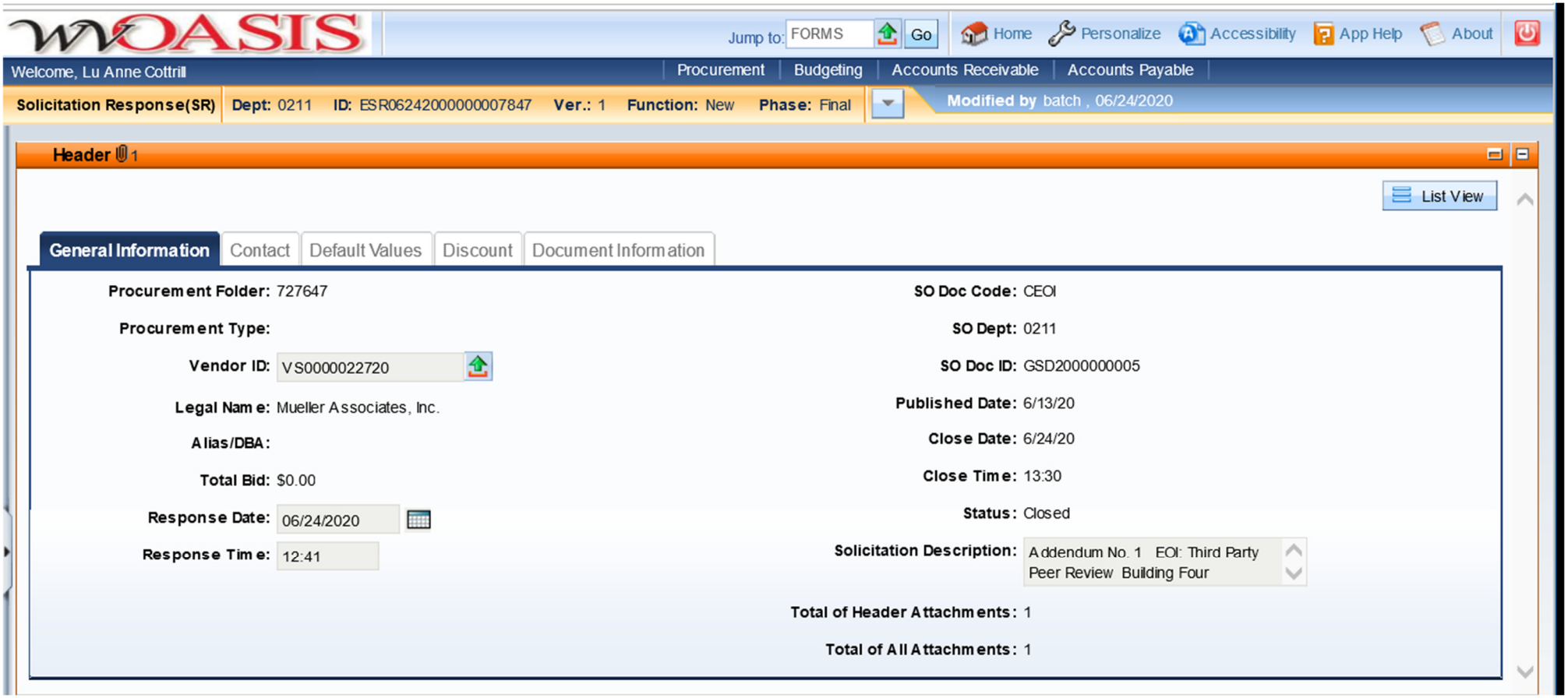
The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at ***wvOASIS.gov***. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at ***WVPurchasing.gov*** with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.


WVOASIS
Jump to: FORMS Go
Home
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About
Welcome, Lu Anne Cottrill
Procurement
Budgeting
Accounts Receivable
Accounts Payable
Solicitation Response(SR) Dept: 0211 ID: ESR06242000000007847 Ver.: 1 Function: New Phase: Final
Modified by batch , 06/24/2020
Header 1
List View
General Information
Contact
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Document Information
Procurement Folder: 727647
Procurement Type:
Vendor ID: VS0000022720
Legal Name: Mueller Associates, Inc.
Alias/DBA:
Total Bid: $0.00
Response Date: 06/24/2020
Response Time: 12:41
SO Doc Code: CEOI
SO Dept: 0211
SO Doc ID: GSD2000000005
Published Date: 6/13/20
Close Date: 6/24/20
Close Time: 13:30
Status: Closed
Solicitation Description: Addendum No. 1 EOI: Third Party Peer Review Building Four
Total of Header Attachments: 1
Total of All Attachments: 1

Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Solicitation Response

Proc Folder : 727647

Solicitation Description : Addendum No. 1 EOI: Third Party Peer Review Building Four

Proc Type : Central Contract - Fixed Amt

Date issued	Solicitation Closes	Solicitation Response	Version
	2020-06-24 13:30:00	SR 0211 ESR06242000000007847	1

VENDOR

VS0000022720

Mueller Associates, Inc.

Solicitation Number: CEOI 0211 GSD2000000005

Total Bid : $0.00 **Response Date:** 2020-06-24 **Response Time:** 12:41:58

Comments:

FOR INFORMATION CONTACT THE BUYER

Melissa Pettrey

(304) 558-0094
melissa.k.pettrey@wv.gov

Signature on File **FEIN #** **DATE**

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	EOI: Third Party Peer Review Building Four				$0.00

Comm Code	Manufacturer	Specification	Model #
81101508			

Extended Description : EOI: Third Party Peer Review Building Four

State of West Virginia Third-Party Peer Review Services Building Four

Expression of Interest
Solicitation No. CEOI 0211 GSD2000000005
West Virginia Department of Administration
June 24, 2020

Mueller

1306 Concourse Drive, Suite 100
Linthicum, MD 21090
410.646.4500 tel
410.646.4738 fax
www.muellerassoc.com

June 24, 2020

Melissa K. Pettrey
Senior Buyer
WV Department of Administration
Purchasing Division
State Capitol Complex
2019 Washington Street, East
Charleston, WV 25305-0130
304-558-0094
melissa.k.pettrey@wv.gov

Subject: Expression of Interest: Third-Party Peer Review Building Four, Solicitation No. CEOI 0211 GSD000000005

Dear Ms. Pettrey,

The State of West Virginia Department of Administration, General Services Division (the Agency) requires the services of a qualified engineering firm to provide third-party peer review services of major renovations to State Capitol Complex Building Four. Mueller Associates has more than five decades of experience providing engineering solutions and peer reviews on similar projects. We excel in the complex renovation of historical buildings, understanding how to protect significant structures while incorporating modern, efficient systems that minimize maintenance and operating costs while prolonging the life of the building.

