been effective in reducing moisture migration and minimizing condensation. The system was originally designed with automatic controls but those controls have been bypassed and the system now runs continuously. There are times when the moisture level in the outdoor air is higher than the gallery level and unwanted moisture is introduced to the gallery space through the vapor barrier. While this has a minor effect on the space under normal conditions it can have an undesirable effect when extended periods of high humidity occur.





Evening Humidity and Temperature Trending:

It was noted by both the Palmer staff and OPP employees that many of the high humidity readings within the 1993 addition gallery spaces occurred in the evening. By utilizing the trending feature of the control system a fairly regular pattern was observed. When the actual humidity levels in Gallery 201 are significantly below the setpoint of 50%, moisture migrates from the adjacent galleries that are at a higher humidity level. This occurs by two mechanisms. Moisture in areas of high concentration naturally moves toward areas of lower concentration because of a difference in vapor pressure between the two areas. Additionally, the galleries in the 1993 addition appear to be positively pressurized when compared to Gallery 201 thereby "forcing" moist air to move toward Gallery 201. This causes the humidification systems in the 1993 addition galleries to compensate for the "lost" moisture by introducing more humidity through their respective systems.

In the evenings when the doors between the two spaces are closed the direct path of moisture migration is significantly reduced. At this time the systems in galleries of the 1993 addition are still attempting to compensate for the "lost"

moisture at rate that is much higher than is actually needed since the moisture is no longer migrating as it was when the doors were open. This causes a spike in the humidity level of the galleries within the 1993 addition. Most notably in those that are closest to the original Gallery 201.

Fortunately this can be improved by correcting the system operation in Gallery 201 to properly maintain the humidity level by its own means as originally designed and by balancing the communicating spaces to a near equal space pressure. In the short term the doors could be kept open in the evening if deemed appropriate by the Palmer staff.

recomendations

The following recommendations have been divided into several 'Tiers' that will allow the University flexibility in both implementation and expense. Each Tier is composed of items that will improve the current operating conditions by varying degrees and can either by fully implemented as part of one significant renovation project or can be incrementally incorporated to gauge improvement in a phased approach.

The first Tier includes simple improvements that can be implemented in a short time frame and at low cost. Each subsequent Tier becomes more disruptive and more costly to implement. It should be noted that items located in an upper Tier will not necessarily have a greater impact on performance than items in a lower Tier. Some of the most effective solutions will arise from the ability to combine items from more than one Tier.

Tier 1

1. Correct the campus chilled water system delivery temperature.
2. Relocate temperature and humidity sensors within each gallery to be located within the airsteam and better sense the actual space conditions. This may include adding sensors to average the conditions within the space.
3. Replace and install in new positions humidity and temperature sensors on each air handling unit to provide more accurate readings.
4. Replace the faulty electric humidifiers and steam control valves. - Tier 3/2
5. Install enthalpy controls on the attic supply fan to prevent the fan from introducing outdoor air during periods when it is in a state that is more humid than the air within the gallery.

Tier 2

1. Commission the Controls System for each piece of equipment serving each gallery and storage area of both the original building and the 1993 addition. This would include modifying the controls sequences based on the findings of the actual operation of the current system.
2. Perform complete Testing and Balancing services for each AHU serving each gallery and storage area. This would include testing and adjusting airflow rates at each AHU and each air device within each space.
3. Replace the steam humidifier and controls for Gallery 201 to provide a system which has the ability and capacity to respond to all operating conditions and maintain the space at the 50% RH mark at all times throughout the year.
4. Relocate the humidifier dispersion tubes to straight sections of ductwork to allow

proper absorption of the steam into the airstream.

Tier 3

1. Remove and replace all existing window wall and glazing systems at stairwell "A". Replace system with new triple glazed thermo "low-e" glass in a high end thermo – break aluminum framing system. Associated work will be to provide insulation within the framing system so as to not allow cold air to contact the perimeter of the glazing system. In addition, replacement of gypsum board walls and wood sills will need to be performed. Even though this is a disruptive item it should be given high consideration because of the positive impact to the stairwell and adjacent spaces.

2. Disable the direct steam humidifiers on each AHU, replace the existing electric humidifiers with new humidifiers rated for the full capacity and revise the control sequence for the new operation. This will reduce the energy consumption of the system and simplify the system controls to enable the system to humidify from a single source rather than humidify from multiple sources thereby improving control. The existing direct steam humidifiers could be removed or retained for redundancy.

3. In lieu of installing only the enthalpy controls on the attic supply fan as outlined in item 5 from Tier one above, install a controls and a conditioning system on the attic supply fan to dehumidify the supply air when it is at levels which exceed those in the gallery space below. This would allow the attic system to be continually pressurized.

4. Provide new dedicated mechanical systems to condition the interstitial space located between the interior gallery wall and the vapor barrier that is part of the exterior wall assembly. This would also condition the space between the gallery ceiling and the vapor barrier located on the gallery roof structure.

   This system would be primarily designed to ensure continuous movement of air within the interstitial space. This would prevent a thermal gradient from occurring that could result in surface temperatures and moisture concentrations in levels that cause condensation on the interior surfaces of the wall, floor and ceiling assemblies. The system would incorporate heating, cooling and reheat to allow the circulated air to be delivered at "space neutral" conditions which match the desired setpoints within the space. This would be achieved with multiple air handling units.

   This option is the most disruptive and expensive of the options presented. It alone is not an ultimate solution and could be considered expensive for the improvement in performance received and may be viewed as one of the last items to implement from the options provided.

Remedial Cost Estimate

Estimates indicate are based Upon 2007 Dollars (add 7% per year for inflation):

Tier 1 = Item 1: No cost. Work currently under review by OPP separately.
Item 2: $6,000 - $9,000
Item 3: $9,000 - $12,000
Item 4: $26,500 – $32,500
Item 5: $4,000 - $5,000

Tier 2 = Item 1: $22,200 - $28,000
Item 2: $25,200 - $33,600
Item 3: $16,500 - $21,000
Item 4: $ 12,600 - $16,800

Tier 3 = Item 1: $65,000 – 85,000
Item 2: $60,000 - $78,000
Item 3: $30,500 - $38,500
Item 4: $304,500 - $365,000

Total Construction Estimate = $582,000 - $724,400

Total Project Costs = $675,120 - $840,304

a. **PSU Air Handler Test Reports**

AIR HANDLER TEST REPORT

BUILDING: PALMER MUSEUM Bldg. No. 755

TESTED BY: RTK

SHEET: 1

First reading. (System balanced) 11-20-03

UNIT NO. / BAR CODE	SFN-01 (FAUH-1) Bar Code 004511		ACF-01 (AHU-01) Bar Code 004499		RAF-02 (RF-1) Bar Code 004536	
LOCATION	Basement Mech. Room M-2		Woodshop Mezzanine		Basement Mech. Room M-2	
MANUFACTURER	Pace Co.		Pace Co.		Greenheck	
SIZE:	A-14FC STD		A-14 B1 DWDI		BSO-240-7	
SERIAL NO.	91-66730-01		91-66730-02		92B04795	
	SPECIFIED	ACTUAL	SPECIFIED	ACTUAL	SPECIFIED	ACTUAL
TOTAL C.F.M.	4,195	4,093	3,065	3,157	4,195	3,226
RETURN AIR C.F.M.	First reading. (System balanced) 10-20-03		85	1,367	First reading. (System balanced) 10-21-03	
O.S.A./C.F.M.			2,980	2,010		
SUCTION STATIC		-1.2"		-1.64"		-.008"
DISCHARGE STATIC		-.18"		.34"		-.532"
TOTAL STATIC	2.69"	1.02"	3.69"	1.98"	.56"	.524"
EXTERNAL STATIC	.92"	.07"	1.28"	.56'		
FAN SHEAVE		2TB60 - 1 7/16"		2BK50H/ 1 3/16"		
MOTOR SHEAVE		2BK45H - 1 1/8"		2BK57H/ 1 1/8"		1VL44 - 5/8"
RPM FAN		1,180	2,345	2,058	1,283	632
BELTS		2 ea.-BX57		2 ea.-BX64		AX74
MOTOR MANUFACTURER		Magnetek		Magetek		G.E.

MOTOR HP. / FRAME SIZE	7 ½	5 / L184T	3	3 / S182T	3/4	3/4 - 56
S.F.		1		1.15		1.25
PHASE	3	3	3	3	3	3
	RATED	RUNNING	RATED	RUNNING	RATED	RUNNING
AMPERAGE	12.8 / 6.4	3 / 3.1 / 3	7.6 / 3.8	2.3 / 2.1 / 2.2	1.3 / .85 2 speed	1.3 / 1 / 1
RPM MOTOR	1,750	1,780	1,750	1,780	1725 / 1140	1,755
VOLTAGE	230 / 460	484 / 484 /483	230 / 460	485 / 485 / 484	460	484 / 482 / 482

AIR HANDLER TEST REPORT

BUILDING: PALMER MUSEUM Bldg. No. 755

TESTED BY: RTK

SHEET: 2

Second reading. (Open partial restricted return.) 12-16-03

Thrid Reading.O.A. damper 75% open. 3/24/04

UNIT NO. / BAR CODE	RF-2 Bar Code 004496		ACF-02 (AHU-02) Bar Code 004493		ACF-03 (AHU-03) Bar Code 004504	
LOCATION	Penthouse Mech. Room		Penthouse Mech. Room		Janitor Rm. J113 & Rm.114	
MANUFACTURER	Greenheck		Pace Co.		Pace Co.	
SIZE:	BSO-360-30		A-22 FC DWDI		SCF-114A/U-11	
SERIAL NO.	92B04796		91-66730-03		91-66730-04	
	SPECIFIED	ACTUAL	SPECIFIED	ACTUAL	SPECIFIC	ACTUAL
TOTAL C.F.M.	10,950	11,103	13,340	13,426	1,630	1,852
RETURN AIR C.F.M.	Second reading. (Open partial restricted return.) 12-16-03		11,310	10,522	750	974
O.S.A./C.F.M.			2,030	1,465	880	878
SUCTION STATIC		-.71"		-1.63"		-1.96"
DISCHARGE STATIC		-.18"		38"		.4"
TOTAL STATIC	.75"	.53"	2.16"	2.01"	2.71"	2.36"

REESE ENGINEERING

HOFFMAN ARCHITECTURE

EXTERNAL STATIC				.84"		1.01"
FAN SHEAVE		2AK164/1 7/16"		2TB154/1 7/16'		2AK39H/ 1"
MOTOR SHEAVE		2VP42/1 1/8"		2VP65/1 3/8"		2VP42/ 7/8"
RPM FAN	526	488	646	672	1,549	1,543
BELTS		2 ea. - A92		2 ea.- BX103		2 ea.- AX40
MOTOR MANUFACTURER		Marathon		Magetek		Magetek
MOTOR HP. / FRAME SIZE	3	3 / 184T	7 1/2	7 ½ / F213T	2	2 / M145T
S.F.		1.15		1.15		1.15
PHASE	3	3	3	3	3	3
	RATED	**RUNNING**	**RATED**	**RUNNING**	**RATED**	**RUNNING**
AMPERAGE	4.6 / 2.7 2 speed	3.8 / 3.7 / 3.8	18.6 / 9.3	8.2 / 7.9 / 8	5.3 / 2.65	1.87 / 1.87 / 1.84
RPM MOTOR	1760 / 1175	1,780	1,750	1,765	1,745	1,744
VOLTAGE	460	488 / 488 / 487	230 / 460	486 / 486 / 484	230 / 460	491 / 492 / 492

AIR HANDLER TEST REPORT

BUILDING: PALMER MUSEUM Bldg. No. 755

TESTED BY: RTK

SHEET: 3

	First reading. (System balanced) 10-20-03		First reading. (System balanced) 10-22-03		First reading. (System balanced) 10-23-03	
UNIT NO. / BAR CODE	**ACF-04 (AHU-04) Bar Code 004515**		**ACF-05 (AHU-05) Bar Code 004521**		**ACF-06 (AHU-06) Bar Code 004520**	
LOCATION	Basement Mech. Room M-2		Basement Mech. Room M-2		Basement Mech. Room M-2	
MANUFACTURER	Pace Co.		Pace Co.		Pace Co.	
SIZE:	SCF-135A / 15U		A-12FCSI		SCF-135A/13U MI	
SERIAL NO.	91-66730-05		91-66730-06		91-66730-07	
	SPECIFIED	**ACTUAL**	**SPECIFIED**	**ACTUAL**	**SPECIFIED**	**ACTUAL**
TOTAL C.F.M.	2,130	2,450	3,150	3,473	2,200	2,538

REESE ENGINEERING

HOFFMAN ARCHITECTURE

RETURN AIR C.F.M.	2,130	2,009	3,150	2,802	2,200	2,457
O.S.A./C.F.M.	305	279	450	250	90	127
SUCTION STATIC		-1.6"		-2.4"		-1.7"
DISCHARGE STATIC		-.51"		.08"		.55"
TOTAL STATIC	3.09"	2.11"	3.06"	2.48"	3.1"	2.25"
EXTERNAL STATIC	.85"	.67"	.89"	.26"	.87"	1.02"
FAN SHEAVE		2AK54H/ 1 1/8"		4.5 O.D. /1 3/16"		2AK49H/ 1 3/8"
MOTOR SHEAVE		2AK41H/ 1 7/16"		2VP42/ 1 1/8"		2VP42/ 1 3/16"
RPM FAN	1,358	1,310	1,453	1,457	1,367	1,328
BELTS		2 ea.- AX48		2 ea.- AX45		2 ea.- AX44
MOTOR MANUFACTURER		Magetek		Magnetek		Magnetek
MOTOR HP. / FRAME SIZE	3	3 / S182T	3	3 / S182T	3	3 / S182T
S.F.		1.15		1.15		1.15
PHASE	3	3	3	3	3	3
	RATED	**RUNNING**	**RATED**	**RUNNING**	**RATED**	**RUNNING**
AMPERAGE	7.6 / 3.8	3 / 2.4 / 2.4	7.6 / 3.8	3.6 / 2.9 / 2.7	7.6 / 3.8	3.4 / 2.7 / 2.6
RPM MOTOR	1,750	1,769	1,750	1,747	1,750	1,764
VOLTAGE	230 / 460	487 / 486 / 486	230 / 460	486 / 485 / 486	230 / 460	485 / 484 / 484

AIR HANDLER TEST REPORT

BUILDING: PALMER MUSEUM Bldg. No. 755

TESTED BY: RTK

SHEET: 4

	First reading. (System balanced) 10-23-03	First reading. (System balanced) 10-23-03	First reading. (System balanced) 10-23-03
UNIT NO. / BAR CODE	**ACF-07 (AHU-07) Bar Code 004522**	**ACF-08 (AHU-08) Bar Code 004518**	**ACF-09 (AHU-09) Bar Code 004516**
LOCATION	Basement Mech. Room M-2	Basement Mech. Room M-2	Basement Mech. Room M-2
MANUFACTURER	Pace Co.	Pace Co.	Pace Co.

REESE ENGINEERING

HOFFMAN ARCHITECTURE

SIZE:	A-12FC DWD1		A-20 AFSI		SCF 114A/9UM1	
SERIAL NO.	91-66730-08		91-66730-09		91-66730-10	
	SPECIFIED	ACTUAL	SPECIFIED	ACTUAL	SPECIFIED	ACTUAL
TOTAL C.F.M.	2,930	2,695	7,085	5,895	1,080	1,130
RETURN AIR C.F.M.	2,930	2,782	7,085	7,072	1,080	1,051
O.S.A./C.F.M.	350	397	915	573	350	229
SUCTION STATIC		-2.34"		-1.93"		-.86"
DISCHARGE STATIC		.114"		.59"		.23"
TOTAL STATIC	2.91"	2.45"	4.42"	2.52"	3.09"	1.09"
EXTERNAL STATIC	.89"	.38"	.95"	.79"	.94"	.44"
FAN SHEAVE		2AK51H/ 1 3/16"		2TB58/1 7/16"		AK46H / 1 1/16"
MOTOR SHEAVE		2VP50/ 1 1/8"		2BK50H/1 3/8"		2VP50 / 7/8"
RPM FAN	1,422	1,419	1,808	1,356	1,909	1,507
BELTS		2 ea.- AX51		2ea.-BX75		2ea.-AX38
MOTOR MANUFACTURER		Magnetek		Magnetek		Magnetek
MOTOR HP. / FRAME SIZE	3	3 / S182T	10	10 / F215T	2	2 / M145T
S.F.		1.15		1.15		1.15
PHASE	3	3	3	3	3	3
	RATED	RUNNING	RATED	RUNNING	RATED	RUNNING
AMPERAGE	7.6 / 3.8	3.6 / 2.6 / 2.4	25 / 12.5	5.5 / 5.3 / 5.5	5.3 / 2.65	1.8 / 1.2 / 1.4
RPM MOTOR	1,750	1,755	1,750	1,789	1,745	1,782
VOLTAGE	230 / 460	484 / 484 / 485	230 / 460	488 / 487 / 486	230 / 460	486 / 485 / 486

AIR HANDLER TEST REPORT

BUILDING: PALMER MUSEUM Bldg. No. 755

TESTED BY: RTK

SHEET: 5

REESE ENGINEERING

HOFFMAN ARCHITECTURE

	First reading. (System balanced) 10-23-03		First reading. (System balanced) 10-24-03		First reading. (System balanced) 10-24-03	
UNIT NO. / BAR CODE	**ACF-010 (AHU-10) Bar Code 004517**		**ACF-011 (AHU-11) Bar Code 004524**		**ACF-012 (AHU-12) Bar Code 004523**	
LOCATION	Basement Mech. Room M-2		Basement Mech. Room M-2		Basement Mech. Room M-2	
MANUFACTURER	Pace Co.		Pace Co.		Pace Co.	
SIZE:	A-12 FCSI		PF-20AF SWSI		A-20 AFSI	
SERIAL NO.	91-66730-11		91-66730-12		91-66730-13	
	SPECIFIED	**ACTUAL**	**SPECIFIED**	**ACTUAL**	**SPECIFIED**	**ACTUAL**
TOTAL C.F.M.	3,455	3,622	4,600	5,205	6,552	4,844
RETURN AIR C.F.M.	3,455	3,619	4,600	4,947	6,552	4,841
O.S.A./C.F.M.	410	632	320	296	780	1,325
SUCTION STATIC		-2"		-1.9"		-2.2"
DISCHARGE STATIC		.08"		1.5"		.33"
TOTAL STATIC	2.93"	2.08"	4.8"	3.4"	4.44"	2.53"
EXTERNAL STATIC	.84"	.22"	1.02"	1.68"	1.04'	.44"
FAN SHEAVE		2TB54P1/1 3/8"		2TB54P1/1 11/16"		2TB58P1/1 7/16"
MOTOR SHEAVE		2VP50/1 3/16"		2VP71/1 7/16"		2BK52H/1 5/16"
RPM FAN	1,434	1,528	2,002	1,805	1,811	1,423
BELTS		2ea.-AX49		2ea.-BX61		2ea.-BX75
MOTOR MANUFACTURER		Magnetek		Magnetek		Magnetek
MOTOR HP. / FRAME SIZE	5	5 / L184T	7 ½	7½ / F213T	10	10 / F215T
S.F.		1.15		1.15		1.15
PHASE	3	3	3	3	3	3
	RATED	**RUNNING**	**RATED**	**RUNNING**	**RATED**	**RUNNING**
AMPERAGE	12.8 / 6.4	4.3 / 3.7 / 3.6	18.6 / 9.3	5.9 / 5.4 / 5.1	25 / 12.5	5.6 / 5.4 / 5.6
RPM MOTOR	1,750	1,764	1,750	1,783	1,750	1,787
VOLTAGE	230 / 460	488 / 486 / 487	230 / 460	487 / 486 / 487	230 / 460	488 / 486 / 486

REESE ENGINEERING

HOFFMAN ARCHITECTURE

AIR HANDLER TEST REPORT

BUILDING: PALMER MUSEUM Bldg. No. 755

TESTED BY: RTK

SHEET: 6

RED - Not sure of Values.