Mueller's commitment to quality has led us to provide third-party reviews on a range of projects. Our breadth of expertise demonstrates the level of trust clients have in the performance of Mueller's engineers. For the Agency's project, we will work with your team and the client in a collaborative manner to determine the level of our peer review services and the scope of our deliverables.

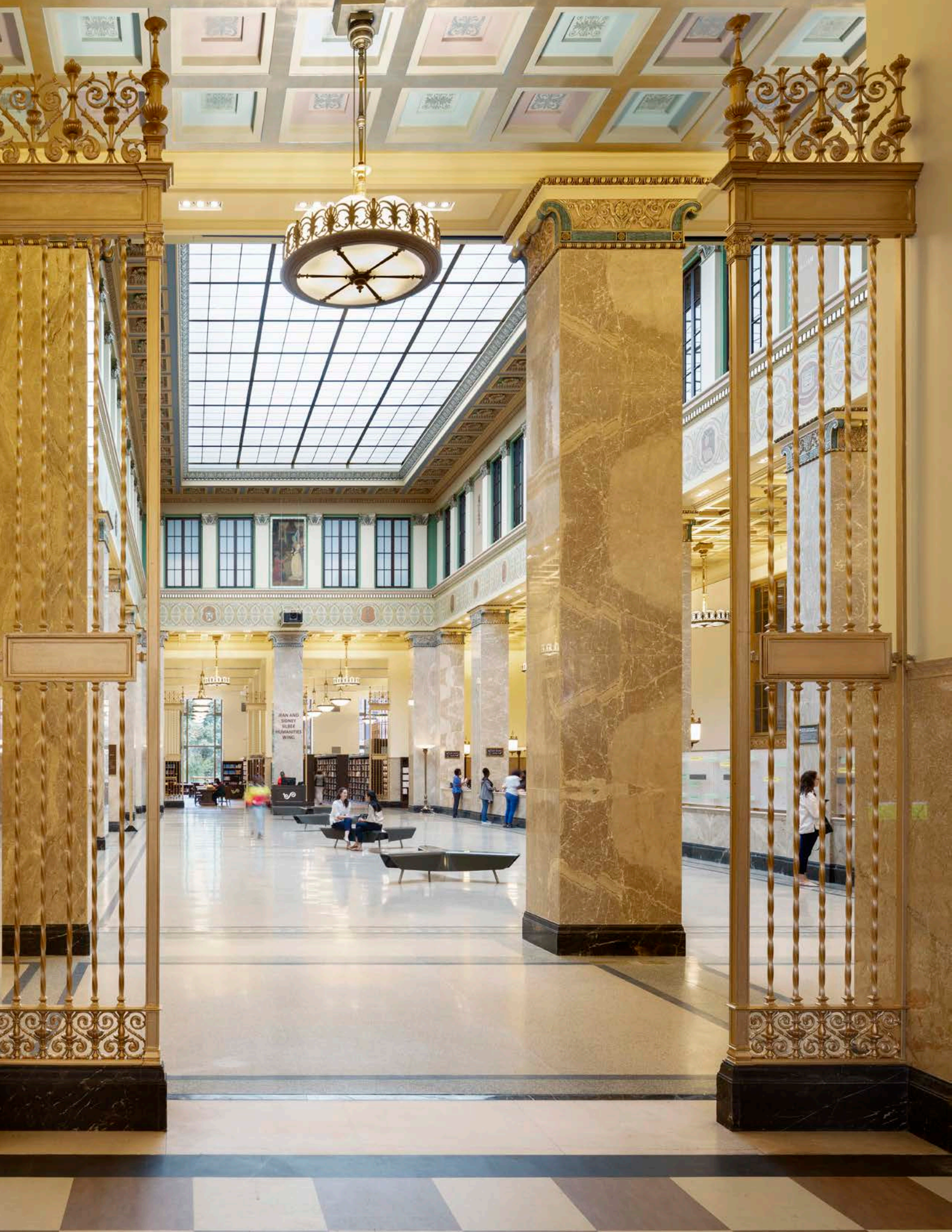
As you will see throughout our proposal, Mueller is strong in all of the areas critical to making the Agency's project a success. As a Vice President at Mueller and the proposed Principal-in-Charge for this project, I offer my personal commitment to providing the best resources and services available. If you have any questions regarding our submission, please do not hesitate to call me at 410.646.4500 or at tgaring@muellerassoc.com.

Very truly yours,

MUELLER ASSOCIATES, INC.

Todd Garing, PE, LEED AP BD+C

Vice President


JEAN AND
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SUBER
HUMANITIES
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QUALIFICATIONS AND EXPERIENCE

FIRM BACKGROUND

Mueller Associates is committed to providing a high level of responsive professional services in mechanical, electrical, plumbing, and fire protection engineering. Since 1966, we have worked on landmark projects throughout the Mid-Atlantic with a focus on complex engineering challenges in the government, civic, cultural, education, laboratory, and corporate markets.

Clients turn to us with their most challenging facility requirements, including environments that put MEP systems to the test. We excel in the complex renovation, retrofit, and new construction projects for private, institutional, historic, and government clients. Our firm and engineers have provided a wide range of services, from designing engineering solutions from conceptual to construction documents to conducting peer reviews, quality assurance/quality control, alternative solutions, life cycle costing, building commissioning, and cost estimating. Our customized-approach to meeting our clients' needs incorporate the development and review engineering design documents, drawings, specifications, and cost estimates, as well as provide construction contract administration.

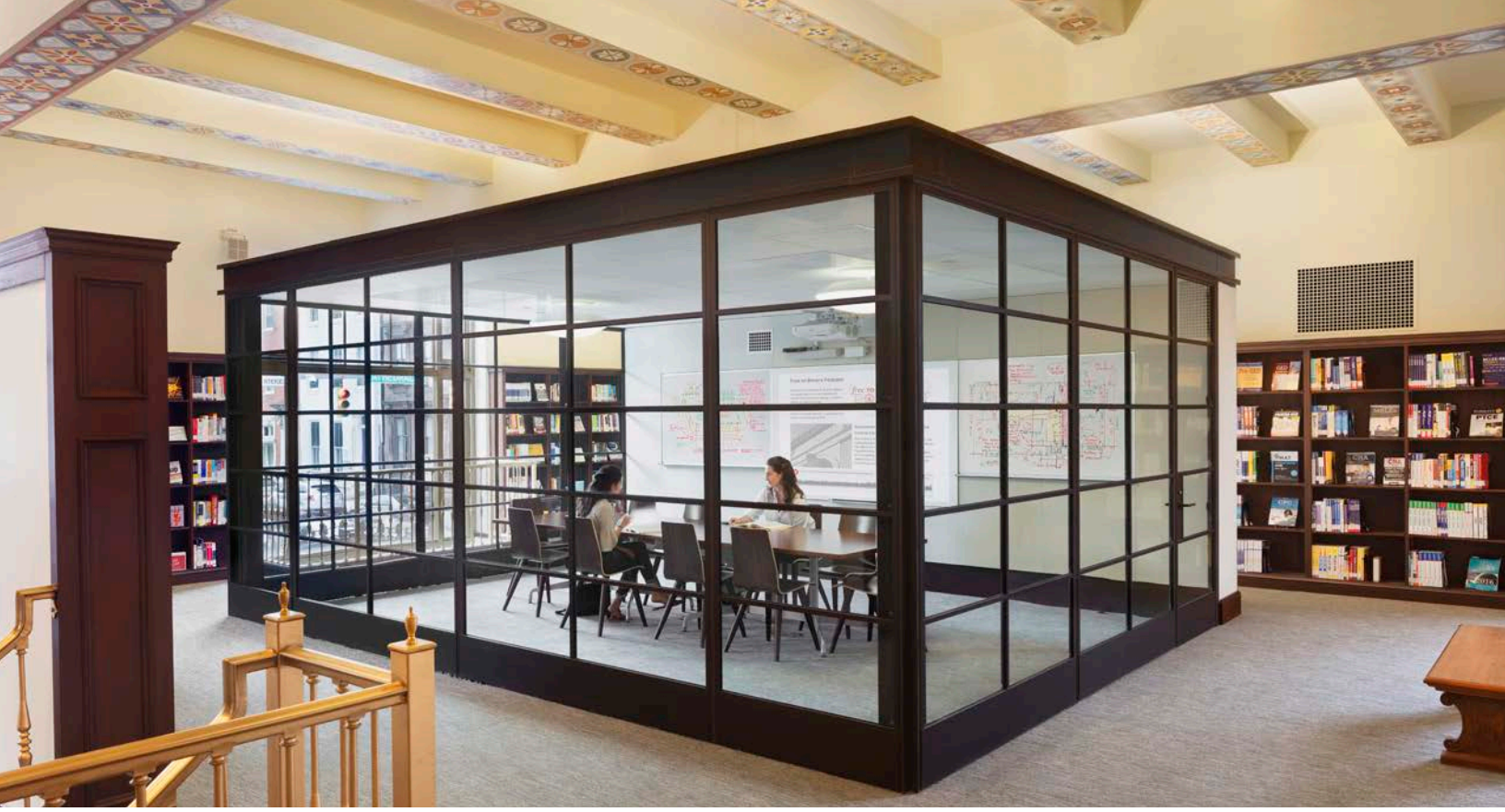
PROFESSIONAL STAFF

Mueller has an experienced staff of 41 professionals, including mechanical and electrical engineers. Our staff complement includes 33 graduate engineers, 22 of whom are registered professional engineers, 12 LEED™ accredited professionals, and 3 certified plumbing designers. Our credentialed staff has worked on large and complex institutional building designs, in addition to small-scale interior renovations. On each project, our experienced principals oversee and remain involved. This level of involvement has resulted in well designed, well-coordinated, functional projects.

TECHNICAL EXPERTISE

For more than five decades, Mueller has excelled in providing design, engineering, quality assurance/ quality control, and third-party peer review services to a wide array of clients and project types. Our firm's specializations include:

- Heating, Ventilating, and Air Conditioning Systems
- Plumbing Systems
- Electrical Power Systems
- Lighting and Lighting Controls Systems
- Fire Suppression Systems
- Fire Alarm and Detection System
- LEED® and Sustainable
- Central Plant and Infrastructure
- Above and Underground Storage Tank
- Feasibility Studies
- Cost Estimating
- Commissioning Oversight
- Life Cycle Cost and Value Engineering Analyses
- Energy Modeling, Audits, Analysis, and Conservation Studies
- Construction Contract Administration



One of Mueller's key qualifications is our experience, understanding, and approach to MEP engineering in historic buildings. We have provided MEP engineering solutions for many of the area's leading buildings constructed in the 1920s and 30s, such as the Art-Deco style Enoch Pratt Library (above).

HISTORIC STRUCTURE EXPERIENCE

One of Mueller's key qualifications is our experience, understanding, and approach to MEP engineering in historic buildings. Our meticulous, research-driven approach has proven to be an ideal fit for the preservation and renovation of historic buildings. We have worked closely with owners and architects to protect significant structures while incorporating modern, efficient systems that minimize maintenance and operating costs while prolonging the life of the building.

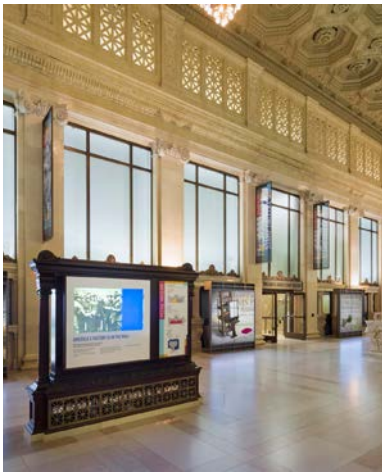
Like many of the other buildings that are part of the State of West Virginia's Capitol Complex, Building Four is designed in the Art-Deco style. Popularized in the United States after World War I, *Mueller has provided MEP engineering solutions for many of the area's leading buildings constructed in the 1920s and 30s. We understand the systems designed for such buildings need to be of quality in keeping with the character of the buildings and to preserve their historical significance.*

When working on projects from this period, our approach is to find ways to make sure the distribution of systems remain hidden, yet accessible, and do not disturb the building's historic fabric. Equipment must be selected for long life, inherently require minimal maintenance, and be arranged so that required maintenance can be easily performed.