	Common Areas	Scond Floor	Thrid Floor
	First reading. (System balanced) 6-1 -04	First reading. (System balanced) 5-25-04	First reading. (System balanced) 5-25-04

UNIT NO. / BAR CODE	ACF-013 (AFC-1) Bar Code 015303		ACF-014 (AFC2) Bar Code 015304		ACF-015 (AFC-3) Bar Code 015305	
LOCATION	Mech. Room M104		Mech. Room M104		Mech. Room M104	
MANUFACTURER	Trane Co.		Trane Co.		Trane Co.	
SIZE:	MCCB010AODOUB		MCCB010AODOUB		MCCB010AODOUB	
SERIAL NO.	K02B23945		K02B23971		K02B23993	
	SPECIFIED	ACTUAL	SPECIFIED	ACTUAL	SPECIFIED	ACTUAL
TOTAL C.F.M.	4,700	4,848	4,960	5,229	4,870	4,857
RETURN AIR C.F.M.	4,020	1,777	4,470	4,568	4,380	4,440
O.S.A./C.F.M.	680	3,071	490	661	490	417
SUCTION STATIC		-3.3"		-3.64"		-3.96"
DISCHARGE STATIC		.2"		.64"		.79"
TOTAL STATIC	2.85"	3.5"	4.51"	4.28"	4.43"	4.75"
EXTERNAL STATIC	1.3"	2.58"	1.6"	1.54"	1.6"	1.83"
FAN SHEAVE		BK65X / 1 3/16"		BK67H / 1 3/16"		BK67H / 1 3/16"
MOTOR SHEAVE		BK55X / 1 1/8"		XBK90 / 1 3/8"		XBK90 / 1 3/8"
RPM FAN	2,092	2,100	2,385	2,395	2,385	2,414
BELTS		BX32		BX38		BX38
MOTOR MANUFACTURER		A. O. Smith		A. O. Smith		A. O. Smith
MOTOR HP. / FRAME SIZE	5	5 / S184T	7 1/2	7.5 / S213T	7 1/2	7.5 / S213T
S.F.		1.15		1.15		1.15
PHASE	3	3	3	3	3	3

REESE ENGINEERING

HOFFMAN ARCHITECTURE

	RATED	RUNNING	RATED	RUNNING	RATED	RUNNING
AMPERAGE	15.2 / 14.8	12.2 / 12.3 / 12.2	22.3	17.7 / 17.5 / 16.6	22.3	17.5 / 17.6 / 17.8
RPM MOTOR	1,745	1,761	1,745	1,756	1,745	1,756
VOLTAGE	200 / 208	206 / 206 / 207	200	205 / 205 / 206	200	205 / 205 / 206

b. Space Condition Trending Reports

Due to the volume of data and the inability to gather it in a simple electronic format from the existing controls system the reports have not been attached. The information is contained in a data base that is part of the Campus Control System at the Office of Physical Plant.

c. Sequence of Operation Reports

Due to inability to gather the data in a simple electronic format from the existing controls system the reports have not been attached. The information is contained in a data base that is part of the Campus Control System at the Office of Physical Plant.

PENNSTATE

Office of Physical Plant

Project Details

Project Nbr: 077311300 **Job Nbr:** None **Requested:** 11/19/2007
Status as of 11/19/2007 **is** WORKING **Stage:** Design **Phases:** 00
Location: PALMER MUSEUM **Bldg:** 0755000 **Room:**
Description: STAIRWELL A, REPLACE WINDOW, ETC.PER ATTACHED

Facil. Coord.: MARUSZEWSKI/K. BAMAT **Proj. Mgr.:** HELTMAN, TIMOTHY A.
Proj. Leader: HELTMAN, TIMOTHY A. **Proj. Coord.:** PERTTU, RONALD D.

Customer Est.: $125,000.00 **Est. Date:** 11/19/2007 **Budgets:** 77808
Due: 05/01/2008 **Comment:** AUTH. ON FILE AT PD

OPP Est.: **Est. Date:**

Contact: TIM HELTMAN **Address:** PHYSICAL PLANT **Telephone:** 865-6475

Funding: **Address:**
Status: Authorized **Comment:** AUTH. ON FILE AT PD

Copy
1) DAVE WILL **Address:** 113 ARTS
2) **Address:**
3) **Address:**

Design: Inside **Bid:** No **Due:**
Construction: Inside **Other:**

Stages Information
Project Schedule
Print Screen

PENNSTATE

PENNSTATE 1855

Office of Physical Plant

Project Details

Project Nbr: 077146000 **Job Nbr:** 1236836 **Requested:** 03/05/2007

Status as of 10/01/2007 **is** ON HOLD **Stage:** Inactive **Phases:** 00

Location: PALMER MUSEUM **Bldg:** 0755000 **Room:**

Description: BASEMENT MECH RM, REMOVE EXISTING ELECTRIC HUMIDIFIERS THAT SERVE THE AIR HANDLERS & REPLACE THEM WITH STEAM HUMIDIFIERSSUPPLIED BY THE CAMPUS STEAM (SEE DON PARTSCH FOR DETAILS)

Facil. Coord.: MARUSZEWSKI/K. BAMAT **Proj. Mgr.:** HELTMAN, TIMOTHY A.

Proj. Leader: HELTMAN, TIMOTHY A. **Proj. Coord.:** PERTTU, RONALD D.

Customer Est.: $65,000.00 **Est. Date:** 03/05/2007 **Budgets:** 77808

Due: 09/30/2007 **Comment:**

OPP Est.: **Est. Date:**

Contact: DON PARTSCH **Address:** PHYSICAL PLANT **Telephone:** 865-9960

Funding: **Address:**

Status: Authorized **Comment:**

Copy

1) BOB MULHOLLEM **Address:** PHYSICAL PLANT

2) DAVE WILL **Address:** 113 ARTS

3) STEVE BRISKAR **Address:** 115C AG. ENGR.

Design: Outside **Bid:** No **Due:**

Construction: Inside **Other:**

DESIGN MEETING MINUTES

HOFFMAN
ARCHITECTURE

Meeting No.

DM5

Date: April 06, 2007

Project Name: PALMER MUSEUM

Project No.: HA #0641

RECEIVED
APR 07 2007

Attendance:

Tim Heltman	Absent	Project Manager
Don Partsch		OPP/PSU
David Will		A &A
Tim Scharf		Reese Engineering (R/E)
Robert Hoffman		Hoffman Architecture (H/A)
Ian Salada	Absent	OPP
Rick Riccardo	Absent	OPP
Mike Norris		Mike Norris Engineers.
Ray Beam Absent		OPP
Jan Muhlert		Palmer

Transpirations:

5.01 Tim Schraf reported that he needs to again meet with Ray Beam and Don Partsch at the site to review mechanical rooms, and to monitor room humidity and calibrations. He will set up a meeting the week of April 9th. He then will meet with Ray to discuss sequence of operations and finalize his research.

5.02 R. Hoffman to receive additional existing drawings from Jeremy after meeting. It is hoped that more information regarding wall construction and vapor barriers will be on drawings.

5.03 A meeting between design Professionals has been set for April 19th so as to discuss proposal for solutions in preparation for a meting with the general committee on the afternoon of the 26th. morning of the 27th. Tim Heltman to set up meeting.

NEXT MEETING: Consultants meeting at Reese Engineering.

Any authorized persons who take exception to any statement in this report shall notify the preparer in writing within five (5) days of the receipt of this report, stating in detail the correction or omission. Otherwise, this report shall be considered correct and final.

Respectfully submitted,

Robert H. Hoffman AIA
HOFFMAN ARCHITECTURE

Copy:

Tim Heltman	tah2@nw.opp.psu.edu
Don Partsch	dfp2@psu.edu
Ian Salada	ims101@psu.edu
Tim Scharf	tscharf@reeseinc.com
Mike Norris	miken@mlnai.com
David Will	dww2@psu.edu
Rick Riccardo	rar7@psu.edu
Mark Bodenschatz	mab163@psu.edu
Ray Beam	rcb11@psu.e

#0641/2.03
Design File

110 WEST MAIN STREET, PO BOX 865, BOALSBURG, PA 16827
O: 814-466-7811 E: rhoffman@hoffmanarchitect.com F: 814-466-6340

110 WEST MAIN STREET, PO BOX 865, BOALSBURG, PA 16827
O: 814-466-7811 E: rhoffman@hoffmanarchitect.com F: 814-466-6340

4-06-07 — PALMER VAPOR BARRIER

—Meetings—

Tim Schart, Ray, Don — WK of APRIL 9

WK of 16 — APRIL 19 — Tim S. BOB, MIKE N.

12/14/26 WK of 23 —

AFTERNOON 26TH, 27TH

DESIGN MEETING MINUTES

HOFFMAN
ARCHITECTURE

Meeting No.

DM4

RECEIVED
MAR 19 2007

Date: March 09, 2007

Project Name: PALMER MUSEUM

Project No.: HA #0641

Attendance:

Tim Heltman		Project Manager
Don Partsch		OPP/PSU
David Will		A &A
Tim Scharf	Absent	Reese Engineering (R/E)
Robert Hoffman		Hoffman Architecture (H/A)
Ian Salada	Absent	OPP
Rick Riccardo		OPP
Mike Norris		Mike Norris Engineers.
Ray Beam		OPP
Jan Muhlert		Palmer
Tom Hovan		Reese Engineering

Transpirations:

FUTURE EXPLORATIONS

- < Investigate to see if System #2 was actually designed/installed as a vapor barrier system.
- < Need records of monitoring from David Will. **03.09.07 Resolved**
- < Begin recording trends and supply results to H/A Reese. **03.09.07 Resolved**
- < Determine if the "Raining in the walls" still occurs.
- < Is original insulation above the vapor barrier (System #1) still in place and valid?
- < Need documentation of ranges required for acceptable performance from Palmer representatives. **03.09.07 Resolved.**
- < Design team to begin the study process of data. **03.09.07 In Process**
- < Define more clearly the present controls system. **03.09.07 In process.**
- < Understand the original HVAC diagram and implement modification in drawing form.
- < Discuss further the original design and site observations made by Mike Norris

4.01 Requested data delivered to R/E for their study. There was a concern to have better testing in individual rooms and to have better data from 8:00pm to 8:00am No action as to how to accomplish.

4.02 Project to replace and relocate mixed air sensors to be performed by OPP. Project to evaluate the electrical humidifiers to be put on hold until this report is finalized.

4.03 A window replacement/repair for the stairwell is being exercised by the Palmer group.

4.04 After reviewing the operation allowables:

Temperature = 68-72 degrees
R. Humidity = 48-52

The group asked to see how these limits correspond to the original design.

4.05 Next design team meeting to be to review the existing AHU units and to explore more of the building

110 WEST MAIN STREET, PO BOX 865, BOALSBURG, PA 16827
O: 814-466-7811 E:rhoffman@hoffmanarchitect.com F: 814-466-6340

envelope. Meeting to be held March 15th or 16th. Arrangements to be announced.

4.06 Next design meeting to be the week of April 2nd. Meeting time and place to be announced. The agenda will be to finalize all data and present preliminary alternates for solution

NEXT MEETING: TIME AND PLACE TO BE ANNOUNCED.

Any authorized persons who take exception to any statement in this report shall notify the preparer in writing within five (5) days of the receipt of this report, stating in detail the correction or omission. Otherwise, this report shall be considered correct and final.

Respectfully submitted,

Robert H. Hoffman AIA
HOFFMAN ARCHITECTURE

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Ray Beam	rcb11@psu.edu

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110 WEST MAIN STREET, PO BOX 865, BOALSBURG, PA 16827
O: 814-466-7811 E:rhoffman@hoffmanarchitect.com F: 814-466-6340

3-9-07

— STEAM VALVES CONTROL

Tim Schraf - NEW TRENDS

— STEAM HUMIDIFIERS

1- Don; Ray. Mike Norris; tim Schaff; ~~Tom~~ Howard MEET ON SITE TO investigate system operation

2-

MEET AGAIN — WK. OF APR 2

PART 1 DON PARTSCH- / Ray Beam — replace MIX AIR SENSORS

Part 2 - replace small HUMIDIFIERS

Robert Hoffman

From: Tim Scharf [tscharf@reeseinc.com]
Sent: Thursday, March 08, 2007 11:22 PM
To: Robert Hoffman
Cc: SC File; Thomas Hovan
Subject: 2007001 - Palmer Museum Update

REESE ENGINEERING

Bob:

As you know I will not be attending the meeting tomorrow. Tom Hovan will be attending the meeting in my place. While I have discussed the project with Tom there is no way to download all of the details to him for this meeting. Tom is familiar with the system types in general and will be able to bring any questions and new information back to me for further discussion. I have discussed the items below with him and wanted you to have a copy of the information in preparation for the meeting.

Progress Since last Meeting:

1. Met with Ray Beam and reviewed the sequence of operation for the controls system as it exists today. We documented the system, corrected a few minor items and defined the new trends that we needed. Ray was going to set up the new trends.
2. Continued review of existing system drawings and determine the impact of the current control scheme on the performance.
3. ~~Requested information that was discussed in last meeting. (see below)~~

Items REI Needs:

1. Temperature and Humidity logging information from the Palmer Museum Staff. Bob and Tim were to get this for us to evaluate.
2. Any new trend information that Ray has for the new trends we set up.
3. Specific Criteria on the acceptable ranges (max and min) for temperature and humidity within the space in order for the project to be considered successful. Bob and Tim were to get this for us to evaluate.
4. Specific Criteria on the acceptable rate of change in temperature and humidity within the space in order for the project to be considered successful. Bob and Tim were to get this for us to evaluate.
5. A name of a contact at Palmer that I can call to set up a time to visit the site. Tim was to get this for us. Jeremy

Next Steps:

1. I need to look at the AHUs in the basement as the next step in the advancement of system options to determine what limitations I have both physically and from a quality standpoint. I also need to see the orientation of the systems to continue development of our options for improvement. In the last meeting several areas were mentioned as accessible without a lift (Back Stairwell - access above ceiling; Wall access Panel near main stair) that I would also like to look at. Ray Beam
2. Determine what the steps are to evaluate the existing envelope construction to determine the effect it is having on the space.

DESIGN MEETING MINUTES

HOFFMAN
ARCHITECTURE

Meeting No. DM2

Date: January 18, 2007

Project Name: PALMER MUSEUM

Project No.: HA #0641

RECEIVED
JAN 23 2007

Attendance:

Tim Heltman		Project Manager
Don Partsch	Absent	OPP/PSU
David Will		A &A
Tim Schraf	Absent	Reese Engineering (R/E)
Robert Hoffman		Hoffman Architecture (H/A)
Ian Salada	Absent	OPP
Rick Riccardo		OPP
Mike Norris		Mike Norris Engineers.

THE PURPOSE OF THE SECOND WALKTRU WAS TO REVIEW THE BUILDING WITH THE ENGINEERING TEAM. MIKE NORRIS FORMELY OF GARY JOHNSTON AND ASSOCIATES WAS INVITED SO AS TO DISCUSS THE ORIGINAL MEP CONCEPTS.

Transpirations:

2.0 Reviewed the stair tower and the effects of excessive moisture.

2.1 By way of lift reviewed the attic spaces. Took pictures and discussed evidence of moisture. Fans were not running at the time. Mike Norris to record thoughts/observations and submit to H/A

2.2 Rick Riccardo to review his findings from studies performed a number of years ago. Discussed issues relating to the upper vapor barrier and elements that violate its continuity.

2.3 Mike Norris discussed the basic concept as he understood it of the HVAC system and conditioning of spaces. Mike to write down concept so team can review how the original system is or is not performing due to alteration performed to the system over time.

2.4 Due to a show being set up, Thursday was the last day that the team could review the upper attic until Spring.

1.5 Since it appears that there are a number of team members who have an idea of the issues at hand, H/A will be scheduling a team meeting in a week so as to allow all thoughts to be heard and allow members to develop a strategy for either forensic work . In addition, the team needs to develop a schedule for assessing the situation and preparing for recommendations to OPP. Recognized team members include:

Tim Heltman PM
Don Partsch
OPP trades representative.
Ian Salada
David Will
Mike Norris
Tim Schraf
Robert Hoffman

110 WEST MAIN STREET, PO BOX 865, BOALSBURG, PA 16827
O: 814-466-7811 E:rhoffman@hoffmanarchitect.com F: 814-466-6340

Please advise H/A if someone is missing or should be included.

1.6 OPP is collecting all control documents, building measurements on temperature and humidity, and all modifications that OPP performed to the system for use by R/E.

1.7 Agenda next design meeting: **WORKSHOP (important that all attend)**

< Re-state present problem for all team members.
< Review observations from building walk thru's
< Report of initial HVAC concept: Mike Norris
< Define modifications to original system and define for what purpose.
< Discuss and record needed further investigations required
< Develop a plan to conclude evaluations and prepare corrective recommendations.
< Develop a time table for conclusion of report to OPP.

NEXT MEETING: TIME AND PLACE TO BE ANNOUNCED. Next week is being investigated. H/A will work with Tim Heltman to organize.

Any authorized persons who take exception to any statement in this report shall notify the preparer in writing within five (5) days of the receipt of this report, stating in detail the correction or omission. Otherwise, this report shall be considered correct and final.

Respectfully submitted,

Robert H. Hoffman AIA
HOFFMAN ARCHITECTURE

Copy:

Tim Heltman	tah2@nw.opp.psu.edu
Don Partsch	dfp2@psu.edu
Ian Salada	ims101@psu.edu
Tim Schraf	tschraf@reeseinc.com
Mike Norris	miken@mlnai.com
David Will	dww2@psu.edu
Rick Riccardo	rar7@psu.edu
Mark Bodenschatz	mab163@psu.edu

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Design File

110 WEST MAIN STREET, PO BOX 865, BOALSBURG, PA 16827
O: 814-466-7811 E: rhoffman@hoffmanarchitect.com F: 814-466-6340

Date: Fri, 9 Mar 2007 09:18:54 -0500
To: jkm11@psu.edu
Subject: Fwd: Palmer Museum of Art Temperature/Humidity Set-Points/Alarms
From: "Jeremy Warner" <jrw255@psu.edu>
X-Sender: jrw255
X-Originating-IP: 146.186.186.205
X-Virus-Scanned: by amavisd-new

Here you go...

---------- Forwarded message ----------
To: dww2@psu.edu
Date: Fri, 01 Dec 2006 16:31:35 -0500
From: "Jeremy Warner" <jrw255@psu.edu>
Subject: Palmer Museum of Art Temperature/Humidity Set-Points/Alarms
CC: jkm11@psu.edu, bxb35@psu.edu, jrw255@psu.edu
Hi Dave:

Here is the information you needed:

Year-Round Museum Temperature Set-Point: 70*

Year-Round Museum Humidity Set-Point: 50%

A "**warning" alarm** and notification of museum staff, CCS, and OPP should occur at **+/- 3 degrees/percent difference.**
A "**take action**" alarm and notification of museum staff, CCS, and OPP should occur at **+/- 4 degrees/percent difference.**
A "**building environment critical**" alarm and notification of museum staff, CCS, and OPP should occur at **+/- 5.5 degrees/percent difference.**

Note: Any corrections to building temperature/humidity should be gradual, (no more than 2 degrees/percent correction an hour) with no big swings.

If any questions, please let me know.

Thanks,
Jeremy

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Jeremy Warner
Coordinator of Security
Palmer Museum of Art
The Pennsylvania State University
University Park, PA 16802-2507
(814) 863-5232 (office)
(814) 863-8608 (fax)
==========

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Jeremy Warner
Coordinator of Security
Palmer Museum of Art
The Pennsylvania State University
University Park, PA 16802-2507
(814) 863-5232 (office)
(814) 863-8608 (fax)
==========

Date: Fri, 17 Nov 2006 12:13:52 -0500
To: dww2@psu.edu
Cc: jrw255@psu.edu
Subject: Update: Temperature and Humidity
From: "Jeremy Warner" <jrw255@psu.edu>
X-Mailer: Penn State WebMail
X-Sender: jrw255
X-Originating-IP: 146.186.186.230
X-Virus-Scanned: by amavisd-new

Hi Dave:

Here is an update on temperatures and humidity as of **11/17/06, 12:00p.m.:**

Auditorium (ACF-1): 70.0*, 30.6%
Lobby South (ACF-2): 69.5*, 37.4%
Lobby North (ACF-3): 72.2*, 24.5%
Baroque Gallery (ACF-4): 70.5*, 43.1%
Asian/African (ACF-5): 70.5*, 40.9%
Art Storage/ Prep Room (ACF-6): 70.0*, 47.5%
Ancient Gallery (ACF-7): 71.4*, 44.6%
American/Paper/Ceramics (ACF-8): 70.0*, 46.7%
Art Holding (ACF-9): 70.5*, 41.2%
Contemporary (ACF10): 70.3*, 48.2%
Gallery Stairs SW (ACF-11): 70.0*, 38.2%
Changing Gallery (ACF-12): 70.3*, 43.0%
1972 building, 1st Floor (ACF-13): 63* - 74*, 42.4%
Print Storage (ACF-14): 70.0*, 45.1%
Print Study (ACF-14): 68.0*, 45.1%
Hull Gallery (ACF-14): 70.0*, 45.1%
1972 building, 3rd Floor (ACF-15): 68* - 74*, 46.3%
1972 building, Stairwell C (ACF-15): 74*, N/A%

Please give me a call if you have any questions.

Thanks,
Jeremy

==========

Jeremy Warner
Coordinator of Security
Palmer Museum of Art
The Pennsylvania State University
University Park, PA 16802-2507
(814) 863-5232 (office)
(814) 863-8608 (fax)

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DESIGN MEETING MINUTES

HOFFMAN
ARCHITECTURE

Meeting No.

DM3

Date: January 30, 2007

Project Name: PALMER MUSEUM

Project No.: HA #0641

RECEIVED
FEB 27 2007

Attendance:

Tim Heltman		Project Manager
Don Partsch		OPP/PSU
David Will	Absent	A &A
Tim Scharf		Reese Engineering (R/E)
Robert Hoffman		Hoffman Architecture (H/A)
Ian Salada	Absent	OPP
Rick Riccardo		OPP
Mike Norris		Mike Norris Engineers.
Ray Beam		OPP
Jan Muhlert	Absent	Palmer

Transpirations:

ORIGINAL DESIGN: MIKE NORRIS

- < Maintain consistant leaving condition for total treated spaces. Individual rooms not controlled.
- < Cooling coil continuation 24 hrs.
- < Maintain roughly 2 ½% RH
- < 100% load design 24/7
- < Mike recalled that there was only one vapor barrier System #1 as shown on the plans. He does not recall a second barrier.
- < Electronic humidfiers still in operation.
- < Mike Norris passed out a single line diagram reflecting his understanding of the original system.

PROBLEMS

- < Experiencing excessive fluctuations in humidity at night and in summer. 65%
- < In the past have experienced excessive moisture on interior I.E stairwell, carpet , running water in walls.
- < Summer dehudification
- < Maintaining design humidity and eliminating fast changes in humidity.
- < Experienced water passing tru System #2 at lighting fixtures.

MODIFICATIONS TO EXISTING SYSTEM

- < Installed a fan in upper attic space above system #1 immediately after occupancy of 1990 addition to correct excessive moisture issues. Fan brings in untreated outside air and provides positive pressure to the interior spaces. This modification has been viewed as a success as long as fan is running in operation. Fan was replaced recently. When out of operation, moisture problem reappeared.
- < Made modifications to chiller to operate full time. False loading inserted. Excessive use of energy experienced.
- < Made modifications to controls so as to monitor actual spaces vs total space as originally designed.
- < Added 24hr. chilled water to building 2006

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- < Removed chiller October 2006.
- < Modified 2nd floor into a "Double Room" design. This has produced a better controlled environment according to Palmer representatives.
- < Since University chilled water has been added to building, the 65% high RH level has not been experience noting constant attic fan operation.

FUTURE EXPLORATIONS

- < Investigate to see if System #2 was actually designed/installed as a vapor barrier system.
- < Need records of monitoring from David Will.
- < Begin recording trends and supply results to H/A Reese.
- < Determine if the "Raining in the walls" still occurs.
- < Is original insulation above the vapor barrier (System #1) still in place and valid?
- < Need documentation of ranges required for acceptable performance from Palmer representatives.
- < Design team to begin the study process of data.
- < Define more clearly the present controls system.
- < Understand the original HVAC diagram and implement modification in drawing form.
- < Discuss further the original design and site observations made by Mike Norris

R. Hoffman has requested that Tim Heltman set up another design meeting sometime in mid-February so all parties can attend and contribute to the progress of the study..

NEXT MEETING: TIME AND PLACE TO BE ANNOUNCED.

Any authorized persons who take exception to any statement in this report shall notify the preparer in writing within five (5) days of the receipt of this report, stating in detail the correction or omission. Otherwise, this report shall be considered correct and final.

Respectfully submitted,

Robert H. Hoffman AIA
HOFFMAN ARCHITECTURE

Copy:

Tim Heltman	tah2@nw.opp.psu.edu
Don Partsch	dfp2@psu.edu
Ian Salada	ims101@psu.edu
Tim Scharf	tscharf@reeseinc.com
Mike Norris	miken@mlnai.com
David Will	dww2@psu.edu
Rick Riccardo	rar7@psu.edu
Mark Bodenschatz	mab163@psu.edu
Ray Beam	rcb11@psu.edu

#0641/2.03
Design File

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O: 814-466-7811 E: rhoffman@hoffmanarchitect.com F: 814-466-6340

Temperature and Humidity Readings, Palmer Museum of Art

Set points: 70 deg F +/- 5; 50% RH +/- 5

Date and time	11/13/06 3:50 PM	11/14/06 7:45 AM	11-14-2006 9:10 AM	11-14-2006 11:00 AM	11-14-06 1:40 p	11-14-06 3:50 p	11-15-06 8:AM	11-15-06 2:15p	11-16-05 8am
Auditorium ACF-1			72.7 32.1	73.4 33.1		70.5 34.0	72.9 33.6		72.2
Lobby South ACF-2			69.0 47.7	69.5 46.2		69.0 47.7	69.5 43.2		72.9
Lobby North ACF-3			72.2 34.8	72.9 35.8		72.7 33.8	71.9 33.3		74.3
Baroque Gallery ACF-4	72.7 42.1	74.8 53.4	74.3 42.6	76.3 46.5	76.5 43.6	73.9 44.6	70.5 45.6		69.8 46.5
Asian/African ACF-5	74.4 41.6	75.1 49.0	75.1 47.5	76.3 46.5	76.4 39.7	74.2 41.6	70.0 41.6	39.7	70.3 47.2
Art storage/Prep room ACF-6	72.4 46.1	71.9 49.5	71.7 49.0	71.5 47.0	73.1 46.1	73.4 47.0	70.0 46.5		70.0 51.9
Ancient/Rennais. & Changing; ACF-7	72.9 44.1	73.4 56.8	73.1 54.9	75.6 52.9	77.3 47.0	75.3 44.1	70.7 47.0	43.0	67.8 47.0
American/Paper/Ceramics ACF-8	77.8 37.5	80.2 50.6	80.7 46.7	81.7 44.3	80.7 35.	73.4 42.3	70.0 47.2		70.0 51.1
Art holding ACF-9	72.0 42.6	72.0 42.6	72.0 42.6	72.0 42.6	72.0 42.6	72.0 42.6	70.3 45.1		70.5 46.5
Contemporary ACF-10	75.3 45.3	75.3 45.3	75.3 45.3	75.3 45.2	75.3 45.3	75.3 45.3	70.3 46.7		70.3 49.2
Gallery Stairs SW ACF-11			73.4 45.6	73.4 45.6	73.4 45.6	73.4 45.6	69.6 42.6		70.3 47.5
Changing Gallery ACF-12	71.6 35.3	71.6 35.3	71.6 35.3	71.6 35.3	71.6 35.3	71.6 35.3	70.1 38.3	37.7	70.3 47.5
1972 building, 1st floor ACF-13			71-75 43.9	71-76 43.9	71-76 44.3	65-74 46.3	60-74 45.9		68-75 56.9
1972 building, 2nd floor ACF-14, Print Storage	75.0 47.0	75.0 48.0	75.0 47.0	75.0 48.0	76.0 48.0	75.0 40.7	70.0 41.2	41.6	74.0 48.0
Print Study	74.0	75.0	75.0	76.0	77.0	74.0	69.0		74.0
Hull Gallery	76.0	77.0	78.0	78.0	79.0	79.0	74.0	76.0	76.0
1972 building, 3rd floor ACF-15	72-75 47.1	72-75 46.3	73-75 45.9	75.76 46.7	76-78 45.5	73-76 42.4	71-74 42.7	72-75 42.7	72-75 49.8
1972 building, stairwell C		76	77	77.0	78.0	76.0	74.0		76.0

11-17-06
7:45A

10-26-06

70.1 37.5	1
68.3 43.2	2
71.9 30.9	3
70.7 44.6	4
70 3 40.9	5
70.0 48.0	6
70.2 45.1	7
69.8 46.7	8
70 3 38.2	9
70.0 46,7	10
69.8 37.2	11
70.1 37.7	12
63-74 44.3	13
70.0 45.1 stbd	14
68.0 PS	
70.0 HULL	
68-74 46.3	15
74.0 Star	

PennState
Physical Plant

UP-Repair building after fire protection system leak - 000801300
Palmer Museum of Art - Museum Building
Building Number: 0755000
Construction Year: 1971 (original)

Meeting: Schematic Review
Date: 1/14/2021
Attendees: Triebold, Steven George sgt4@psu.edu
Garbini, Steven Paul spg15@psu.edu
Salada, Ian M ims101@psu.edu
Craig Thompson cthompson@rhinofpe.com
Hugar, Steven Harris shh10@psu.edu
Robert Lingenfelter [PSU OPP] rrl144@psu.edu
Lorson, Heath Alan hal14@psu.edu
Barefoot, Douglas Allen dab6017@psu.edu
Craig Thompson cthompson@rhinofpe.com

Joint Scope Meeting Topics/Agenda –

1. Determine what system info we have to inform system options. Do we need any further as-built information? Review of Fire Protection (FP) schematic drawings:
    a. Dry system corrosion has occurred due to pipe and system type (see report).
    b. Horizontal lines (piping) through galleries. Assumptions made on 1st and 2nd floor layout based on typical dry system design. Head locations needed.
    c. 2nd floor 3” wet riser generally feeds lines to back-of-house areas.
    d. The two existing dry systems (pre-action systems) generally feed lines to Core galleries and Northwest Wing galleries.
2. System replacement will be intrusive. Is continuous occupancy possible? What are the impacts? Review of primary building areas:
    a. Core (adjacent Curtin Rd): 6” dry riser to core 2nd floor galleries and 3rd floor offices could be replaced with wet system. Less difficult based on accessible ceiling type.
    b. Northwest Wing: Replacement includes 2nd floor galleries. More difficult based drywall ceiling type. A lot of cutting, patching and painting. Could replace one gallery at a time.
3. How long can we husband? What is the risk? Husbanding system now:
    a. System could get another pinhole leak (see report). Will use compressors to monitor for potential leaks in existing pre-action system. Additional investigation required to find actual leak location(s) since only measuring pressure loss via compressor data.

b. Nitrogen dry system may buy some time reducing rate of corrosion and minimizing potential pinholes. It does not fix existing pinholes.

4. What is the preferred option? Review of report:
    a. Option 2 (replace with pre-action) and Option 3 (replace with wet) seem similar in terms of logistics. Option 3 generally preferred as funding permits.
    b. Option 3 possible in phases. In general, a Core phase and a NW Wing phase. Deferred phase would continue to be husbanded and monitored via compressors.
5. Next steps.
    a. Monitor: Install and monitor compressors starting week of 1/18/21. Doug Barefoot to establish and coordinate monitoring information (through Fire Alarm panel or sperate meter). Monitoring information will reveal priority phase (Core or NW Wing). How functional is the Core pre-action system vs the NW Wing?
    b. Review: Review monitor findings with Palmer and FC by end of February. Identify logistics and art protection concerns in relation to Option 3. Outline a phased approach that allows for replacement and continuous occupancy.
    c. Refine: Incorporate head locations into schematics to refine system layout. Rhino back in March to locate heads.
    d. Develop: Develop a rough order of magnitude cost by phase building on steps above (monitoring, review, and refinement). Confirm 1st phase scope, funding, and schedule.

Next meeting: End of February pending monitoring information.

Attachments: Report, Schematics

CC: File
Attendees
Melnick, Phillip prm1@psu.edu
Lynch, Kirsten Blair kbh16@psu.edu
Harold Silbaugh harold.silbaugh@fmglobal.com

RHINO
FIRE PROTECTION
ENGINEERING, PLLC

12359 Sunrise Valley Dr
Suite 350
Reston, VA 20191
T: 703-476-5034
F: 703-476-5038

To: Robert Lingenfelter
Pennsylvania State University
101 Physical Plant Building
University Park, PA 16802-1118

From: Craig Thompson P.E.

Subject: Pennsylvania State University - Palmer Museum Dry/Preaction System Study

Date: January 12, 2021

Rhino Fire Protection Engineering, PLLC has been contracted to evaluate the replacement of the dry and preaction fire suppression systems in the Palmer Museum. There was no investigation into Microbiologically Induced Corrosion (MIC) as MIC is often found in dry pipe and preaction sprinkler systems and can be a contributing factor to corrosion. It is assumed that MIC and corrosion from oxidation within the systems has caused the pin hole leaks within the system(s) throughout the building.

Background

The Palmer Museum is located on Curtain Road at the Pennsylvania State University in University Park, PA. The museum opened in 1970's and houses 9,850 of works of art. In an effort to protect the art from fire damage, the building is equipped with fire suppressions systems. To limit the possibility of water damage to the works of art by the fire suppression system, Palmer Museum has several pre-action sprinkler systems. The pre-action systems do not contain water normally but are filled with water when a fire is detected. However, even though the pipes are to not have water, there are always trace amounts of water in the system. These traces of water can cause corrosion and possibly harbor MIC which further damages the pipe.

Preaction Valves and System Locations

The preaction valves (a 4" and 6") are located in the basement on the northwest side of the building. The 4" valve has a riser that extends up to the system on the first and second floor and serves the galleries on the northwest side of the building. The 6" riser extends up to the first floor at the Janitor's closet and then traverses the first floor to the stair and extends up to the second and third floors, serving the gallery and offices on the southeast side of the stair.

RHINO
FIRE PROTECTION
ENGINEERING, PLLC

12359 Sunrise Valley Dr
Suite 350
Reston, VA 20191
T: 703-476-5034
F: 703-476-5038

Estimation

The current schematic plans show the extent of the preaction systems that could be seen without any destructive testing. It is estimated that the sprinkler lines in the galleries and offices follow similar lines and are of similar sizes as to what could be visually verified during the site visit in December 2020. No further site visits are planned at this time for additional verification as no additional hatches currently existing to aid in visual verification of the system.

Conclusion

Based on the evaluation, it can be concluded that corrosion via oxidation and MIC causing bacteria are the source of the leaks in the preaction systems. This indicates that merely changing the pipes will not mitigate the issue and that the systems need to be replaced with wet pipe sprinkler systems.

For the pre-action systems, three recommendations are provided. The recommendations can be done individually, or together to best suit the needs of Palmer Museum. The first recommendation is to supply the pre-action systems with nitrogen instead of air. This will reduce the likelihood of MIC causing bacteria proliferating. The second recommendation is to replace the pre-action system piping, either partially or as a whole. This can ensure that the corroded piping is removed, along with temporarily reducing the MIC causing bacteria. The third recommendation (preferred) is to replace the pre-action system with a wet system with black steel piping. Wet systems are less prone to MIC related issues, and black steel is less susceptible to corrosion than galvanized piping, which is typically used for pre-action systems, since the corrosion attacks the small areas on the pipe walls that were not sufficiently coated with zinc.

Rhino Fire Protection will work with the Pennsylvania State University and Palmer Museum to select the recommendation(s) that best fit within the Palmer Museum's vision.

Sincerely,

Craig Thompson, P.E.
Senior Fire Protection Engineer
Rhino Fire Protection Engineering, PLLC

RHINO
FIRE PROTECTION
ENGINEERING, PLLC

12359 Sunrise Valley Dr
Suite 350
Reston, VA 20191
T: 703-476-5034
F: 703-476-5038

Appendix A

See separate PDF initial investigation of the dry pipe/preaction systems in the Palmer Museum. The drawings show the existing pipe that could be visually verified without cutting open ceilings and walls.

FIRE PROTECTION SPECIFICATIONS:

PART 1 – GENERAL

1.1 STIPULATIONS
- A. THE SPECIFICATION SECTIONS "GENERAL CONDITIONS OF CONTRACT", "SPECIAL CONDITIONS" AND DIVISION 1 – GENERAL REQUIREMENTS" FORM A PART OF THIS SECTION BY THIS REFERENCE.

1.2 DESCRIPTION OF WORK
- A. SCOPE: REPLACE THE EXISTING DRY–PIPE AND PREACTION SYSTEMS (REMOVE CONTROL VALVES, GALVANIZED PIPE, AND SPRINKLERS) ON A ONE–FOR–ONE BASIS AND PROVIDING NEW CONTROL VALVES, WATER FLOW SWITCHES, AND TAMPER SWITCHES. CONTRACTOR TO REUSE EXISTING HANGARS. PIPE SIZES TO REMAIN THE SAME. WORK TO BE UNDERTAKEN AS SYSTEM REPAIRS..
- B. NOT IN USE.
- C. COMPLIANCE: THE ENTIRE WET–PIPE AUTOMATIC SPRINKLER SHALL BE DESIGNED IN ACCORDANCE WITH SECTION 1.3 A. ANY REFERENCE TO "AUTHORITY HAVING JURISDICTION" SHALL BE INTERPRETED TO MEAN THE PENNSYLVANIA STATE UNIVERSITY DEPARTMENT OF PHYSICAL PLANT. ALL MATERIAL AND EQUIPMENT USED SHALL BE APPROVED BY FM GLOBAL, UNLESS NOTED OTHERWISE AND APPROVED BY THE ENGINEER, FOR THEIR INTENDED USE AND SERVICE. EQUIPMENT THAT DOES NOT HAVE FM GLOBAL APPROVAL MAY BE USED ONLY IF NO COMPATIBLE FM GLOBAL EQUIPMENT EXISTS AND THIS EQUIPMENT MUST HAVE THE UL LISTING AND APPROVED BY THE OWNER PRIOR TO INSTALLATION. ANY CONFLICT WITH THE DESIGN DOCUMENTS AND SPECIFIED CODES AND REGULATIONS SHALL BE BROUGHT TO THE ENGINEER'S IMMEDIATE ATTENTION.