Also, over the life of such systems, the operating energy cost becomes an extremely important factor influencing the design. We have utilized state-of-the-art technologies, including demand-based controls, energy recovery, thermal storage, and on-site renewable energy systems. We have also incorporated intelligent building concepts into the design of mechanical and electrical systems for these building types.

QUALIFICATIONS AND EXPERIENCE

HISTORIC STRUCTURE EXPERIENCE



Projects that Mueller has worked that are on designed in the Art-Deco and Neoclassical architectural styles include:

- Embassy of Japan, 1930
- Enoch Pratt Free Library, 1933
- Folger Shakespeare Library, 1932
- Holzapfel Hall, University of Maryland College Park, 1930
- National Academy of Sciences, 1924
- Smithsonian Freer Gallery, 1923
- Smithsonian National Postal Museum, 1914

Mueller's qualifications and experience working on historical structures also include work at the U.S. Capitol Building, the Thurgood Marshall Federal Building, and the U.S. Supreme Court.

A complete list of Mueller's experience working on historical structures is provided below:

US National Historic Landmarks

- Anderson House Museum, 1902
- B&O Railroad Museum: Mount Clare Station, 1851
- James Brice House, 1767
- Buchanan House, U.S. Naval Academy, 1906
- Commandant's Residence US Marine Barracks, 1806
- Ferry Farm Visitor's Center, 1738
- Garrett-Jacobs Mansion, 1884
- Hagley Museum & Library (du Pont Mansion), 1803
- Homewood Museum, 1801
- Maryland State House, 1772
- Octagon House, 1799
- Peale Museum, 1814
- Rankin Memorial Chapel, 1894
- Smithsonian Arts & Industries Building, 1879
- Smithsonian American Art Museum, 1867
- Smithsonian Castle Building, 1849
- Smithsonian Cooper Hewitt Museum, 1899
- Smithsonian Freer Gallery, 1923
- Smithsonian Renwick Gallery, 1873
- Star Spangled Banner Flag House Museum, 1793
- Washington National Cathedral, 1912
- White House, 1801

US National Register of Historic Places

- Banneker Douglas Museum, 1874
- Corcoran Art Building, 1890
- Dumbarton Oaks Research Library & Collection, 1801
- Embassy of Japan, 1930
- Folger Shakespeare Library, 1932
- Fredericksburg Area Museum & Cultural Center, 1816
- Lovely Lane United Methodist Church, 1895
- Lyric Opera House, 1894
- Mattapany-Sewall Manor, 1663
- Mechanical Hall, University of Delaware, 1898
- Mercantile Trust & Deposit Company, 1855
- Monticello, Visitor Center, 1768
- Mt. Vernon Estate, 1739
- National Academy of Sciences, 1924
- National Museum of Women in the Arts, 1908
- Phillips Collection (Phillips House), 1897
- Robinson House, Virginia Museum of Fine Arts, 1840

QUALIFICATIONS AND EXPERIENCE

HISTORIC STRUCTURE EXPERIENCE

- Smithsonian National Postal Museum, 1914
- U.S. General Accounting Office Building, 1951
- Wadsworth House (Sulgrave Club), 1900
- Winterthur Museum (DuPont Mansion), 1839

Historic Buildings

- Baltimore Museum of Art (Pope Building), 1929
- Baltimore Penn Station, 1911
- Blair House, Butler's Pantry, 1824
- Palazzo Building (Walters Art Museum), 1908
- Enoch Pratt Free Library, 1933
- Frontier Culture Museum, 1740
- George Peabody Library, Peabody Institute, 1876
- Holzapfel Hall, University of Maryland College Park 1930
- Jefferson Patterson Park & Museum, 1933
- Jewish Museum of Maryland, 1845
- Maryland Historical Society: Enoch Pratt House, 1844
- Nemours Mansion & Gardens Visitor Center, 1910
- One West Mount Vernon Place, 1850
- Parrish Hall, Swarthmore College, 1864
- Peabody North Hall, Peabody Conservatory, 1880
- Point Lookout Lighthouse, 1830
- Saint Ignatius Church, 1857
- Saint William's Chapel, 1930
- Smithsonian Natural History Building, 1910
- Sports Legends Museum, Camden Station, 1857
- Weinberg Center for the Arts, 1926

Drawing on the expertise of our leading engineers, Mueller proposes Todd Garing, PE, LEED AP BD+C, to manage our team and serve as Principal-in-Charge. Mr. Garing brings 27 years of consulting engineering and project management experience. He's conducted third-party peer reviews on several projects as well as provided HVAC engineering design solutions for some of Mueller's most notable and landmark work. In particular, he specializes in understanding the complexity of designing MEP systems in historical building structures and how to protect these significant structures while incorporating modern, efficient systems that minimize maintenance and operating costs, while prolonging the life of the building.

Working with Mr. Garing will be Mr. Paul Czajkowski, PE, who is Mueller's Chief Mechanical Engineer. With over 40 years of experience, Paul leads Mueller's quality assurance/quality control (QA/QC) process and is responsible for the technical review of HVAC specifications and drawings. Due to expertise and position, clients often turn to Mr. Czajkowski for his subject matter expertise in the design of central HVAC systems on large-scale government, civic, institutional, and historic buildings.

Rounding out Mueller's team is Mr. Carl Canatella, PE, who brings over 47 years of experience in consulting engineering and 4 years of experience in the manufacturing industries. As Mueller's Chief Electrical Engineer, Mr. Canatella oversees reviewing electrical drawings and specifications for a wide range of projects, from historic renovations to new construction of building engineering systems for government and institutional clients. His technical expertise entails primary and secondary electrical distribution systems.

On the following pages, please find our proposed team members' resumes, demonstrating their experience in the required disciplines to deliver third-party peer review services to the State of West Virginia's State Capitol Campus, Building Four project.