1.3 QUALITY ASSURANCE
- A. INSTALLER REQUIREMENTS:
  1. SEE GENERAL CONDITIONS OF THE CONTRACT. IN ADDITION, DESIGN SHALL BE BY A NICET LEVEL III OR A REGISTERED FIRE PROTECTION ENGINEER. A CERTIFIED SPRINKLER CONTRACTOR OR A SPECIALIST WHO IS EXPERIENCED IN THE DESIGN AND INSTALLATION OF AUTOMATIC SPRINKLER SYSTEMS SHALL PERFORM INSTALLATION.
  2. THE CONTRACTOR SHALL SUBMIT THE FOLLOWING FOR VERIFICATION OF QUALIFICATIONS: PRIOR TO INSTALLATION, SUBMIT DOCUMENTATION, TO THE ENGINEER, SHOWING THAT THE CONTRACTOR HAS SUCCESSFULLY INSTALLED AUTOMATIC FIRE SUPPRESSION SPRINKLER SYSTEMS OF COMPARABLE SIZE, TYPE AND DESIGN AS SPECIFIED HEREIN OR THAT THE CONTRACTOR HAS A FIRM CONTRACTUAL AGREEMENT WITH A SUBCONTRACTOR HAVING SUCH EXPERIENCE. THE DATA SHALL INCLUDE THE NAMES AND LOCATIONS OF AT LEAST TWO INSTALLATIONS WHERE THE CONTRACTOR, OR SUBCONTRACTOR, INSTALLED SUCH SYSTEMS. THE CONTRACTOR, OR SUBCONTRACTOR, SHALL CERTIFY THAT EACH SYSTEM HAS PERFORMED SATISFACTORILY FOR A PERIOD OF NOT LESS THAN ONE YEAR.
- B. PROJECT SUPERINTENDENT: THE CONTRACTOR SHALL PROVIDE ONE FULL–TIME, ON–SITE STAFF MEMBER DESIGNATED AS THE "PROJECT SUPERINTENDENT". THE DUTIES OF THE PROJECT SUPERINTENDENT ARE TO SUPERVISE EXECUTION OF ALL ASPECTS OF THIS SPECIFICATION, INCLUDING SAFETY ON THE JOB SITE AS DESCRIBED IN THE "ACCIDENT PREVENTION CLAUSE" OF THE GENERAL PROVISIONS OF THE OCCUPATIONAL SAFETY AND HEALTH (OSHA) ACT OF 1970. THAT CLAUSE INCORPORATES INTO THE CONTRACT, BY REFERENCE, THE SECRETARY OF LABOR'S OSHA STANDARDS (29 CFR PART 1926). THE PROJECT SUPERINTENDENT SHALL BE THOROUGHLY FAMILIAR WITH ALL CONTRACT OBLIGATIONS AND SHALL BE CAPABLE OF MAKING ALL CONTRACTUAL DECISIONS WITH REGARDS TO THEIR PROJECT SCOPE OF WORK ON BEHALF OF THE CONTRACTOR, OR SUBCONTRACTOR. THE PROJECT SUPERINTENDENT SHALL BE RESPONSIBLE FOR MAKING SURE THAT QUALITY CONTROL REVIEW HAS BEEN PERFORMED ON ALL SUBMITTALS PRIOR TO THE SUBMISSION TO THE ENGINEER. THE PROJECT SUPERINTENDENT SHALL ALSO BE RESPONSIBLE FOR ENSURING THAT ALL SUBMITTALS ARE ACCURATE AND FULLY COORDINATED.
- C. GUARANTEE: THE CONTRACTOR SHALL GUARANTEE LABOR, MATERIALS, AND EQUIPMENT PROVIDED UNDER THIS CONTRACT AGAINST DEFECTS FOR A PERIOD OF ONE YEAR AFTER THE DATE OF FINAL ACCEPTANCE OF THIS WORK BY THE ENGINEER. FINAL ACCEPTANCE INCLUDES, BUT IS NOT LIMITED TO, THE RECEIPT OF AS–BUILT DRAWINGS AND OPERATION AND MAINTENANCE MANUALS.
- D. CODES AND STANDARDS: PROVIDE A WET–PIPE SPRINKLER SYSTEM CONFORMING TO THE SPECIFIED EDITIONS OF CODES AND STANDARDS OF THE FOLLOWING ORGANIZATIONS:
  1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), INCLUDING ALL AMENDMENTS AND APPENDICES: NO.13, STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS (2007 EDITION), NO.33, STANDARD FOR SPRAY APPLICATION USING FLAMMABLE OR COMBUSTIBLE MATERIALS (2018), NFPA 33
  2. THE CENTER REGION CODE AGENCY: PENNSYLVANIA UNIFORM CONSTRUCTION CODE (UCC) AND CENTRAL REGION CODE.
  3. FM GLOBAL ENGINEERING AND RESEARCH CORPORATION (FM): FM–P7825CD FM GLOBAL APPROVAL GUIDE 2–8N FM GLOBAL PROPERTY LOSS PREVENTION DATA SHEETS 3–26 FM GLOBAL PROPERTY LOSS PREVENTION DATA SHEETS.
  4. UNDERWRITERS LABORATORIES INC. (U.L.): UL–FPED FIRE PROTECTION EQUIPMENT DIRECTORY

1.4 SYSTEM DESIGN
- A. GENERAL: DESIGN AUTOMATIC SPRINKLER SYSTEMS IN ACCORDANCE WITH ALL REQUIRED AND ADVISORY PROVISIONS OF NFPA 13 AND FM GLOBAL EXCEPT WHERE MODIFIED HEREIN,
- B. LOCATION OF SPRINKLERS: THE SPACING OF SPRINKLERS SHALL NOT EXCEED THAT PERMITTED BY NFPA 13, AS APPLICABLE, OR THE LISTING OF THE SPECIFIC SPRINKLER. WHERE PRACTICAL, UNIFORMLY SPACE SPRINKLERS ON THE BRANCH PIPING. LOCATE SPRINKLERS IN A PATTERN CONSISTENT WITH CEILING GRID, LIGHTS, AND AIR SUPPLY DIFFUSERS. IT IS THE INTENT OF THE DESIGN TO INSTALL QUICK RESPONSE SPRINKLERS (QRS) IN ALL SPACES PERMITTED BY NFPA 13.
- C. SPRINKLER DISCHARGE AREA: THE DISCHARGE AREA SHALL BE AS DEFINED BY NFPA 13 AND FM GLOBAL REQUIREMENTS. THE SPRINKLERS SHALL BE QUICK RESPONSE WITH A DESIGN AREA OF 1500 SQ FEET FOR EXTRA HAZARD. AREA REDUCTIONS PER NFPA 13 ARE ALLOWED.

1.5 SUBMITTALS
- A. "SHOP DRAWINGS, PRODUCT DATA AND SAMPLES." SUBMIT SIX (6) COMPLETE SETS OF SUBMITTALS TO THE ENGINEER, THREE (3) COMPLETE SETS TO FM GLOBAL AND THREE (3) COMPLETE SETS TO CENTER REGION. APPROVED DRAWINGS FROM EACH OF THE ENTITIES LISTED ABOVE MUST BE RECEIVED AND APPROVED PRIOR TO BEGINNING OF THE CONSTRUCTION. PARTIAL SUBMITTALS WILL NOT BE ACCEPTABLE AND WILL BE RETURNED WITHOUT REVIEW. BEFORE ANY WORK IS COMMENCED, THE SUBMITTAL MUST BE APPROVED BY THE ENGINEER, CENTER REGION AND FM GLOBAL. MANUFACTURER'S DATA SHALL BE PROVIDED FOR THE FOLLOWING AND ANNOTATED TO SHOW THE SPECIFIC MODEL, TYPE AND SIZE OF EACH ITEM: CHECK VALVE, CONTROL VALVE, AUXILIARY VALVES, WATER FLOW SWITCHES, DRAIN VALVES, VALVES INCLUDING GATE AND GLOBE, PIPE, FITTINGS, HANGERS, SUPPORTS, AND MECHANICAL COUPLINGS, VALVE SUPERVISORY (TAMPER) SWITCHES, ALL OTHER ASSOCIATED EQUIPMENT.
- B. TEST CERTIFICATION AND INSTRUCTION: SUBMIT TEST CERTIFICATION, TO THE ENGINEER, FOR ALL PIPE AND FITTINGS.
- C. SHOP DRAWINGS: SUBMIT ELECTRONIC VERSION OF DETAILED SHOP DRAWINGS, IN ACCORDANCE WITH NFPA 13, "WORKING PLANS", ON UNIFORM SIZE SHEETS OF 24 INCHES X 36 INCHES, TO THE ENGINEER FOR REVIEW AND APPROVAL. INFORMATION SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING:
  1. LAYOUT INDICATING DETAILS PLAN VIEW AND ELEVATIONS OF THE SYSTEM PIPING. INDICATE THE LOCATION OF SPRINKLERS AND PIPING IN RELATION TO THE CEILING LAYOUT, SHOWING PIPE LENGTHS AND SIZES.
  2. COORDINATION WITH THE SOFFIT MANUFACTURER SHOWING ALL LOCATION OF SOFFITS.
  3. THE SIGNATURE AND SEAL OF A REGISTERED PROFESSIONAL FIRE PROTECTION ENGINEER, REGISTERED PROFESSIONAL ENGINEER WITH A MINIMUM OF TWO YEARS FIRE PROTECTION DESIGN EXPERIENCE, OR A NICET LEVEL III OR IV TECHNICIAN.
  4. LOCATION OF SOFFIT ENCLOSURES.
  5. SPRINKLER IDENTIFICATION NUMBER (SIN) FOR EACH TYPE OF SPRINKLER.
  6. ALL NFPA13 REQUIREMENTS.

1.6 AS–BUILT DRAWINGS
- A. GENERAL: PREPARE AND SUBMIT TO THE ENGINEER ONE SET OF REPRODUCIBLE DETAILED "RECORD DRAWINGS" AND AN ELECTRONIC COPY OF THE SAME DRAWINGS ON CD MEDIA (IN DWG AND TIF FORMATS). THE DRAWINGS SHALL SHOW THE SYSTEM AS INSTALLED, INCLUDING ALL DEVIATIONS FROM BOTH THE PROJECT DRAWINGS AND THE APPROVED SHOP DRAWINGS. THE DRAWINGS SHALL ALSO INCLUDE ALL INFORMATION AS REQUIRED BY NFPA 13. THE DRAWINGS SHALL BE PREPARED IN AN ELECTRONIC FORMAT. SUBMIT THESE DRAWINGS WITHIN TWO WEEKS AFTER THE FINAL ACCEPTANCE TEST OF THE SYSTEM.

1.7 OPERATION AND MAINTENANCE MANUALS
- A. GENERAL: NOT LESS THAN 7 CALENDAR DAYS PRIOR TO THE FINAL ACCEPTANCE TESTING OF THE ENTIRE SYSTEM, AND FOR USE DURING THE INSTRUCTION PERIOD HEREINAFTER SPECIFIED, PROVIDE THREE (3) BOUND COPIES OF AN OPERATION AND MAINTENANCE MANUAL TO THE ENGINEER. THE MANUAL SHALL INCLUDE AN INDEX, COPIES OF ALL APPROVED SHOP DRAWINGS AND SUBMITTAL MATERIALS (UPDATED TO AS_BUILT), AND A COMPLETE PARTS LIST OF ALL COMPONENTS. THE MANUAL SHALL ALSO INCLUDE, FOR EACH ITEM, THE MANUFACTURER'S NAME, AND THE SERIAL NUMBER OF THE PART, AN ORDERING NUMBER, IF APPROPRIATE, AND A PHYSICAL DESCRIPTION OF THE PART.

PART 2 – PRODUCTS

2.1 ABOVEGROUND PIPING SYSTEMS
- A. GENERAL: PROVIDE PIPING, VALVES, AND FITTINGS, APPROVED FOR 175 PSI WORKING PRESSURE, IN ACCORDANCE WITH NFPA 13, AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN. CONCEAL ALL PIPING IN AREAS WITH SUSPENDED CEILINGS AS INDICATED ON THE CONTRACT DRAWINGS. LEAVE PIPING EXPOSED AS INDICATED ON THE CONTRACT DRAWINGS. PROVIDE FITTINGS FOR CHANGES IN DIRECTION OF PIPING AND FOR CONNECTIONS. MAKE CHANGES IN PIPING THROUGH TAPERED REDUCING PIPE FITTINGS; BUSHINGS WILL NOT BE PERMITTED. STEEL PIPING WITH WALL THICKNESS LESS THAN SCHEDULE 30 SHALL NOT BE THREADED. LISTED CPVC SPRINKLER PIPING AND COPPER SPRINKLER TUBING SHALL BE PERMITTED.
- B. STEEL PIPE: THE INTERIOR OF STEEL PIPE SHALL BE TREATED WITH ANTI–MICROBIOLOGICAL PROCESS TO PREVENT THE DETERIORATION OF THE PIPE FROM MICROBIOLOGICALLY INFLUENCED CORROSION (MIC). THIS TREATMENT SHALL BE SIMILAR TO THE ANTIBACTERIAL FORMULA USED BY ALLIED TUBE AND CONDUIT.
- C. FITTINGS: THE SAME MANUFACTURER SHALL SUPPLY FITTINGS, MECHANICAL COUPLINGS AND RUBBER GASKETS. FITTINGS INTO WHICH SPRINKLERS, SPRINKLER RISER NIPPLES, OR DROP NIPPLES ARE THREADED SHALL BE WELDED, THREADED, OR GROOVED–END TYPE. PLAIN–END FITTINGS WILL NOT BE PERMITTED. FITTINGS UTILIZING A METHOD OF COMPRESSING THE FITTING ONTO THE PIPE SHALL NOT BE PERMITTED.
- D. PIPE AND HANGER SUPPORTS: PROVIDE PIPE SUPPORTS, SWAY BRACES, HANGERS, AND CLAMPS IN ACCORDANCE WITH NFPA 13.
- E. ARM–OVERS, DROPS AND SPRGS: ARM–OVERS, DROPS AND SPRIGS SHALL BE EITHER STEEL OR FLEXIBLE PIPING.
- F. IDENTIFICATION SIGNS: ATTACH PROPERLY LETTERED AND APPROVED METAL SIGNS TO EACH CONTROL VALVE, ALARM DEVICE, INSPECTOR'S TEST VALVE, DRAIN VALVE, AUXILIARY VALVE AND ALARM BYPASS VALVE. EACH SIGN SHALL INDICATE THE NORMAL VALVE POSITION AS WELL AS THE PORTION OF THE SYSTEM THAT THE VALVE SERVES.

2.2 SPRINKLERS
- A. GENERAL: SPRINKLERS SHALL BE IN CONFORMANCE WITH NFPA 13, AS APPLICABLE.
- B. ALL SPRINKLERS SHALL BE FM GLOBAL APPROVED FOR FINISH AND APPLICATION.
- C. PAINT BOOTH: PROVIDE PENDENT, SIDEWALL AND UPRIGHT STANDARD RESPONSE INTERMEDIATE TEMPERATURE SPRINKLERS,
- D. INSIDE EXHAUST FAN: PROVIDE SIDEWALL STANDARD RESPONSE HIGH TEMPERATURE SPRINKLER.
- E. EXHAUST EQUIPMENT: PROVIDE UP RIGHT STANDARD RESPONSE INTERMEDIATE TEMPERATURE SPRINKLER.
- F. SPARE SPRINKLERS: PROVIDE METAL CABINET(S) CONTAINING A STOCK OF SPARE SPRINKLERS OF ALL TYPES AND RATINGS INSTALLED AS WELL AS ANY SPECIAL TOOLS REQUIRED FOR REMOVAL OR REPLACEMENT OF THE SPRINKLERS. THE NUMBER OF SPARE SPRINKLERS SHALL CONFORM TO NFPA 13. THE CABINET SHALL BE LOCATED, IN AN AREA WHERE THE TEMPERATURE WILL NOT EXCEED 100 DEGREES F., AND APPROVED BY THE UNIVERSITY.
- G. MECHANICAL PROTECTION: PROTECT SPRINKLERS WITH SPRINKLER GUARDS IN THE FOLLOWING AREAS:
  1. PROVIDE SPRINKLER GUARDS ON ALL EXPOSED SIDEWALL, PENDENT OR UPRIGHT SPRINKLERS IN STAIRWELLS, LAUNDRY ROOMS, AND OTHER AREAS INDICATED ON THE DRAWINGS.
  2. PROTECT SPRINKLERS INSTALLED WHERE THEY MIGHT RECEIVE MECHANICAL INJURY OR ARE LESS THAN 7 FEET ABOVE THE FLOOR LEVEL WITH APPROVED GUARDS IN ACCORDANCE WITH NFPA 13.
  3. PROVIDE SPRINKLER GUARD ON ALL EXPOSED SPRINKLERS LOCATED IN CORRIDORS AND ALL OTHER COMMON, PUBLIC AREAS.

2.3 ESCUTCHEON PLATES
- A. GENERAL: PROVIDE ESCUTCHEONS FOR PIPES PASSING THROUGH FLOOR SLABS, WALLS, SOFFITS, PARTITIONS, OR CEILINGS. ESCUTCHEONS SHALL BE WALL FINISH, CHROMIUM PLATED.

PART 3 – EXECUTION

3.1 INSTALLATION
- A. INSTALLATION, WORKMANSHIP, FABRICATION, ASSEMBLY, ERECTION, EXAMINATION, INSPECTION AND TESTING SHALL BE IN ACCORDANCE WITH NFPA 13, EXCEPT AS MODIFIED HEREIN. INSTALL PIPING STRAIGHT AND TRUE TO BEAR EVENLY ON HANGERS AND SUPPORTS. DO NOT HANG PIPING FROM PLASTER CEILINGS. KEEP THE INTERIOR AND ENDS OF NEW PIPING AFFECTED BY CONTRACTOR'S OPERATION THOROUGHLY CLEANED OF WATER AND FOREIGN MATTER. KEEP PIPING SYSTEMS CLEAN DURING INSTALLATION BY MEANS OF PLUGS OR OTHER APPROVED METHODS. WHEN WORK IS NOT IN PROGRESS, SECURELY CLOSE OPEN ENDS OF PIPING TO PREVENT ENTRY OF WATER AND FOREIGN MATTER. INSPECT PIPING BEFORE PLACING INTO POSITION.
- B. FIELD CHANGES: DO NOT MAKE FIELD CHANGES IN THE PIPING LAYOUT OR PIPE SIZES WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.
- C. FREEZE PROTECTION: PROTECT WET–PIPE SPRINKLER PIPING AGAINST FREEZING IN ACCORDANCE WITH NFPA 13.
- D. WELDING: PERFORM ALL WELDING IN THE SHOP. FIELD WELDING MUST BE APPROVED BY THE CONTRACT OFFICER. THE UNIVERSITY MUST APPROVE ALL WELDING ACTIVITIES BEFORE THEY OCCUR.
- E. PAINTING: PAINTING SHALL MEET THE REQUIREMENTS OF THE PAINTING SPECIFICATION. ALL EXPOSED PIPE, FITTINGS, HANGERS AND SUPPORTS SHALL BE PAINTED TO MATCH THE SURROUNDING BACKGROUND COLOR. CONFIRM WITH OWNER AS TO COLOR AND SHEEN REQUIREMENTS BEFORE PAINTING THE PIPE.

3.2 DRAINS
- A. GENERAL: DRAIN ALL PIPE IN ACCORDANCE TO NFPA 13.

3.3 FIRE STOPPING
- A. GENERAL: FIRE STOP ALL HOLES FOR CONDUIT, PIPING, OR OTHER PENETRATIONS WHICH PASS THROUGH FLOOR SLABS, FIRE–RATED WALLS, PARTITIONS WITH FIRE–RATED DOORS, VERTICAL SERVICE SHAFTS, OR ANY FIRE–RATED ASSEMBLIES IN ACCORDANCE WITH SECTION 07270, FIRE STOPPING. FOR PURPOSES OF THIS DESIGN, ALL STAIRWELL WALLS, SHAFT WALLS, AND FLOORS SHALL BE CONSIDERED TWO–HOUR FIRE RESISTIVE. ALL CORRIDOR WALLS OR ROOM–TO–ROOM WALLS SHALL BE CONSIDERED ONE–HOUR FIRE RESISTIVE. PROVIDE PIPE SLEEVES FOR EACH WALL PENETRATION. FIRE STOP BOTH SIDES OF WALLS FOR ALL SPRINKLER PIPE PENETRATION.
- B. EXISTING PENETRATIONS: FIRE STOP ALL EXISTING PENETRATIONS INTO STAIR SHAFTS. FIRE STOP ALL EXISTING PENETRATIONS FROM PIPE TUNNEL INTO BASEMENT OF BUILDING(S).
- C. THE CONTRACTOR SHALL SCHEDULE INSPECTIONS OF ALL FIRE STOP MATERIAL WITH THE OWNER AND CENTER REGION. PROVIDE AMPLE TIME FOR THE OWNER AND CENTER REGION TO INSPECT THE FIRE STOP MATERIALS.

3.3 TESTING
- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF ALL TESTS AND INSPECTIONS BETWEEN CENTER REGION, THE OWNER AND THE ENGINEER. RHINO FIRE PROTECTION MUST WITNESS ALL TESTING. THE CONTRACTOR SHALL ALLOW THE PROPER TIME PERIOD FOR SCHEDULING ALL TESTS AND INSPECTIONS AND FOR COORDINATION OF SCHEDULES OF CENTER REGION, THE OWNER AND THE ENGINEER. THE CONTRACTOR MAY NEED TO SCHEDULE TESTS AND INSPECTIONS A MONTH IN ADVANCE.
- B. PRELIMINARY TESTING: HYDROSTATICALLY TEST WET–PIPE SPRINKLER SYSTEM, AS REQUIRED BY NFPA 13 FOR ABOVE GROUND PIPE IN THE PRESENCE OF THE ENGINEER OR DESIGNATED REPRESENTATIVE. THE CONTRACTOR AND AN AUTHORIZED REPRESENTATIVE FROM EACH SUPPLIER OF EQUIPMENT SHALL BE IN ATTENDANCE AT THE PRELIMINARY TEST. WHEN TESTS ARE COMPLETED AND CORRECTIONS MADE, SUBMIT A SIGNED AND DATED MATERIAL AND TEST CERTIFICATE SIMILAR TO THAT SPECIFIED IN NFPA 13, WITH A REQUEST FOR FORMAL INSPECTION AND TESTS.
- C. FINAL INSPECTION AND TESTING: ADVISE THE ENGINEER WHEN HYDROSTATIC AND ALARM TESTS HAVE BEEN COMPLETED AND ALL NECESSARY CORRECTIONS MADE, SO AS TO PERMIT FINAL INSPECTION AND TESTING. SUBMIT REQUEST FOR TESTING AT LEAST 15 CALENDAR DAYS PRIOR TO TEST DATE. A FINAL ACCEPTANCE TEST WILL NOT BE SCHEDULED UNTIL OPERATION AND MAINTENANCE MANUALS HAVE BEEN RECEIVED BY THE ENGINEER.
  - a. AT THE FINAL TEST, A MATERIAL AND TEST CERTIFICATE MUST BE PROVIDED IN ACCORDANCE WITH NFPA 13.
  - b. SUBMIT UP–TO–DATE REDLINED SHOP DRAWINGS TO THE ENGINEER AT THE FINAL TEST. THESE DRAWINGS SHALL BE UNDAMAGED SETS OF PRINTS OF THE SHOP DRAWINGS, WITH CHANGES FROM THE ORIGINAL DRAWINGS MARKED IN RED.
  - c. FINAL TESTING SHALL INCLUDE, BUT IS NOT LIMITED TO, FULL FLOW TESTING THROUGH BOTH THE MAIN DRAIN AND THE INSPECTOR'S TEST CONNECTION AS WELL AS TESTING OF WATER FLOW AND TAMPER SWITCHES.

PennState Physical Plant
DESIGN SERVICES
113 Physical Plant Building
University Park, PA 16802
Phone: (814) 865-7605
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RHINO FIRE PROTECTION ENGINEERING
12359 SUNRISE VALLEY DRIVE
SUITE 350
RESTON, VA 20191
Phone: 703.476.5034
Fax: 703.476.5038
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REVISIONS
SYM DATE DESCRIPTION

SUBMISSIONS
DATE DESCRIPTION

PSU PALMER SCHEMATIC

FIRE PROTECTION SPECIFICATIONS

PALMER MUSEUM OF ART
BUILDING No.: 0755-000
PROJECT No.: 00069500
DRAWN BY: VMT
CHECKED BY: CPT

SHEET
FP0.01

CASE DRAWER SECT NO

GENERAL NOTES:

1. THE BUILDING SHALL BE OCCUPIED DURING THE ENTIRE PERIOD OF CONSTRUCTION. THE WATER SERVICE SHALL NOT BE TAKEN OUT OF SERVICE WITHOUT PRIOR NOTIFICATION OF THE OWNER AND MUST BE RETURNED TO SERVICE BY THE END OF THE DAY.
2. INFORMATION CONTAINED IN THESE DRAWINGS IS BASED ON EXISTING DOCUMENTS AND LIMITED FIELD MEASUREMENT VERIFICATION. THE INFORMATION CONTAINED HEREIN MAY REQUIRE ADJUSTMENTS AND/OR MODIFICATIONS TO CONFORM TO EXISTING CONDITIONS. IN ADDITION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY DISCREPANCY IN EXISTING CONDITIONS SHOULD PROHIBIT EXECUTION OF THE DESIGN INTENT OF THESE DRAWINGS.
3. DRAWINGS ARE NOT TO BE SCALED. DIMENSIONS SHALL GOVERN. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS AT JOB SITE CONCERNING EXISTING AND NEW WORK BEFORE PROCEEDING WITH EITHER FABRICATION OR INSTALLATION OF NEW WORK.
4. ANY INFORMATION CONFLICTS BETWEEN THE CONDITIONS AND DRAWINGS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION. THE CONTRACTOR(S) SHALL NOT PROCEED WITH ANY WORK, EXCEPT AT THEIR OWN RISK, UNTIL CLARIFICATIONS OF THE CONFLICTS ARE ISSUED TO THE CONTRACTOR(S) BY THE ENGINEER.
5. ALL WORK AND INSTALLATION SHALL CONFORM WITH THE APPLICABLE PROVISIONS OF THE IBC INTERNATIONAL BUILDING CODE (2015) AND NFPA STANDARD NOS. 13 (2013), 70 (2012), AND 72 (2013) AND FM GLOBAL MUTUAL REQUIREMENTS.
6. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS ON THE DRAWINGS PRIOR TO THE EXECUTION OF THIS CONTRACT. LOCATION OF EXISTING PIPING, LIGHTING FIXTURES, AND FIRE ALARM COMPONENTS ARE APPROXIMATE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION OF ALL SYSTEM COMPONENTS. CONTRACTOR SHALL REPORT ANY DISCREPANCIES WITH THESE DRAWINGS TO THE ENGINEER IMMEDIATELY.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR AVOIDING ALL CONFLICTS WITH LIGHTING FIXTURES, DIFFUSERS, GRILLS, DUCTS, STRUCTURAL MEMBERS, PIPES AND OTHER OBSTRUCTIONS ENCOUNTERED.
8. ALL DAMAGE TO EXISTING WALLS, CEILINGS, FLOORS, AND STRUCTURAL MEMBERS FROM PENETRATIONS, REMOVALS INSTALLATIONS OR OTHER ACTIONS OF THE CONTRACTOR SHALL BE PATCHED, REPAIRED, AND PAINTED WITH NEW MATERIALS BY THE CONTRACTOR TO MATCH ADJACENT WORK, WHETHER SPECIFICALLY NOTED OR NOT.
9. BEFORE ANY WATER SYSTEM IS SHUT DOWN CONTRACTOR SHALL MAKE NOTIFICATION 24 HOURS IN ADVANCE TO THE UNIVERSITY, AND LOCAL FIRE DEPARTMENT. COORDINATE WITH OWNER'S SCHEDULE THE SHUT DOWN OF ALL SERVICES. SHUT DOWN OF DOMESTIC WATER SERVICE MUST BE ARRANGED WITH OWNER. SHUT DOWN OF SERVICE TO OCCUR EARLY IN THE MORNING OR OVERNIGHT.
10. DUCTWORK, PIPING, MECHANICAL EQUIPMENT AND CEILINGS SHALL NOT BE UTILIZED AS LADDERS, SCAFFOLDING OR WORK PLATFORMS.
11. NO STRUCTURAL MEMBERS SHALL BE CUT, DRILLED, OR BURNED.
12. THE TERM "PROVIDE" SHALL MEAN THE CONTRACTOR SHALL FURNISH, INSTALL, AND CONNECT FOR A COMPLETE AND OPERATIONAL SYSTEM.
13. THE TERM "REMOVE" SHALL MEAN THE CONTRACTOR SHALL DISCONNECT AND CLEAR FROM SITE.
14. CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF THE EXISTING CONDITIONS. THE CONTRACTOR IS TO PROVIDE THE NECESSARY PROTECTION OF WALLS FLOORS AND CEILING IN A MANNER IN WHICH THEY DEEM ADEQUATE FOR THE PROTECTION OF THE AREA.

SPRINKLER NOTES:

FIRE SUPPRESSION SCOPE OF WORK: REPLACE THE EXISTING DRY-PIPE AND PREACTION SYSTEMS (REMOVE CONTROL VALVES, GALVANIZED PIPE, AND SPRINKLERS), TESTING AND LABOR FOR AN ACCEPTED SYSTEM. PRESSURE TEST THE SYSTEM PER NFPA 13. INSTALLATION SHALL CONFORM WITH THE APPLICABLE PROVISIONS OF THE IBC INTERNATIONAL BUILDING CODE (2015) AND NFPA STANDARD NOS. 13 (2013), 70 (2012), AND 72 (2013), AND NFPA 33 (2018), NFPA 33 AND FM GLOBAL MUTUAL REQUIREMENTS.

1. CONTRACTOR SHALL SUBMIT TO L&I AND OWNER TO SCHEDULE ALL TESTS PER L&I REQUIREMENTS.
2. REPLACE THE EXISTING DRY-PIPE AND PREACTION SYSTEMS (REMOVE CONTROL VALVES, GALVANIZED PIPE, AND SPRINKLERS) ON A ONE-FOR-ONE BASIS AND PROVIDING NEW CONTROL VALVES, WATER FLOW SWITCHES, AND TAMPER SWITCHES. CONTRACTOR TO REUSE EXISTING HANGARS. PIPE SIZES TO REMAIN THE SAME. WORK TO BE UNDERTAKEN AS SYSTEM REPAIRS.
3. ALL FIRE PROTECTION SYSTEM CONTROL VALVES SHALL BE EQUIPPED WITH APPROVED VALVE SUPERVISORY SWITCHES. ALL INSPECTOR'S TEST, DRAIN AND CONTROL VALVES SHALL BE PROVIDED WITH VALVE TAMPER COVERS (LOCKOUT COVER) TO PREVENT TAMPERING. CONTRACTOR SHALL PROVIDE PAD LOCK FOR EACH TEST AND DRAIN DEVICE AND 12 KEYS. ALL PAD LOCKS SHALL BE KEYED IDENTICAL.

SYMBOLS LEGEND:

- 90 ELBOW
- PIPE CONTINUATION
- PIPE CAP
- TEE TURN AWAY
- NEW SPRINKLER PIPE
- EXISTING PIPE TO REMAIN
- EXISTING PIPE TO BE DEMO
- W — UNDERGROUND PIPE
- START OF NEW WORK
- DEMO POINT
- 1 — DEMOLITION KEY NOTE
- 1 — RENOVATION KEY NOTE
- NEW PENDENT SPRINKLER
- NEW UPRIGHT SPRINKLER
- PIPE HANGER
- NOT IN SCOPE OF WORK AREA
- AI — ADDRESSABLE INTERFACE
- VS — VALVE SUPERVISORY SWITCH
- WF — WATER FLOW SWITCH

ABBREVIATIONS:

A	AMP
ABV	ABOVE
A/E	ARCHITECT/ENGINEER (OF RECORD)
AFF	ABOVE FINISHED FLOOR
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
A/S	AUTOMATIC SPRINKLER
AWG	AMERICAN WIRE GAUGE
BLDG	BUILDING
BOB	BOTTOM OF BEAM
BOJ	BOTTOM OF JOIST
C	CEILING
CMU	CONCRETE MASONRY UNIT
CONT	CONTINUED
ELEC	ELECTRIC
EOLR	END OF LINE RESISTOR
EXIST	EXISTING
FACP	FIRE ALARM CONTROL PANEL
FDC	FIRE DEPARTMENT CONNECTION
GPM	GALLONS PER MINUTE
IN	INCH
LAT	LAY-IN ACOUSTICAL TILE
NAC	NOTIFICATION APPLIANCE CIRCUIT
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NTS	NOT TO SCALE
PSI	POUNDS PER SQUARE INCH
QR	QUICK RESPONSE
SF	SQUARE FOOT
STO	STORAGE
TC	TERMINAL CABINET
TOJ	TOP OF JOIST
U.N.O.	UNLESS NOTED OTHERWISE
WP	WEATHERPROOF

HAZARDOUS MATERIALS:

THE GENERAL CONTRACTOR MUST PROVIDE THIS INFORMATION TO, AND REVIEW WITH, ALL SUB-CONTRACTORS AND WORKERS ON THE JOB SITE PRIOR TO BEGINNING WORK.

LEAD-BASED PAINT

ALL BUILDINGS CONSTRUCTED BEFORE 1978 ARE ASSUMED TO CONTAIN LEAD-BASED PAINT, REGARDLESS OF THE PERCENTAGE OF LEAD AND EVEN IF ONLY A SINGLE PAINT LAYER (OF MANY) CONTAINS LEAD. UNLESS COATINGS ARE SPECIFICALLY REMOVED OR STRIPPED FOR RESTORATION OR REFINISHING PURPOSES (VIA SANDING, GRINDING, TORCHING, CHEMICAL STRIPPERS, ETC.), LEAD-BASED PAINT "ABATEMENT" ACTIVITIES ARE NOT REQUIRED. HOWEVER, ALL CONTRACTORS AND WORKERS ON-SITE ARE REQUIRED TO COMPLY WITH THE FOLLOWING REGULATIONS AND POLICIES:

- OSHA LEAD IN CONSTRUCTION STANDARD (29 CFR 1926.62).
- PENN STATE UNIVERSITY LEAD AND OTHER HEAVY METAL EXPOSURE / DISPOSAL CONTROL PROCEDURES HTTP://WWW.EHS.PSU.EDU/PAINT/LEAD.HTML.
- OPP / EHS LEAD PAINT SOP AT: HTTP://WWW.EHS.PSU.EDU/OCCHEALTH/LEAD_PAINT_SOP.PDF.

MERCURY

CONTRACTOR SHALL COMPLY WITH THE OPP / EHS MERCURY SOP AT: HTTP://WWW.EHS.PSU.EDU/OCCHEALTH/MERCURY.CFM.

ASBESTOS-CONTAINING MATERIALS

ASBESTOS-CONTAINING MATERIALS ARE FOUND IN MOST UNIVERSITY FACILITIES.

PENN STATE'S ASBESTOS IDENTIFICATION QUICK REFERENCE CAN BE FOUND AT:

HTTP://WWW.EHS.PSU.EDU/OCCHEALTH/ASBESTOSIDENTIFICATION-PSUQUICKREFERENCE(JULY82005).PDF

EPA'S SAMPLE LIST OF SUSPECT ASBESTOS-CONTAINING MATERIALS CAN BE FOUND AT: HTTP://WWW.EHS.PSU.EDU/OCCHEALTH/ASBESTOS_MATERIALS_LIST.PDF

IF SUSPECT ASBESTOS IS DISCOVERED AND IS HINDERING PROGRESS OR DAMAGED STOP WORK AND CONTACT THE PROJECT OFFICE OF PHYSICAL PLANT CONTACT.

SPRINKLER DESIGN DENSITIES*

OCCUPANCY HAZARD CATEGORY	DENSITY	AREA SQ.FT	HOSE GPM
HAZARD CATEGORY – 2	0.20	2500	250
HAZARD CATEGORY – 1	0.10	1500	250
EXTRA HAZARD –1	0.40	1500	500

*ALL AREAS ARE CONSIDERED HAZARD CATEGORY-1 UNLESS NOTED OTHERWISE ON FLOOR PLANS AND NO QUICK RESPONSE SPRINKLER REDUCTION IS ALLOWED.

WATER FLOW TEST:

DATE FLOW TEST PERFORMED:
TEST PERFORMED BY: PSU WATER SERVICES DEPARTMENT.

TEST HYDRANT:
FLOW HYDRANT:

STATIC: PSI
RESIDUAL : PSI
FLOW: GPM

1 / FA1.00 FIRE PROTECTION – SITE PLAN
SCALE: N.T.S

PennState Physical Plant
DESIGN SERVICES
113 Physical Plant Building
University Park, PA 16802
Phone: (814) 865-7605
Fax: (814) 865-3737
www.opp.psu.edu

RHINO FIRE PROTECTION ENGINEERING
12359 SUNRISE VALLEY DRIVE
SUITE 350
RESTON, VA 20191
Phone: 703.476.5034
Fax: 703.476.5038
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REVISIONS
SYM DATE DESCRIPTION

SUBMISSIONS
DATE DESCRIPTION

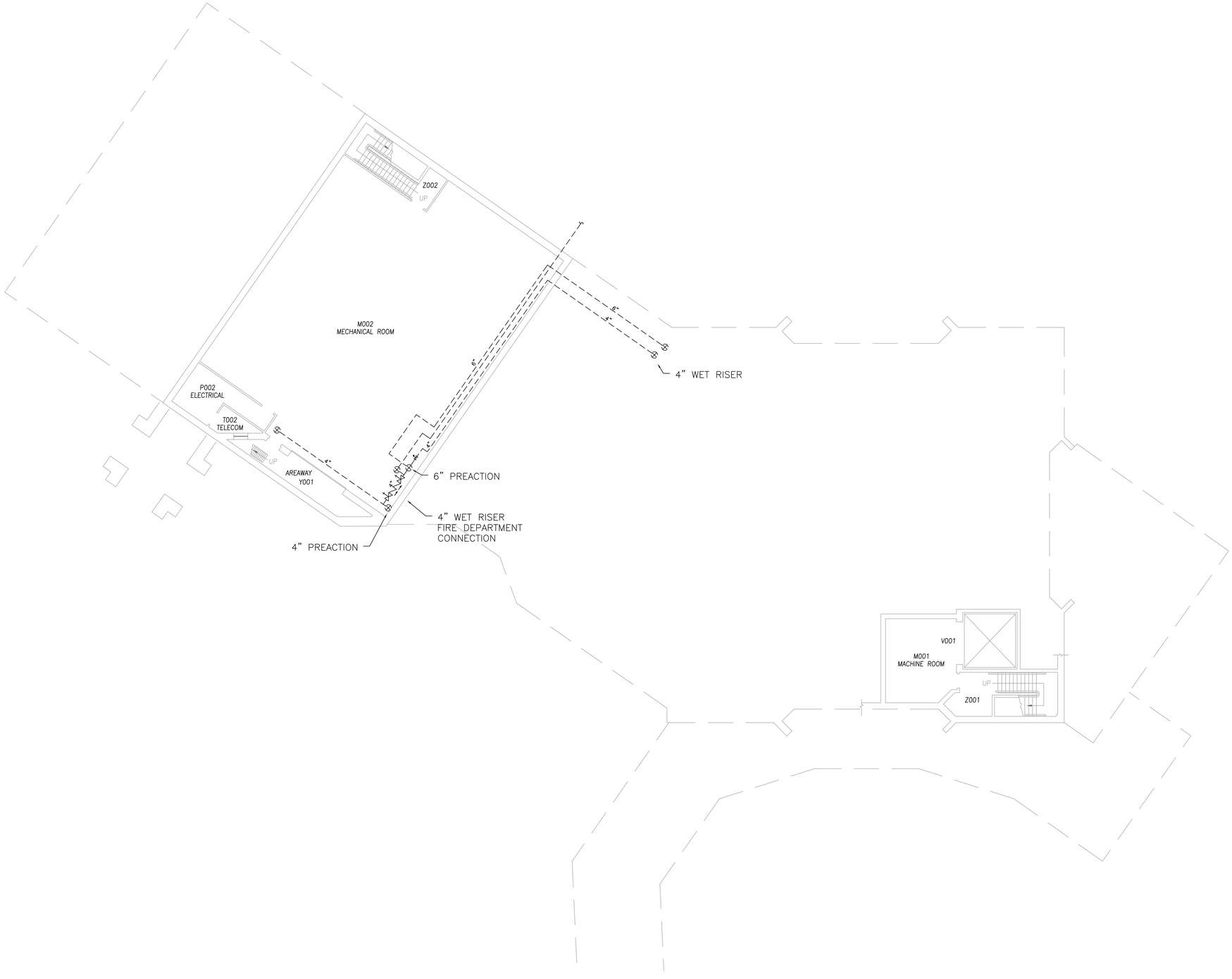
PSU PALMER SCHEMATIC

FIRE PROTECTION NOTES, LEGEND, AND ABBREVIATIONS

PALMER MUSEUM OF ART
BUILDING No.: 0755-000
PROJECT No.: 00069500
DRAWN BY: VMT
CHECKED BY: CPT

SHEET
FP1.00

CASE DRAWER SECT NO



KEY NOTES

1 NOT IN USE.

FIRE PROTECTION WORK – BASEMENT PLAN

SCALE: 1/8" = 1'-0"

REFERENCE NORTH

CAUTION: IF THIS PLAN IS A REDUCTION
GRAPHIC SCALE MUST BE USED

0 2' 4' 8' 16' 32'
GRAPHIC SCALE 3/32"=1'-0

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Physical Plant
DESIGN SERVICES
113 Physical Plant Building
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FIRE PROTECTION ENGINEERING
12359 SUNRISE VALLEY DRIVE
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REVISIONS