"The value Mueller's team brings to the Agency's Building Four peer review project is our team's experience and knowledge in understanding how to design engineering solutions for historic buildings and how to protect these significant structures while incorporating modern, efficient systems that minimize maintenance and operating costs, while prolonging the life of the building. We will bring this perspective to the peer review services for the Building Four project."


(443) 708-4698
ENOCH PRATT FREE LIBRARY
THE BALTIMORE BASILICA
ARCHDIOCESE OF BALTIMORE
FRANKLIN ST.
W. FRANKLIN ST.
ONE

KEY PERSONNEL

PRINCIPAL-IN-CHARGE
Todd Garing | PE, LEED AP BD+C

CHIEF MECHANICAL ENGINEER
Paul Czajkowski | PE

CHIEF ELECTRICAL ENGINEER
Carl Canatella | PE

TODD GARING, PE, LEED AP BD+C

PRINCIPAL-IN-CHARGE

ROLE ON THIS PROJECT
Principal-in-Charge

YEARS OF EXPERIENCE
27

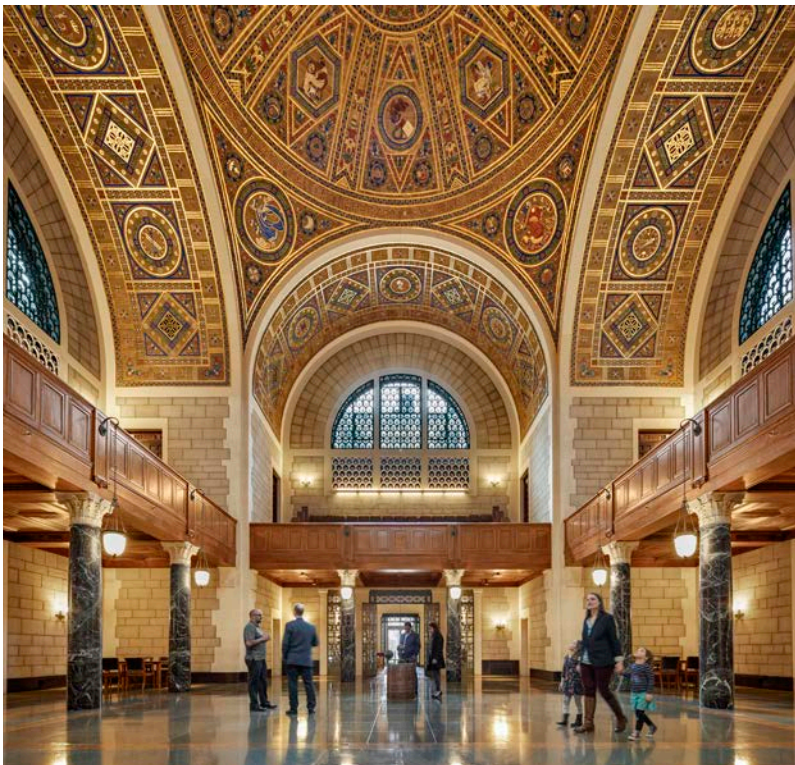
EDUCATION
BAE/ Pennsylvania State University/ 1993/ Architectural Engineering with Mechanical Emphasis

LICENSES/CERTIFICATIONS
Registered Professional Engineer (PE), States of Maryland, Delaware, District of Columbia, Michigan, Ohio, Pennsylvania, Virginia, and West Virginia.
LEED Accredited Professional

Mr. Garing is a mechanical engineer with 27 years of experience in consulting engineering and project management. He has directed the design and peer reviews of HVAC, elevator and lift conveyances, plumbing, piping, and fire protection systems, along with overseeing the building commissioning and cost estimating for many of the firm's government, institutional, and historical projects. In this capacity, he has prepared and reviewed drawings, specifications, and cost estimates for mechanical systems. He is also a seasoned professional recognized for his meticulous project management skills.

In his role as Principal-In-Charge, Mr. Garing will have the prime responsibility for the completion of all contracted services. He will directly supervise Mueller's team to ensure the schedule is maintained; review and act upon staffing and resource requirements; and work closely with our team and the Agency in the investigation and review of the design documents.

Mr. Garing brings to the Building Four project his understanding of the complexity of designing MEP systems in historical building structures and how to incorporate modern, efficient systems. Enoch Pratt Free Library (left); National Academy of Sciences (right)



SAGAMORE DISTILLERY, PEER REVIEW OF HVAC, ELECTRICAL, AND PLUMBING

LOCATION: BALTIMORE, MD
SIZE: 60,000 GSF | **COST:** CONFIDENTIAL
DATE: 2016
ROLE: PRINCIPAL-IN-CHARGE

The project comprised a peer review of the project 100% mechanical, electrical, and plumbing drawings and specifications including commissioning report and processing engineer coordination plan for codes, industry standards, general design practices, and the completeness of documents.

BALTIMORE HORSESHOW CASINO PEER REVIEW OF HVAC AND PLUMBING

LOCATION: BALTIMORE, MD
SIZE: 300,000 GSF | **COST:** $442 MILLION
DATE: 2014
ROLE: PRINCIPAL-IN-CHARGE

The project entailed a peer review of the project's 60% progress mechanical and plumbing drawings for codes, local industry standards, and general design practices. The building consisted of a three-level casino building, including casino space, multipurpose room, restaurants, poker, high limit, food court, and back-of-house support areas containing 310,000 gsf and a two-level central utility services building including HVAC central plant, electrical rooms, back-of-house storage areas comprising 13,500 gsf.

KINGDOWN FELLOWSHIP AME CHURCH PEER REVIEW MEP

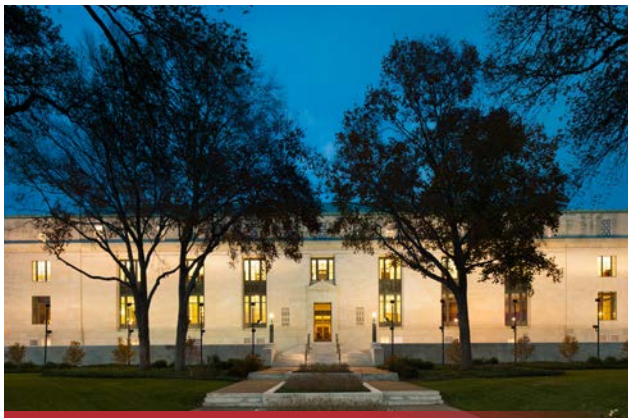
LOCATION: BELTSVILLE, MD
SIZE: 80,000 GSF **|** **COST:** TBD
DATE: 2020
ROLE: PRINCIPAL-IN-CHARGE

The project scope comprises a peer code and constructability review of the project 50% Progress and 100% Final mechanical, electrical, and plumbing drawings for the 80,000 gsf church. We are providing a review of the drawings for local Codes, as well as a constructability review for local industry standards and general design practices.