SYM	DATE	DESCRIPTION

SUBMISSIONS

DATE	DESCRIPTION

PSU PALMER
SCHEMATIC

FIRE PROTECTION
BASEMENT PLAN

PALMER MUSEUM
OF ART

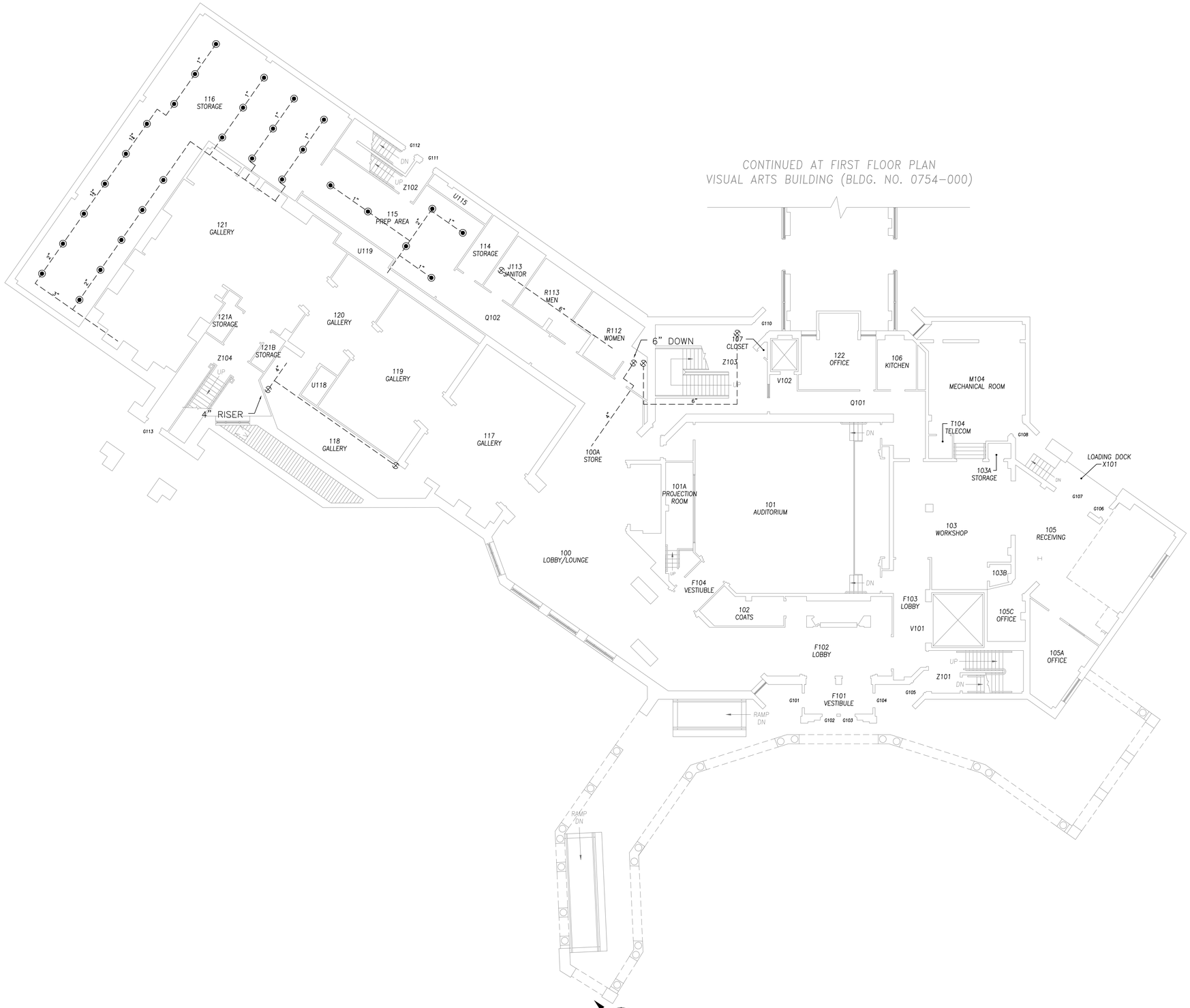
BUILDING No.:	PROJECT No.:
0755-000	00069500
DRAWN BY:	CHECKED BY:
VMN	CPT

SHEET
FP1.01

CASE DRAWER SECT NO

KEY NOTES

1 NOT IN USE.



CAUTION: IF THIS PLAN IS A REDUCTION GRAPHIC SCALE MUST BE USED

0 2' 4' 8' 16' 32'
GRAPHIC SCALE 3/32"=1'-0

FIRE PROTECTION WORK – FIRST FLOOR PLAN

SCALE: 3/32" = 1'-0"

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12359 SUNRISE VALLEY DRIVE
SUITE 350
RESTON, VA 20191
Phone: 703.476.5034
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REVISIONS

SYM	DATE	DESCRIPTION

SUBMISSIONS

DATE	DESCRIPTION

PSU PALMER SCHEMATIC

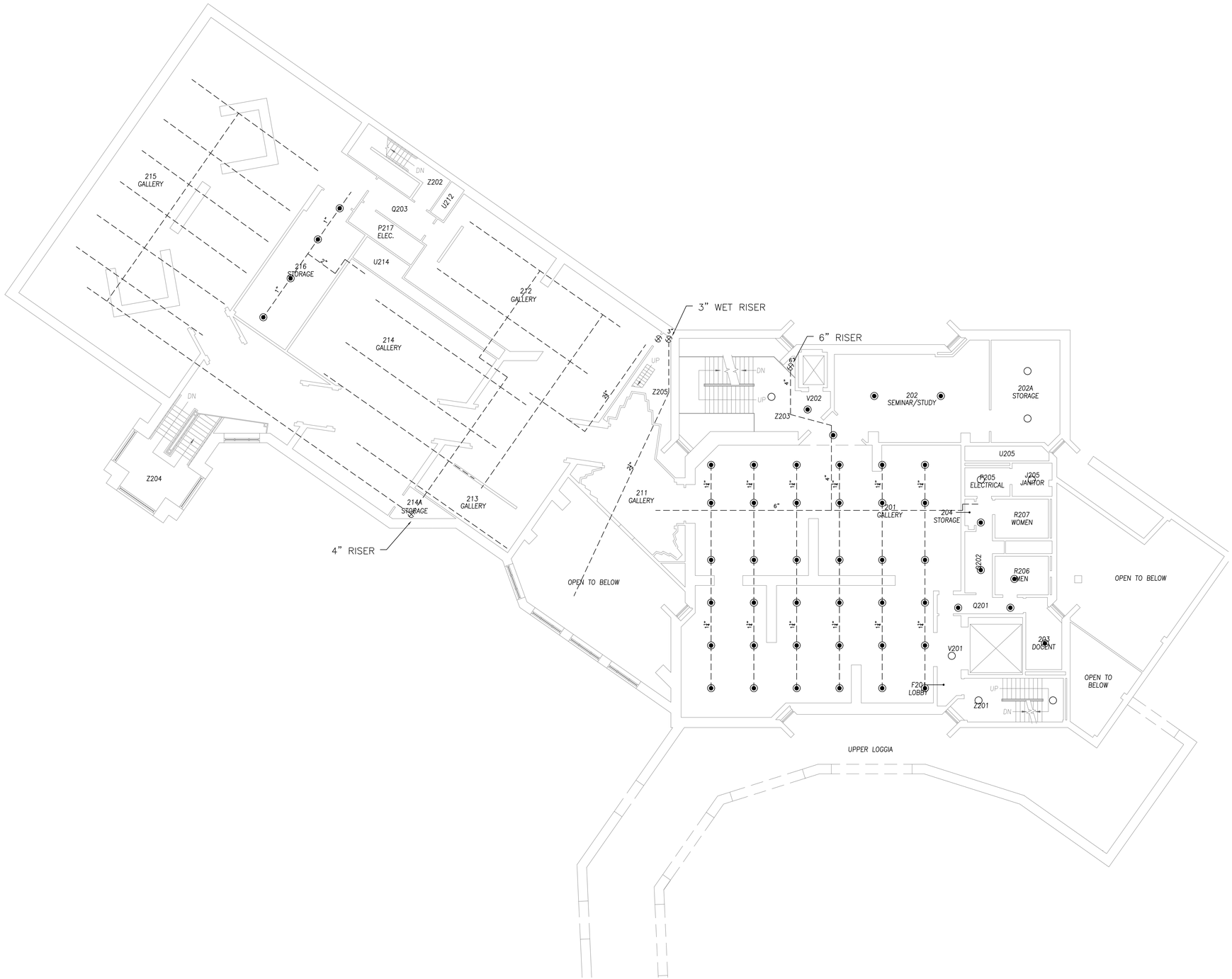
FIRE PROTECTION FIRST FLOOR PLAN

PALMER MUSEUM OF ART

BUILDING No.:	PROJECT No.:
0755-000	00069500
DRAWN BY:	CHECKED BY:
VMT	CPT

SHEET FP1.01

CASE DRAWER SECT NO



KEY NOTES

1 NOT IN USE.

CAUTION: IF THIS PLAN IS A REDUCTION
GRAPHIC SCALE MUST BE USED

0 2' 4' 8' 16' 32'
GRAPHIC SCALE 3/32"=1'-0

FIRE PROTECTION WORK – SECOND FLOOR PLAN

SCALE: 3/32" = 1'-0"

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Physical Plant
DESIGN SERVICES
113 Physical Plant Building
University Park, PA 16802
Phone: (814) 865-7605
Fax: (814) 865-3737
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FIRE PROTECTION ENGINEERING
12359 SUNRISE VALLEY DRIVE
SUITE 350
RESTON, VA 20191
Phone: 703.476.5034
Fax: 703.476.5038
Web: www.rhinofpe.com

REVISIONS

SYM	DATE	DESCRIPTION

SUBMISSIONS

DATE	DESCRIPTION

PSU PALMER
SCHEMATIC

FIRE PROTECTION
SECOND FLOOR PLAN

PALMER MUSEUM
OF ART

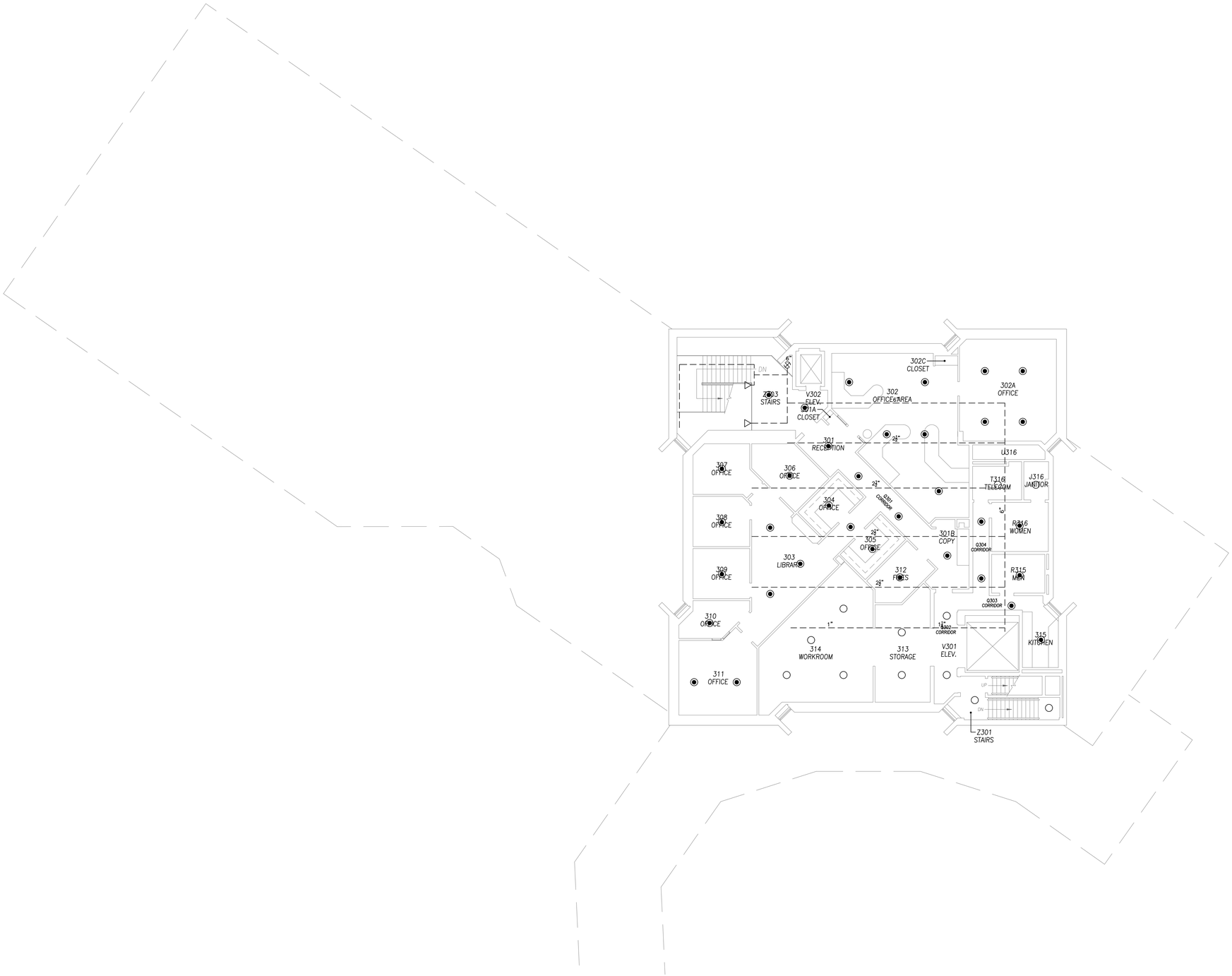
BUILDING No.: 0755–000
PROJECT No.: 00069500
DRAWN BY: VMT
CHECKED BY: CPT

SHEET
FP1.01

CASE DRAWER SECT NO

KEY NOTES

1 NOT IN USE.



CAUTION: IF THIS PLAN IS A REDUCTION GRAPHIC SCALE MUST BE USED

0 2' 4' 8' 16' 32'
GRAPHIC SCALE 3/32"=1'-0

FIRE PROTECTION WORK – THIRD FLOOR PLAN

SCALE: 3/32" = 1'-0"

REFERENCE NORTH

PennState
Physical Plant
DESIGN SERVICES

113 Physical Plant Building
University Park, PA 16802

Phone: (814) 865-7605
Fax: (814) 865-3737

www.opp.psu.edu

RHINO FIRE PROTECTION ENGINEERING

12359 SUNRISE VALLEY DRIVE
SUITE 350
RESTON, VA 20191
Phone: 703.476.5034
Fax: 703.476.5038
Web: www.rhinofpe.com

REVISIONS

SYM	DATE	DESCRIPTION

SUBMISSIONS

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PSU PALMER
SCHEMATIC

FIRE PROTECTION
THIRD FLOOR PLAN

PALMER MUSEUM
OF ART

BUILDING No.:	PROJECT No.:
0755-000	00069500
DRAWN BY:	CHECKED BY:
VMT	CPT

SHEET
FP1.01

CASE	DRAWER	SECT	NO

13 April 2021 **DRAFT**

Mr. Ian Salada
Mr. Robert Lingenfelter
The Pennsylvania State University
113J Office of the Physical Plant
University Park, PA 16802

Project 210249 – Moisture Investigation, Existing Palmer Art Museum, University Park, PA

Dear Messrs. Salada and Lingenfelter:

We have developed a multi-faceted approach for mitigating the condensation observed in the second floor at the Existing Palmer Art Museum. This letter lays out the anticipated schedule and sequence, and lays out the interdependencies between the elements. Museum management has informed us that they can create a gap in the gallery schedules from 14 June to 30 July 2021, and we have developed our schedule accordingly. The information provided herein is for discussion and will be amended as the plan and schedule are finalized.

- Construction Start Date: 14 June 2021
- Finish Ceiling Removal: approximately 14 June to 21 June 2021 (general contractor)
- Install Ports for Pressure Test, Perform First Pressure Test: Two days during first week (general contractor, PSU staff, or SGH staff)
- Air Barrier Inspection and Repairs: approximately 21 June to 21 July 2021 (general contractor with SGH/PSU review)
- Smoke Test to Identify Unobserved Air Barrier Defects: Concurrent with air barrier inspection and repairs as needed to identify additional issues (general contractor with SGH/PSU review)
- Perform Second Pressure Test: One day during last week (PSU staff or SGH staff)
- Finish Construction, including Museum Approved Finishes: 26 to 30 July 2021 (general contractor)
- Mechanical Upgrade Installation: Before 31 October 2021 (design assist mechanical partner and/or local mechanical engineer with SGH)

The first pressure test will be used to determine if roof ventilation changes are required. Comparing the first and second pressure tests will describe the efficacy of the air barrier repairs. The second pressure test will inform the final design of the mechanical equipment upgrade.

Enclosed are the memos describing the pressure test set up and procedure and the mechanical upgrade, and an outline specification for the air barrier repairs.

Sincerely yours,

Emily W. O'Keefe
Senior Project Manager

Edward G. Lyon
Staff Consultant

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Encls.

8 April 2021 **DRAFT**

Mr. Ian Salada
Mr. Robert Lingenfelter
The Pennsylvania State University
113J Office of the Physical Plant
University Park, PA 16802

Project 210249 – Moisture Investigation, Existing Palmer Art Museum, University Park, PA

Dear Messrs. Salada and Lingenfelter:

Enclosed is test procedure to characterize the potential effectiveness of the attic ventilation. As described in the test procedure, we recommend that these ports or air hoses are installed on a semi-permanent basis, this will allow periodic testing to collect information overtime. If conducted before and after the air barrier repair project, it will allow us to quantify the effectiveness of that project. Performed after the air barrier repair project, it will help define the requirements for an attic ventilation upgrade, and identify if roof ventilation modifications are necessary.

We believe that the identified equipment is available within the project team, and that on-site technicians can perform the testing as described. Please review and let us know if there are any questions.

Sincerely yours,

Emily W. O'Keefe
Senior Project Manager

Edward G. Lyon
Staff Consultant

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Memorandum

Date: 8 April 2021 **DRAFT**

To: File

From: Edward G. Lyon

Project: 210249 – Moisture Investigation, Existing Palmer Art Museum, University Park, PA

Subject: Attic Ventilation/Pressurization Test

The following outlines a test procedure that will characterize the effectiveness of attic ventilation and help define the requirements for an attic ventilation upgrade.

General Test Procedure

This testing procedure measures the attic pressure at multiple locations, with the existing attic fan off, and then again with the attic fan operating, to characterize the potential effectiveness of attic ventilation.

Test Equipment

Testing will require the following equipment:

- The existing attic ventilation fan, both on and off.
- Calibrated air pressure gage (monometer or other similar equipment), capable of measurement to the nearest 0.1 Pa or 0.001 in. of water column.
- Tubes or air hoses, compatible with the calibrated air pressure gage. As described below, these will be left in place semi-permanently to allow future measurements.

Test Preparation

Prior to testing, the following setup needs to be performed:

- Install the tubes/ air hoses, extending from the attic to either the roof or the interior. Refer to Sketches SK-1 through SK-4 for the approximate locations of the six pressure port air hose locations. The air hoses must traverse between the attic space and either the exterior or the interior, as indicated in Sketches SK-3 and SK-4. Air hoses in the attic must be placed above the insulation, generally open to the air. Air hoses extending to the interior through the foil-faced gypsum board (upper ceiling) must be sealed. Similarly,

penetrations through the finish ceiling must be sealed as well. The interior termination of the air hose can be concealed behind existing finishes, but the tube end must be readily accessible for pressure measurements (hatches may be preferable).

Pressure Port List

Port #1 Air hose extends from attic (main open space near the ventilation fan) to the exterior at roof level (measures pressure difference attic to exterior).

Port #2 Air hose extends from attic to Gallery 212 (measures pressure difference from attic at this location to interior).

Port #3 Air hose extends from attic to Gallery 213 (measures pressure difference from attic at this location to interior).

Port #4 Air hose extends from attic to Gallery 215 (labeled as 211 northeast) (measures pressure difference from attic at this location to interior).

Port #5 Air hose extends from attic to Gallery 215 (labeled as 211 southwest) (measures pressure difference from attic at this location to interior).

Port #6 Air hose extends from attic to Gallery 215 (labeled as 211 north) (measures pressure difference from attic at this location to interior).

Test preparation also includes uncovering the existing attic ventilation fan and opening all gallery doors (per typical occupancy).

Testing Protocol

Testing should be performed on a relatively calm day. Roof hatch to attic should be closed throughout testing, but Port #1 air hose needs to extend through opening without being pinched. If conditions are windy, pressure test measurements should be long-term averages to lessen wind effects.

1. Record interior and exterior temperature conditions and log attic temperature sensors,

2. Note time and weather conditions including solar exposure,

3. Measure pressure at each of the six pressure ports with the attic fan off,

4. Turn the attic fan on, note time and measure each of the six pressure ports again,

5. At the attic fan, measure the pressure drop across the fan while operating,

6. While attic fan is on (after measurements), introduce tracer smoke into attic near roof ridge vent and observe/document air flow.

Follow-Up Work

Based on a review of test results, Simpson Gumpertz & Heger Inc. (SGH) may recommend some modification of the roof ridge or soffit vents followed by a repeat of the air testing to evaluate effectiveness of the modifications.

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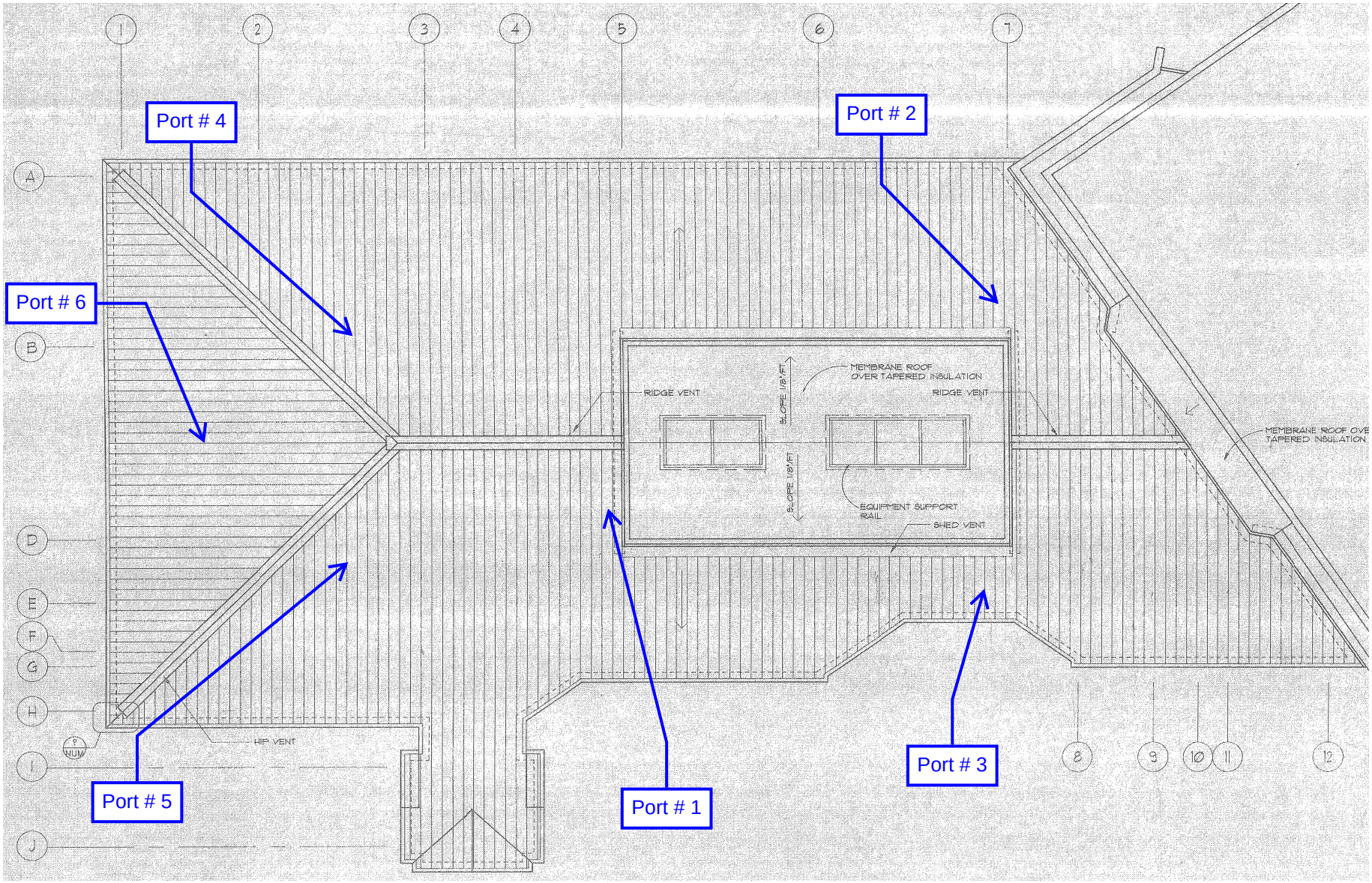

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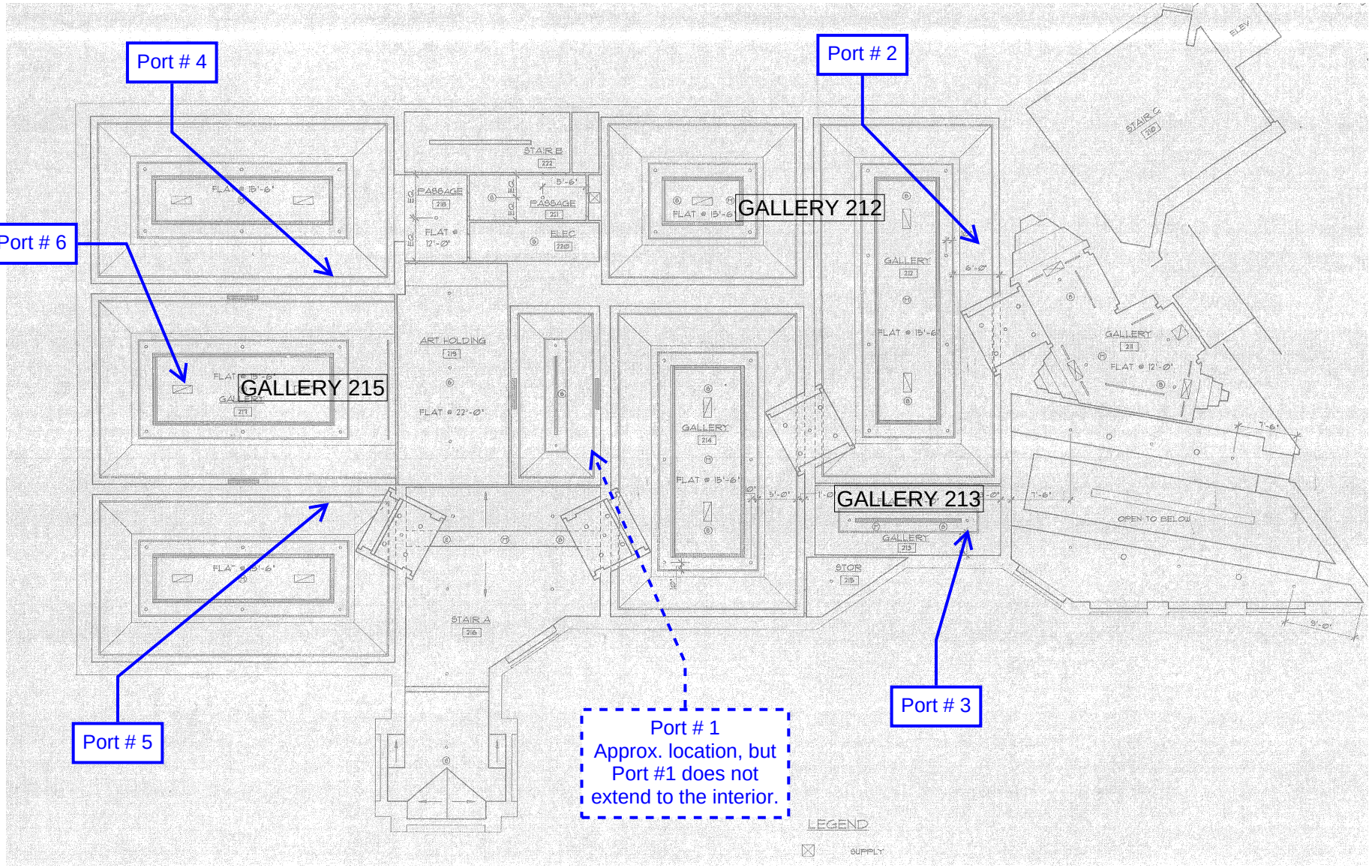
SIMPSON GUMPERTZ & HEGER

Engineering of Structures and Building Enclosures

Simpson Gumpertz & Heger Inc.
135 South LaSalle Street, Suite 3800
Chicago, Illinois 60603

main: 312.754.7500
fax: 312.754.7501
www.sgh.com

Project: **Moisture Investigation, Existing Palmer Art Museum, University Park, PA**				Drawing No.: **SK-1**
Title: **Attic Pressure Port Locations**				Scale **N.T.S.**
Drawn: **EGL**	Checked: **EWO**	Approved **XXX**	Project No.: **210249.00**	Date: **04/07/2021**



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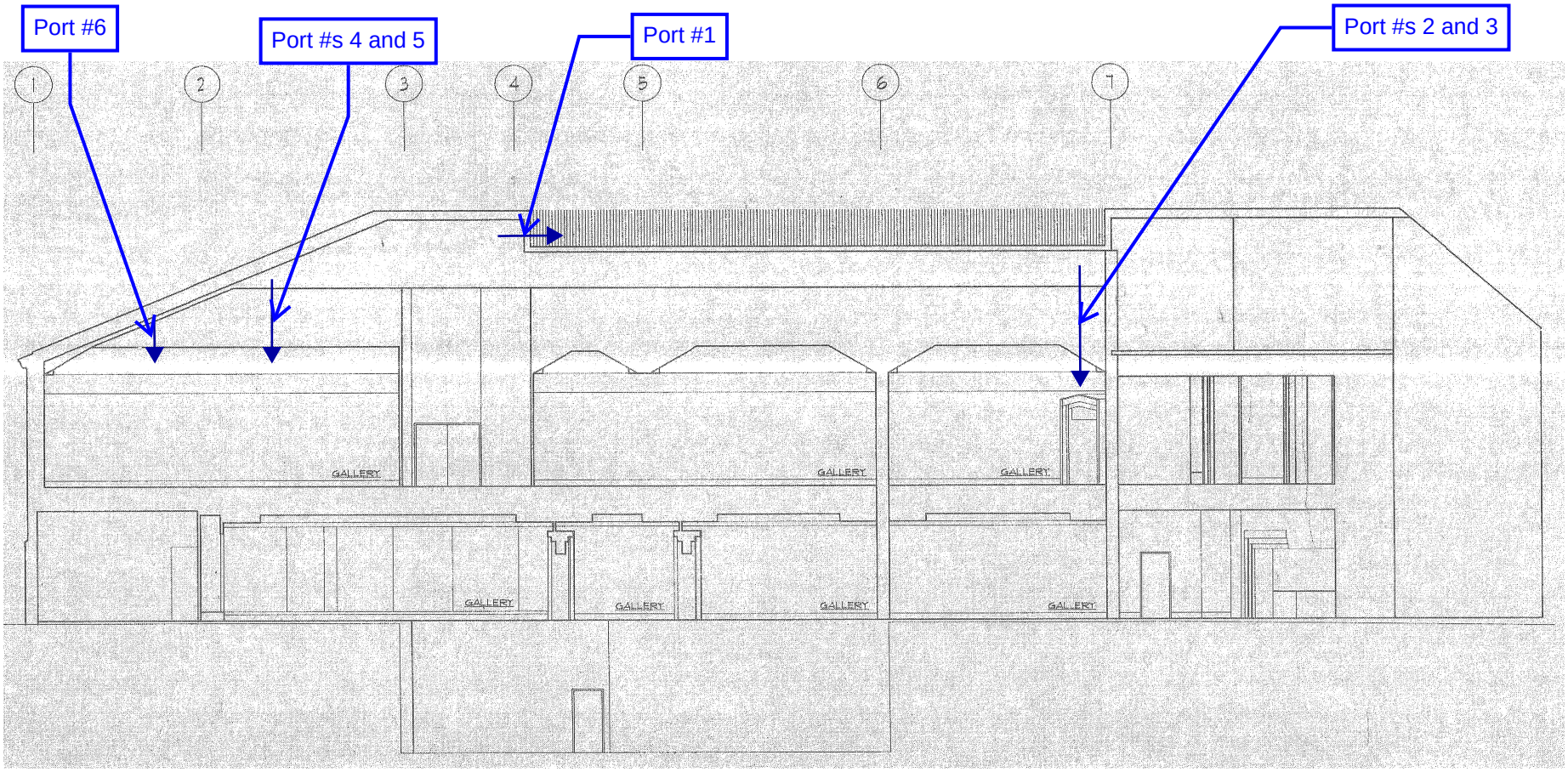
SIMPSON GUMPERTZ & HEGER Engineering of Structures and Building Enclosures Simpson Gumpertz & Heger Inc. 135 South LaSalle Street, Suite 3800 Chicago, Illinois 60603 main: 312.754.7500 fax: 312.754.7501 www.sgh.com	Project: **Moisture Investigation, Existing Palmer Art Museum, University Park, PA** Title: **Second Floor Pressure Port Locations** Drawn: **EGL** · Checked: **EWO** · Approved **XXX** · Project No.: **210249.00**	Drawing No.: **SK-2** Scale **N.T.S.** Date: **04/07/2021**	



Indicates the placement of the air hose at each port location extending from the attic to either the exterior or the interior to take readings

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SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures
Simpson Gumpertz & Heger Inc.
135 South LaSalle Street, Suite 3800
Chicago, Illinois 60603
main: 312.754.7500
fax: 312.754.7501
www.sgh.com

Project: **Moisture Investigation, Existing Palmer Art Museum, University Park, PA**

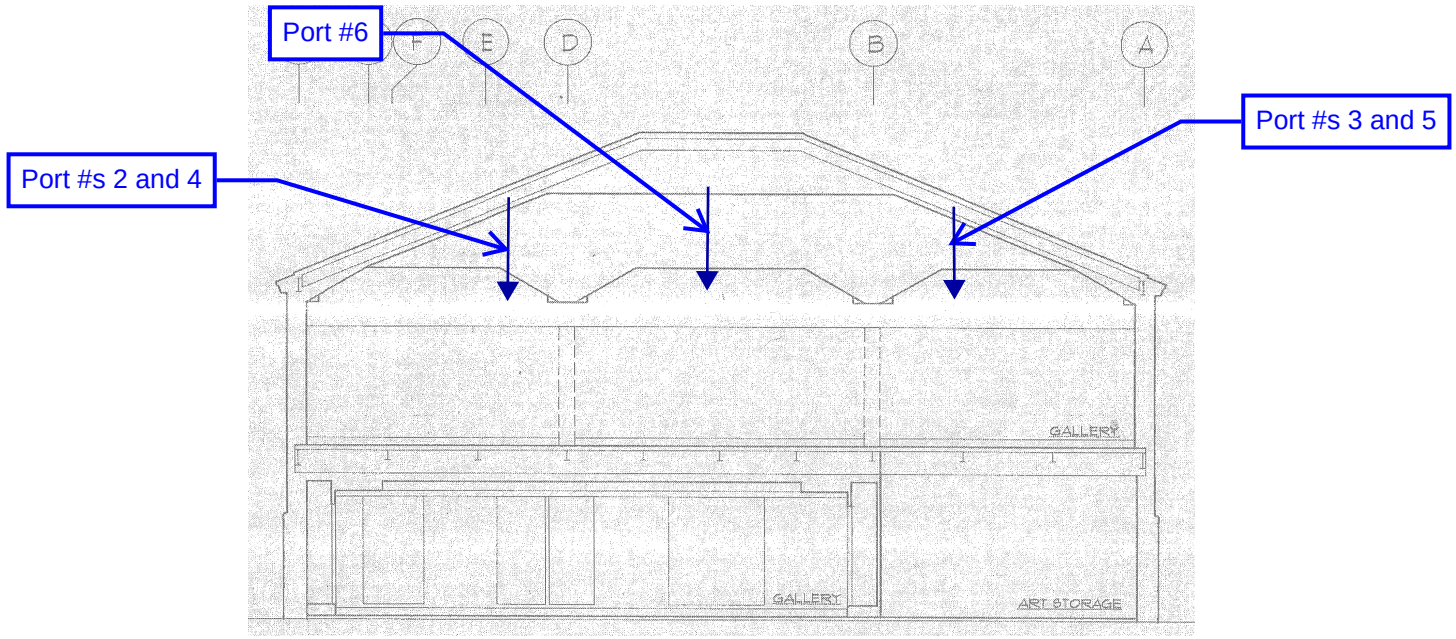
Title: **Pressure Port Air Hose Locations - Section**

Drawn:	Checked:	Approved	Project No.:
EGL	EWO	XXX	210249.00

Drawing No.: **SK-3**

Scale: **N.T.S.**

Date: **04/07/2021**



Note: Port #1 not readily visible in this section view

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Engineering of Structures and Building Enclosures
Simpson Gumpertz & Heger Inc.
135 South LaSalle Street, Suite 3800
Chicago, Illinois 60603
main: 312.754.7500
fax: 312.754.7501
www.sgh.com

Project: **Moisture Investigation, Existing Palmer Art Museum, University Park, PA**				Drawing No.: **SK-4**	
Title: **Pressure Port Air Hose Locations - Section**				Scale **N.T.S.**	
Drawn: **EGL**	Checked: **EWO**	Approved **XXX**	Project No.: **210249.00**	Date: **04/07/2021**	

9 April 2021 **DRAFT**

Mr. Ian Salada
Mr. Robert Lingenfelter
The Pennsylvania State University
113J Office of the Physical Plant
University Park, PA 16802

Project 210249 – Moisture Investigation, Existing Palmer Art Museum, University Park, PA

Dear Mssrs. Salada and Lingenfelter:

Enclosed is a brief assessment of the existing attic moisture issues and ventilation intervention. We provide two options for ventilation upgrades to mitigate the moisture issues. The attic ventilation/pressure testing described in a separate memo will inform the design of this system.

Please review and let us know if there are any questions.

Sincerely yours,

Emily W. O'Keefe
Senior Project Manager

Edward G. Lyon
Staff Consultant

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Encl.

Memorandum DRAFT

Date: 9 April 2021

To: File

From: Ned Lyon

Project: 210249 – Moisture Investigation, Existing Palmer Art Museum, University Park, PA

Subject: Preliminary Attic Ventilation Upgrade Recommendation

The following outlines our preliminary recommendations for an attic ventilation upgrade to partially mitigate attic condensation. These recommendations are subject to modification based on the results of the attic ventilation/pressurization testing we have outlined in a separate memorandum. There is significant potential for reduction of first equipment cost and future operational cost if the system air flow can be quantified and potentially reduced.

Existing Attic Ventilation Fan

The existing attic ventilation fan is a Greenheck untempered makeup air unit. From the name plate information, it appears to have a 460V, three-phase, three-horsepower motor with an air flow in the 6,500 to 7,000 cu ft per minute (cfm) range. The current control protocol uses an average of two attic space temperature and relative humidity (RH) sensors to turn the fan on when there is high RH in the attic space, and to turn the fan off if the average temperature in the attic drops below a set point temperature.

SGH has not seen the basis of design for this attic ventilation system, but it has been described as a mitigation measure to combat humidity and moisture. We do not know the rationale for the existing cfm capacity.

The current control protocol will cause the fan to run during warm weather when it is likely to introduce high-humidity, unconditioned outdoor air into the attic, and could cause infiltration of this air into the galleries. Additionally, the current temperature cutoff prevents the fan from diluting attic moisture during cold weather. This combination of effects renders it useless for condensation control.

SGH Basis of Design for Attic Ventilation/Pressurization

Using the eave-to-ridge triangular area and the length of the gallery, SGH estimated the attic volume conservatively. This overestimates actual volume because the flat roof cuts off part of the peak, and the attic does not extend to the actual eaves of the building. From this volume estimate, we determined that 3,000 cfm of airflow could provide two air changes per hour (ACH) in the attic

space, which should be more than sufficient to control attic dew point temperatures. A final determination of recommended air flow volume depends upon the results of attic ventilation/pressurization testing. The most accurate information should be obtained after the air barrier repairs are implemented.

SGH Attic Ventilation Upgrade Recommendation

SGH recommends replacement of the existing attic ventilation fan with a new system. There are two reasons for replacement rather than modification of the existing unit. First is that the total air flow volume of the existing fan is significantly greater than needed if the ventilation is effectively distributed. Second is that the air intake needs substantial modification to mitigate the introduction of rain and snow into the system.

In addition to replacing the attic ventilation system, it is likely that some modification to the existing roof venting and attic connectivity will be needed to improve ventilation air distribution and attic pressurization. We anticipate sealing much of the existing roof ridge and hip vents as part of an attic ventilation upgrade.

There are two options for new fan systems:

Option 1 – Attic Ventilation with Cold Weather Heat Only

Install a 3,000 cfm makeup air fan system with a 30 kW electric heating coil. This equipment will require approximately 40 amp, 460V three-phase service for motor and heater. The heater capacity is sufficient to heat 20°F outdoor air to 50°F, the approximate winter interior dew point temperature. The system can be controlled by outdoor air temperature to operate the fan when exterior temperature drops below 50°F to provide 55°F air to the attic. As the outdoor air temperature approaches 20°F, the discharge air temperature will drop to 50°F, but the dry air will dilute any moisture entering the attic, and the attic temperature will remain above freezing to protect the sprinkler system wet loop.

Greenheck Model MSX tempered makeup air systems can be configured with appropriate intake air hoods and filters to fit these requirements. Other manufacturers have similar equipment.