ENOCH PRATT FREE LIBRARY HISTORIC RENOVATION

LOCATION: BALTIMORE, MD
SIZE: 290,138 GSF **|** **COST:** $115 MILLION
DATE: 2019
ROLE: PRINCIPAL-IN-CHARGE

Renovation of the 290,138 gsf historic Art-Deco Central Building of the Enoch Pratt Free Library. Constructed in 1933, the Central building houses frequently used collections; Administrative Offices, the Board Room, Closed Stacks, Staff Offices, and the Maryland Library Training Center. The renovation modernized the building's infrastructure, upgrading mechanical systems and updating humidity controls, security, and fire protection.



NATIONAL ACADEMY OF SCIENCE HISTORIC RENOVATION

LOCATION: WASHINGTON, DC
SIZE: 190.000 GSF **|** **COST:** $50 MILLION
DATE: 2013
ROLE: PROJECT MANAGER

The project comprised the upgrade and expansion of this neo-classical 190,000 gsf, 1924 historic building, and includes 53 offices that cover more than 64,000 gsf including support space such as restrooms and conference rooms. This headquarters and conference facility is dedicated to the research of science and technology.

“Mueller provided some of the best drawings I’ve ever seen—a renovation of an occupied, historic building is challenging but they had obviously done their homework and were responsive throughout construction.”

JOHN ROTA | SENIOR MEP MANAGER, GILBANE BUILDING COMPANY

ENOCH PRATT FREE LIBRARY (PICTURED ABOVE)

PAUL CZAJKOWSKI, PE

CHIEF MECHANICAL ENGINEER

ROLE ON THIS PROJECT
Chief Mechanical Engineer

YEARS OF EXPERIENCE
40

EDUCATION
BS / University of Maryland/
1986/ Mechanical Engineering

LICENSES/CERTIFICATIONS
Registered Professional Engineer (PE), State of Maryland

Mr. Czajkowski is Mueller's chief mechanical engineer with over 40 years of experience in the industry. He has designed central HVAC, plumbing, and utility distribution systems on large-scale government, civic, institutional, and historic buildings. He has also overseen the design of elevator and lift conveyances, building commissioning, and cost estimating on his projects. He brings broad-ranging expertise and a seasoned perspective to the delivery of complex engineering projects.

In his role, he primarily oversees Mueller's quality assurance, quality control (QA/QC) process, and is in charge of the technical review of mechanical specifications and drawings for code compliance, completeness of documents, adherence to budget, constructability, maintainability, biddability, and energy efficiency. He also provides guidance, design support, and quality control to Mueller's design teams.

Clients often turn to Mr. Czajkowski for his subject matter expertise in the design of central HVAC systems on large-scale government, civic, institutional, and historic buildings. National Museum of Women in the Arts (left); National Academy of Sciences (right).

KINGDOWN FELLOWSHIP AME CHURCH PEER REVIEW MEP

LOCATION: BELTSVILLE, MD
SIZE: 80,000 GSF | **COST:** TBD
DATE: 2020
ROLE: CHIEF MECHANICAL ENGINEER

The project scope comprises a peer code and constructability review of the project 50% Progress and 100% Final mechanical, electrical, and plumbing drawings for the 80,000 gsf church. We are providing a review of the drawings for local Codes, as well as a constructability review for local industry standards and general design practices.

TRINITY WASHINGTON UNIVERSITY QA/QC REVIEW ALUMNAE HALL MODERNIZATION

LOCATION: WASHINGTON, DC
SIZE: 67,000 GSF | **COST:** $50 MILLION
DATE: 2019
ROLE: CHIEF MECHANICAL ENGINEER

Quality Control of the mechanical design to modernize the existing 67,000 gsf, five-story, Alumnae Hall, which was constructed around 1927. The concept design evaluated options for providing code-required mechanical ventilation air throughout the building, adding central air-conditioning, and evaluating alternative approaches for new systems and supporting utilities that best serve the proposed spatial renovations.

ARCHITECT OF THE CAPITOL, QA/QC REVIEW FAIRCHILD BUILDING 1ST FLOOR RENOVATION

LOCATION: WASHINGTON, DC
SIZE: 3,100 GSF | **COST:** $680,000
DATE: 2021
ROLE: CHIEF MECHANICAL ENGINEER

Quality Control of the mechanical design renovations of the Fairchild building for the U.S. Capitol Police (USCP) Badging/ID office and the USCP Background Investigations office. There are nine offices in one suite and three in the other, for a total renovation area of approximately 3,100 gsf. HVAC ductwork and diffusers, lighting fixtures, switches, and receptacles were modified to suit the new layout.

NATIONAL MUSEUM OF WOMEN IN THE ARTS, QA/QC REVIEW PRESERVATION PLAN

LOCATION: WASHINGTON, DC
SIZE: 96,400 GSF | **COST:** $30 MILLION
DATE: 2022
ROLE: CHIEF MECHANICAL ENGINEER

Quality Control for the renovation of the seven-story 96,400 gsf historic museum constructed in 1910. The renovation includes the replacement of all MEP systems and infrastructure. The building will be designed to employ sensible green and sustainable practices in compliance with the Department of Consumer and Regulatory Affairs' (DCRA) Green Building Act, and planned to utilize the compliance path through LEED certification.

NATIONAL ACADEMY OF SCIENCES HISTORIC RENOVATION

LOCATION: WASHINGTON, DC
SIZE: 190.000 GSF | **COST:** $50 MILLION
DATE: 2013
ROLE: CHIEF MECHANICAL ENGINEER

The project comprised the upgrade and expansion of this neo-classical 190,000 gsf, 1924 historic building, and includes 53 offices that cover more than 64,000 gsf including support space such as restrooms and conference rooms. This headquarters and conference facility is dedicated to the research of science and technology.