Option 2 – Attic Ventilation with DOAS Capable of Winter Heating and Summer Dehumidification

Install a 3,000 cfm dedicated outdoor air system (DOAS) makeup air system. Provide electric heat per Option 1. Additionally, equip the system with direct expansion (DX) cooling and reheat to supply 70°F neutral temperature air with a 50°F dew point temperature to the attic during warm weather (matching the interior conditions). The fan operates continuously. Control the system to operate in heating mode as described for Option 1 when outdoor air temperatures fall below 50°F. When the outdoor air dry-bulb temperature rises above 60°F, with a dew point temperature above 50°F, the system will operate the DX cooling and reheat to provide 50°F dew point discharge air reheated to no more than 70°F dry-bulb temperature. Electric reheat is not needed even if the DX reheat will not meet the 70°F discharge air temperature set point when dehumidification is active.

This system provides winter ventilation air tempering for condensation control and summer attic ventilation with dry air to reduce gallery cooling loads. We expect that the DX cooling power requirements will not exceed the electric heat coil capacity and a 40 amp, 460V three-phase service will be acceptable. This assumption needs to be verified by the equipment manufacturer.

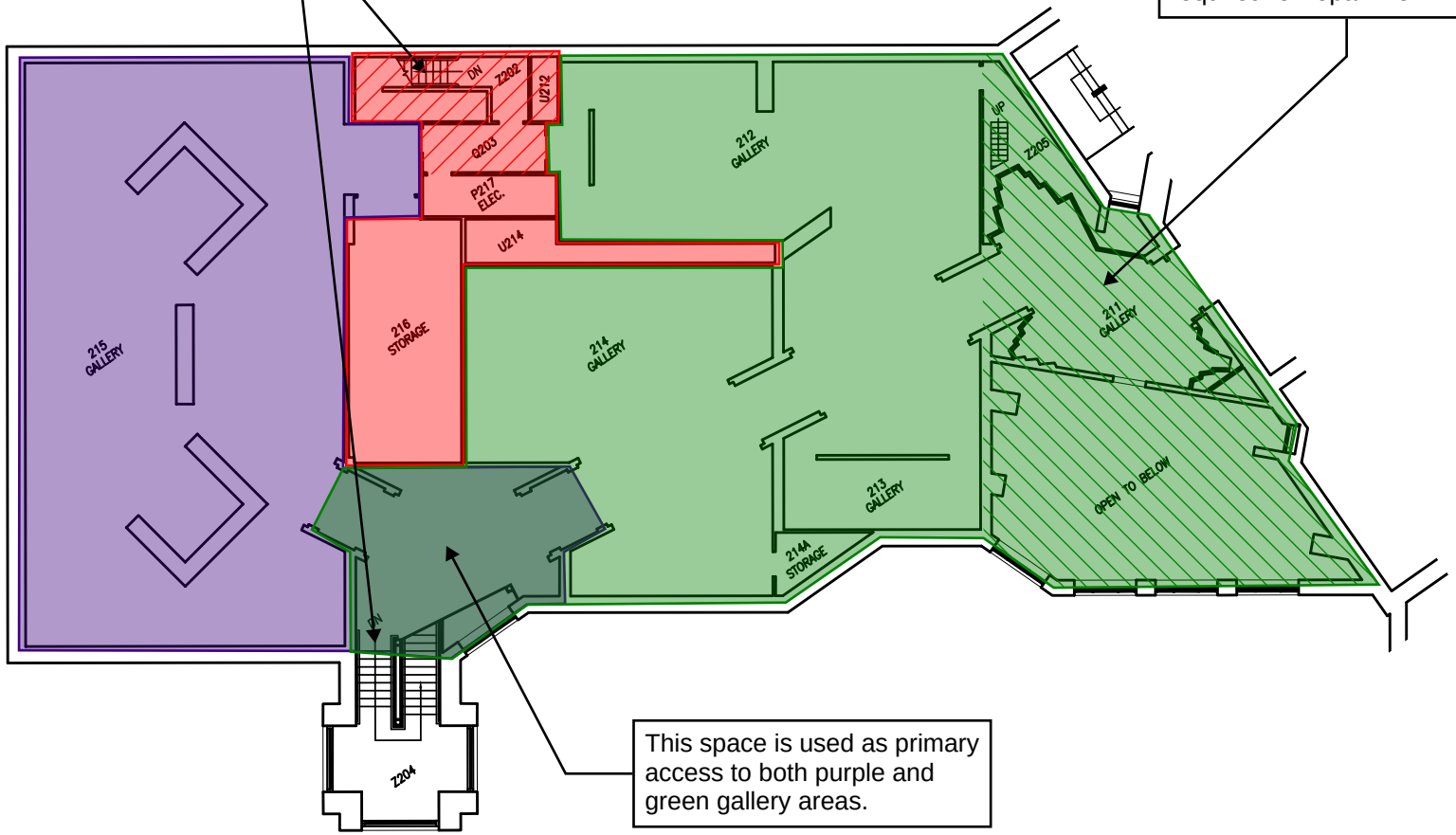
The Greenheck Model MSX systems can be configured with DX cooling, but it is not clear from the catalog data if they can provide true supply air dew point control. Desert Aire among other manufacturers can provide DOAS equipment capable of controlling discharge air dew point temperature and with neutral air reheat.

Other Attic Ventilation System Upgrade Integration

Typical controls for new attic ventilation will allow standalone operation. We recommend integrating communication from the standalone controllers with the building management systems to facilitate monitoring of system operations and alarming when there are faults.

Need to review possible egress implications of closing access to emergency stairs, or primary stairs and associated hallways

Hatch indicates area accessed from mechanical space/access to mechanical space. Access through ceiling may not be required for repair work.



This space is used as primary access to both purple and green gallery areas.

Note: Image is Owner base building drawing

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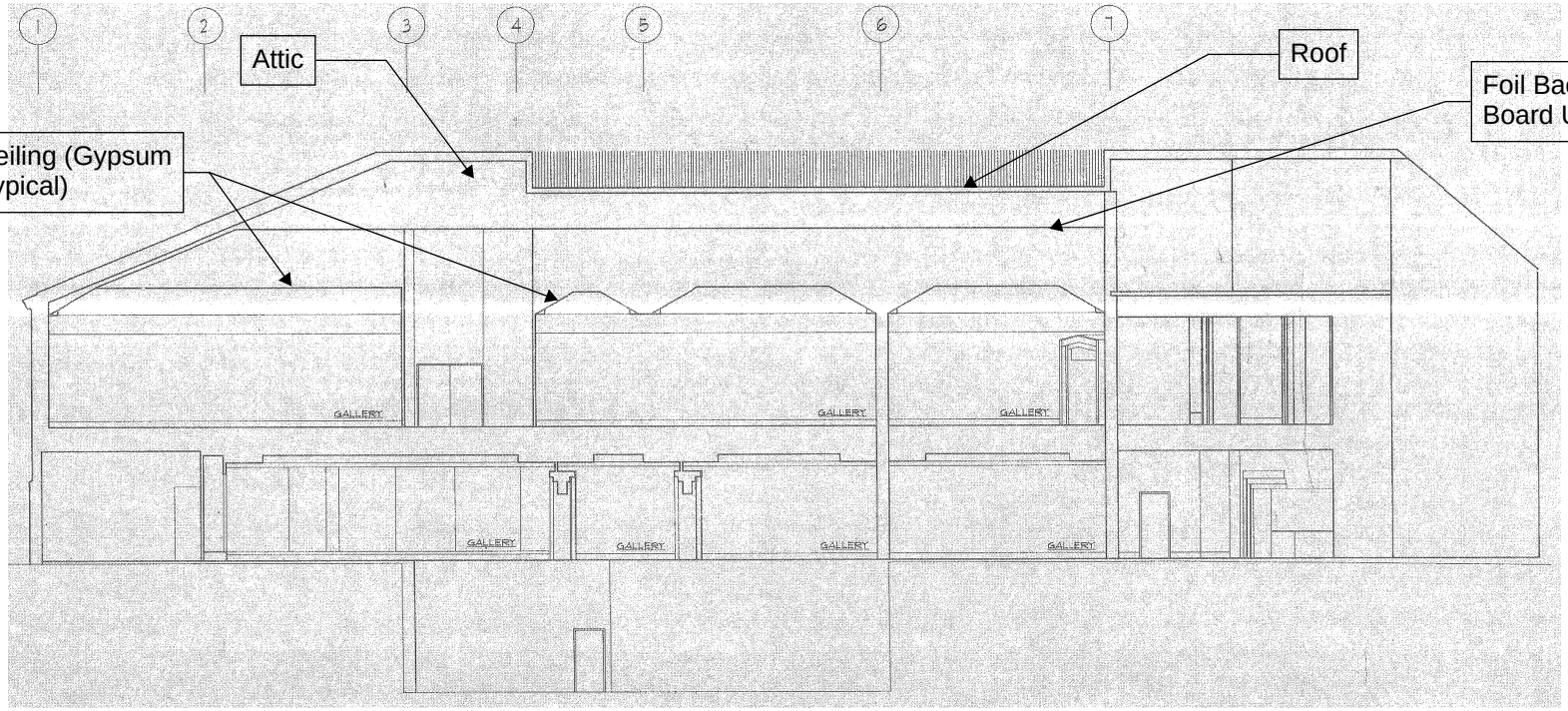
SIMPSON GUMPERTZ & HEGER

Engineering of Structures and Building Enclosures

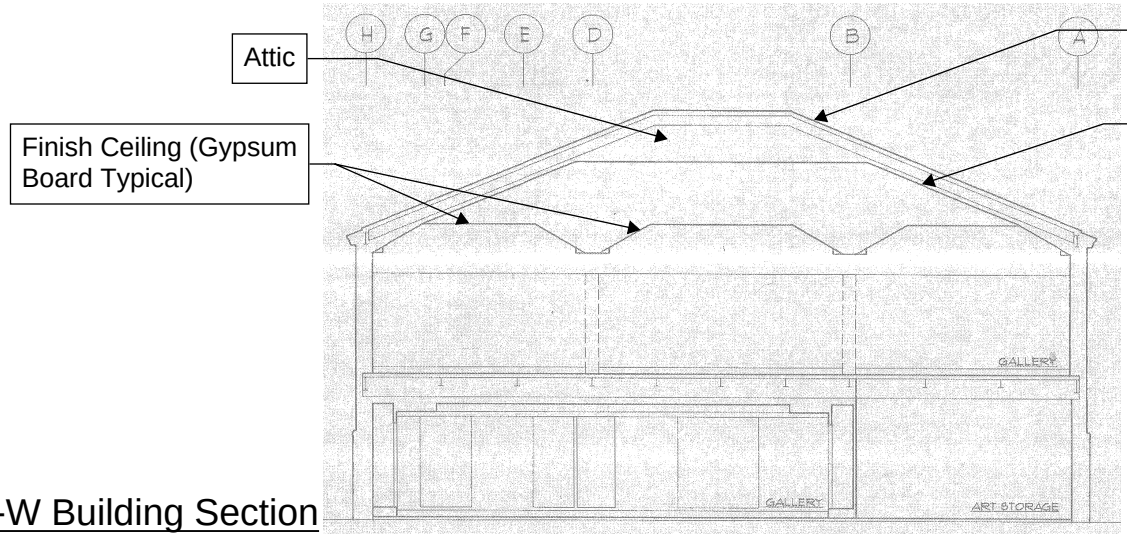
Simpson Gumpertz & Heger Inc.
135 South LaSalle Street, Suite 3800
Chicago, Illinois 60603

main: 312.754.7500
fax: 312.754.7501
www.sgh.com

Project: Moisture Investigation, Existing Palmer Art Museum, University Park, PA				Drawing No.:	SK-5
Title: Air Barrier Repair - Phasing Diagram				Scale	N.T.S.
Drawn: EWO	Checked: AMA	Approved XXX	Project No.: 210249.00	Date:	04/08/2021



N-S Building Section



E-W Building Section

Note: Images are from building renovation drawings

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Simpson Gumpertz & Heger Inc.
135 South LaSalle Street, Suite 3800
Chicago, Illinois 60603

main: 312.754.7500
fax: 312.754.7501
www.sgh.com

Project: Moisture Investigation, Existing Palmer Art Museum, University Park, PA

Title: Air Barrier Repair - Component Identification

Drawn:	Checked:	Approved	Project No.:
EWO	AMA	XXX	210249.00

Drawing No.: SK-6

Scale: N.T.S.

Date: 04/08/2021

OUTLINE SPECIFICATION
Air Barrier Repair, Existing Palmer Art Museum
University Park, PA

The Pennsylvania State University
113J Office of the Physical Plant
University Park, PA 16802

Simpson Gumpertz & Heger Inc.
135 South LaSalle Street, Suite 3800
Chicago, IL 60603

8 April 2021

SGH Project 210249

1.0 GENERAL

1.1 Scope of Work

A. Contractor to provide all labor, materials, equipment, permits, and fees required to perform the following:

1. Remove the existing finish ceiling to expose the foil backed gypsum board upper ceiling. Temporarily support or remove all lighting, electrical, mechanical, and fire protection equipment. Remove top 1 ft of all wall gypsum board.

2. Inspect foil backed gypsum board and identify all locations of foil damage, tape damage, unsealed penetrations, and other defects. Inspection access will vary throughout spaces.

3. Repair all defects in the foil backed gypsum board air barrier. As required, replace foil backed gypsum board and tape. Repair penetrations and other defects with tape and/or sealant.

    a. Pressurize space and use tracer smoke to identify any remaining defects and repair.

4. Provide new finish ceiling. Integrate and resecure all lighting, electrical, mechanical, and fire protection equipment. Provide new wall board. Tape and paint all interior gypsum board surfaces to match existing.

B. Work may be phased as required to meet schedule and access constraints (refer to SK-5).

1.2 General Requirements

A. The illustrations of the existing construction were obtained from original and renovation design drawings. Variations from the information shown are likely and all information should be field verified.

B. In cases, if any, where requirements, including but not limited to manufacturer's installation instructions differ from the information provided herein and in the referenced sketches, notify Engineer of Record (EOR).

C. The contractor is responsible for engineering tasks required to perform any related construction processes including, but not limited to, means and methods, access, and submission of documents requested outside of the Project documents.

D. Deficient work and/or work not in conformance with the Contract Documents will be repaired at the contractor's expense. The contractor will reimburse the parties required for performing the design services arising from deficient work, such as review of modifications/contractor substitutions, or expediting of submittals.

E. The contractor is solely responsible for the means, methods, techniques, sequences, and operation of construction and safety precautions and programs incidental thereto.

1.3 Selective Demolition

A. The contractor is solely responsible for the means and methods of demolition and the integrity and stability of the existing structure and building components during demolition and throughout the duration of the Project.

B. The contractor is solely responsible for protecting openings and providing appropriate egress throughout the duration of the Project.

C. Examine the existing construction prior to demolition for conditions that may be hazardous or unsafe. Inspect the existing work and demolition area for areas that may require temporary shoring before demolition can occur.

D. The contractor is solely responsible for protecting the remainder of the building, building occupants, including staff, security, and visitors, from any and all hazards related to the construction.

1.4 Submittals

A. Provide Owner and EOR with a phasing schedule and plan indicating where and how spaces will be closed off, how long each phase will take, and how equipment, materials, and labor will be brought to the space. Schedule should include anticipated work hours, staffing, material delivery schedule, and refuse removal schedule.

B. Submit product data and manufacturer's installation instructions for each air barrier material planned for use on the Project.

C. Submit color charts and samples for all finish materials, including paint and drop ceiling tiles.

D. Explanation of sealant manufacturer's code for manufacturing date or product expiration date label on product containers (not required if this information is clearly labeled on product containers).

E. Record Drawings: Submit record drawings at the completion of the work that detail the following:

1. Locations and extent of repairs, including locations of new foil backed gypsum board air barrier assembly.

2. Typical air barrier repair details, and details of all typical conditions such as:

a. Intersections with other envelope assemblies and materials.

b. How gaps in the construction were bridged, and how inside and outside corners were negotiated.

c. How materials covering the foil backed gypsum board air barrier were secured with airtight conditions maintained.

d. How miscellaneous penetrations such as conduits, pipes, electric boxes, and similar items were sealed.

1.5 Quality Control and Quality Assurance

A. The contractor and its site superintendent shall have at least 5 yrs experience supervising the installation of similar air barrier systems.

B. Perform adhesion tests of all tapes and sealants submitted for use on the Project. Adhesion tests should be performed on all potential substrates, including foil, tape, existing sealant and foam, gypsum board, board edges, and any other applicable surfaces. Adhesion tests shall be basic pull tests to confirm consistent adhesion and bond.

C. Post-Air-Barrier Repair Testing

1. Following completion of air barrier repairs, but before installation of the finish ceiling materials, conduct pressurized air tests of the construction space with tracer smoke to identify any remaining air barrier defects.

1.6 Mockups

A. First in-place installation of each repair type will be reviewed by Owner, EOR, and relevant contractors to assess its performance, durability, and constructability. The mockup will establish both the technical and aesthetic standards for the remainder of the Project. Reconstruct the mockup as many times as necessary to meet the Owner and EOR's approval, without additional cost to the Owner.

1.7 Delivery, Storage, and Handling

A. All materials are to be delivered in the manufacturer's original, unopened, undamaged containers, properly labeled. Remove all damaged materials from site.

B. All materials are to be new and of recent manufacture. Use sealants within manufacturer's expiration date. Discard any sealants that are beyond the manufacturer's expiration date or are more than six (6) months old.

C. Store temperature-sensitive materials indoors at the temperatures recommended by the manufacturers. Discard any materials that are exposed to temperatures or conditions outside the range recommended by the manufacturer.

1.8 Use of Site

A. Comply with the Owner's requirements for use of the site at all times on this Project.

B. Protect the building, site, building occupants, and pedestrians from all risks associated with this work.

C. Locate materials, access equipment, and staging areas only in areas approved by the Owner in advance.

D. Provide a two-week look ahead schedule each week to the Owner to identify areas requiring coordination.

E. Construction schedule is 14 June 2021 to 30 July 2021. This includes all mobilization, testing, and demobilization steps.

2.0 MATERIALS

A. Throughout Project (including all phases), all material types, manufacturers, and suppliers to remain the same.

2.2 Air Barrier Repair Materials

A. Foil backed gypsum board matching existing panel thickness.

B. Tape. Metal foil tape with butyl rubber adhesive compatible with foil backed gypsum board.

C. Sealant. Silicone or polyurethane fire-rated sealant compatible with foil backed gypsum board.

D. Spray-foam sealant. One- or two-component expanding polyurethane foam insulation, fire rated.

2.3 Finish Materials

A. Gypsum board. Use materials to match those used elsewhere in the building and/or for typical building repairs.

B. Tape and drywall mud. Use materials to match those used elsewhere in the building and/or for typical building repairs.

C. Paint to match existing, type and color; multiple colors used throughout spaces on walls and ceilings.

D. Drop ceiling tiles. Use materials to match those used elsewhere in the building and/or for typical building repairs.

3.0 EXECUTION

A. As described above, work may be phased. During each phase, complete the following work in its entirety.

3.2 Demolition At Areas Designated For Inspection

A. Remove the existing ceiling to expose the foil backed gypsum board upper ceiling. Galleries and public hallways have a finished gypsum board ceiling. Access hallways and stairwells have drop ceiling tiles. Auxiliary spaces and mechanical spaces do not have ceilings.

B. Remove top 1 ft of all finished wall gypsum board at all interior and exterior walls within the work space to expose foil backed gypsum board.

C. Temporarily support or remove all lighting, electrical, mechanical, and fire protection equipment.

3.3 Identify Damaged Air Barrier Locations

A. Inspect foil backed gypsum board and identify all locations of foil damage, tape damage, unsealed penetrations, and other defects. Inspection access will vary throughout spaces. Foil damage includes loose or wrinkled foil, debonded from the gypsum board.

1. Inspection should be performed from less than 1 ft from the board surface.

2. All defects and potential defects should be identified for repair.

3. All unsealed fasteners should be included in scope as well.

3.4 Air Barrier Repair

A. Repair all defects in the foil backed gypsum board air barrier. This includes:

1. Replace foil backed gypsum board where defect is larger in any direction than tape width (approximately 2 in.).

2. Replace tape where existing tape is missing or unadhered.

3. Seal around all penetrations with tape and/or compatible sealant.

B. Pressurize space and use tracer smoke to identify any remaining defects and repair. This work must be coordinated with the facility staff to allow appropriate fire

protection modifications, and allow access to adjacent spaces for inspection, as necessary.

3.5 Finish Replacement

A. Provide new finish ceiling.

B. Integrate and resecure all lighting, electrical, mechanical, and fire protection equipment.

C. Provide new wall board at top 1 ft of interior and exterior walls.

D. Tape and paint all interior gypsum board surfaces to match existing.

E. Reinstall drop ceiling grid. Provide new ceiling tiles.