"We are always pleased with Mueller's work. They are thorough in their review and understanding of existing systems, savvy with technical and design solutions, meet their deadlines, and their follow-through is very strong. All of the attributes came into play in the renovation of the National Academy of Sciences project."

LARRY BARR, AIA | PRESIDENT, QUINN EVANS

CARL CANATELLA, PE

CHIEF ELECTRICAL ENGINEER

ROLE ON THIS PROJECT
Chief Electrical Engineer

YEARS OF EXPERIENCE
47

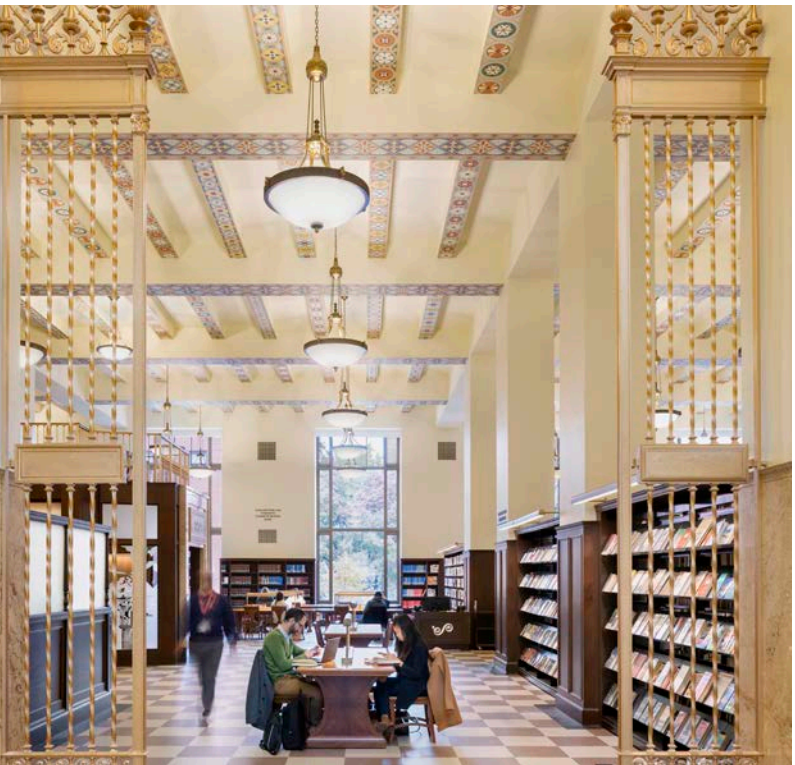
EDUCATION
BSE/ Johns Hopkins University/ 1975/ Electrical Engineering

LICENSES/CERTIFICATIONS
Registered Professional Engineer (PE), States of Maryland, Delaware, District of Columbia, Georgia, Massachusetts, North Carolina, Pennsylvania, and Virginia

Mr. Canatella is Mueller's firm's chief electrical engineer with over 47 years of experience in consulting engineering and 4 years' experience in manufacturing industries. His diverse knowledge includes quality assurance/quality control and peer reviews, investigations, studies, master planning, value engineering, design, cost estimates, plans and specifications for renovation and new construction of building engineering systems for government, institutional and historic projects. His extensive technical expertise includes primary and secondary electrical distribution, including aerial and underground, interior/exterior, and site lighting, security, fire alarm and life safety systems.

Mr. Canatella will be responsible for performing investigations, peer reviews, and quality assurance/quality control of electrical drawings and specifications associated with the HVAC systems, for code compliance, completeness of documents, adherence to budget, constructability, and maintainability.

Mr. Canatella oversees reviewing electrical drawings and specifications for a wide range of projects, from historic renovations to new construction of building engineering systems for government and institutional clients. Enoch Pratt Free Library (left); The Phillips Collection (right).



SAGAMORE DISTILLERY, PEER REVIEW OF HVAC, ELECTRICAL, AND PLUMBING

LOCATION: BALTIMORE, MD
SIZE: 60,000 GSF **|** **COST:** CONFIDENTIAL
DATE: 2016
ROLE: CHIEF ELECTRICAL ENGINEER

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KINGDOWN FELLOWSHIP AME CHURCH PEER REVIEW MEP

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SIZE: 80,000 GSF **|** **COST:** TBD
DATE: 2020
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LOCATION: WASHINGTON, DC
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DATE: 2013
ROLE: CHIEF ELECTRICAL ENGINEER

The project comprised the upgrade and expansion of this neo-classical 190,000 gsf, 1924 historic building, and includes 53 offices that cover more than 64,000 gsf including support space such as restrooms and conference rooms. This headquarters and conference facility is dedicated to the research of science and technology.

ENOCH PRATT FREE LIBRARY HISTORIC RENOVATION

LOCATION: BALTIMORE, MD
SIZE: 290,138 GSF | **COST:** $115 MILLION
DATE: 2019
ROLE: CHIEF ELECTRICAL ENGINEER

Renovation of the 290,138 gsf historic Art-Deco Central Building of the Enoch Pratt Free Library. Constructed in 1933, the Central building houses frequently used collections; Administrative Offices, the Board Room, Closed Stacks, Staff Offices, and the Maryland Library Training Center. The renovation modernized the building's infrastructure, upgrading mechanical systems and updating humidity controls, security, and fire protection.

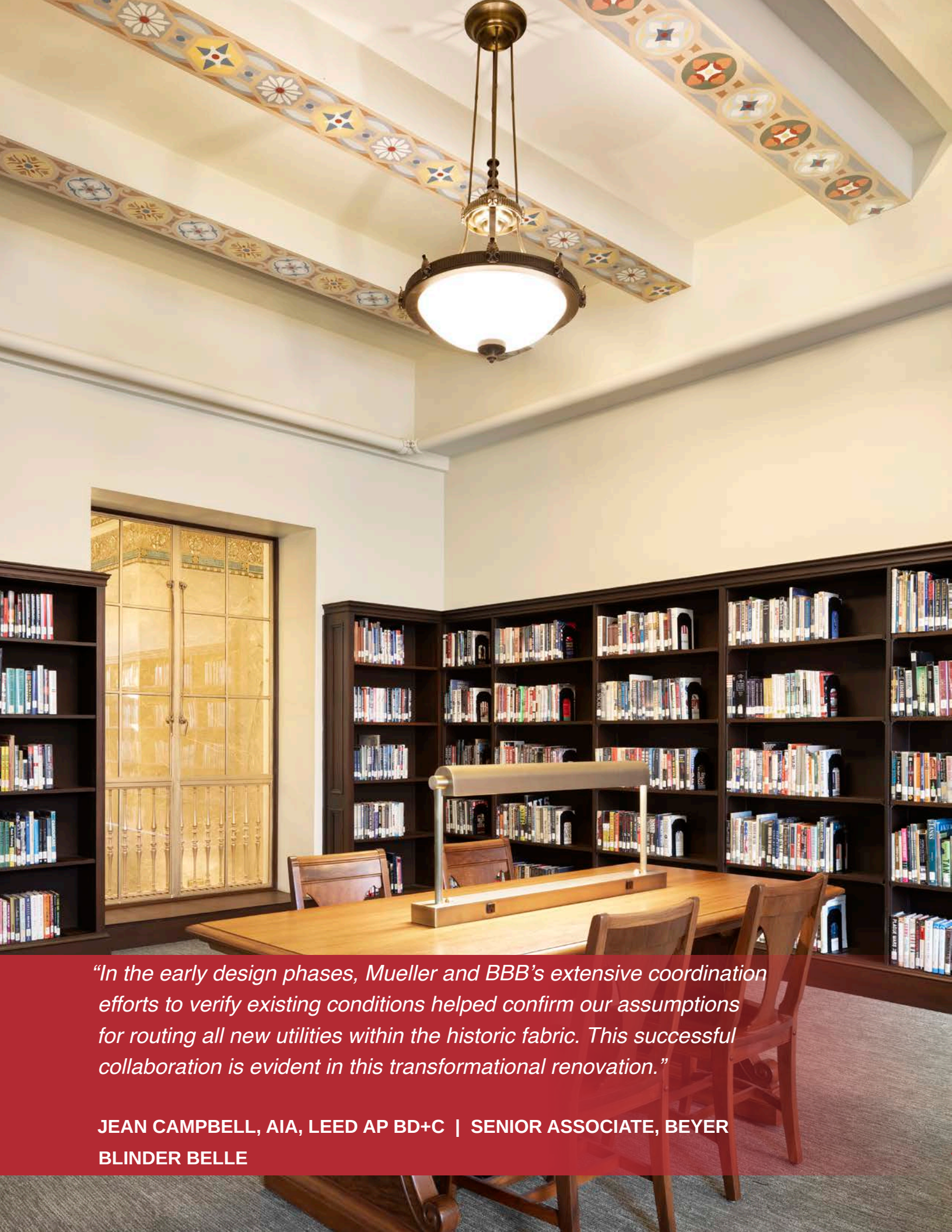
PHILLIPS COLLECTION HVAC SYSTEM UPGRADE QA/QC REVIEW

LOCATION: WASHINGTON, DC
SIZE: 60,000 | **COST:** $6.5 MILLION
DATE: 2018
ROLE: CHIEF ELECTRICAL ENGINEER

Quality Control of the electrical design for the HVAC upgrade of the four-story, elegant 1897 Georgian Revival House. Work included replacing the air-cooled chiller, heating hot water boilers, steam humidification boiler, AHUs, EFs, FCUs, Fire Alarm, and other components.

“These upgrades to the essential control systems governing the temperature and humidity within the museum will ensure the protection of our collection and the enjoyment of our visitors for years to come.”

DOROTHY KOSINSKI | DIRECTOR, THE PHILLIPS COLLECTION



"In the early design phases, Mueller and BBB's extensive coordination efforts to verify existing conditions helped confirm our assumptions for routing all new utilities within the historic fabric. This successful collaboration is evident in this transformational renovation."

JEAN CAMPBELL, AIA, LEED AP BD+C | SENIOR ASSOCIATE, BEYER BLINDER BELLE

THIRD-PARTY PEER REVIEWS

THIRD-PARTY PEER REVIEW EXPERIENCE

During our 50-plus years of experience in mechanical, electrical, and plumbing engineering, we have created and utilized a stringent quality control process for all of our projects. Recognized by our clients for our due diligence, attention to detail, and production and specification quality has led Mueller to conduct third-party peer reviews on behalf of our clients.

Our third-party review experience has ranged from corporate and civic institutions to higher education and worship spaces. Our breadth of expertise demonstrates the level of trust clients have in the performance of Mueller's engineers. For each project, we work with the owner and client to determine the level of our peer review services and the scope of our deliverables, which range from edits and comments on drawing sets to detailed memos touching on each aspect of the review. All of our reviews encompass code compliance, adherence to budget, completion of documents, energy efficiency, and maintenance accessibility.

A list of Mueller's third-party peer review projects is provided below. More detailed information on a selection of these projects is offered in our proposal.

- Peer Review of HVAC, Electrical and Plumbing Drawings, Sagamore Distillery, Baltimore, MD
- Peer Review of HVAC System Assessment Report, The Phillips Collection, Washington, DC
- Peer Review of HVAC and Plumbing Drawings, Horseshoe Casino, Baltimore MD
- Peer Review, Chilled Water Plant Optimization, Central Plant, Georgetown University, Washington, DC
- Peer Review, Evaluation of HVAC System, Yates Field House Natatorium, Georgetown University, Washington, DC
- Peer Review, Mechanical, Electrical, and Plumbing, Kingdom Fellowship, AME Church in Beltsville, MD


THE ESTIENNES

PROJECT SAMPLES

SAGAMORE SPIRIT DISTILLERY
PEER REVIEW OF HVAC, ELECTRICAL AND PLUMBING
Baltimore, MD

THE PHILLIPS COLLECTION
HVAC SYSTEMS ASSESSMENT PEER REVIEW
Washington, DC

BALTIMORE HORSESHOE CASINO PEER REVIEW OF HVAC AND PLUMBING DRAWINGS
Baltimore, MD

GEORGETOWN UNIVERSITY
YATES FIELD HOUSE NATATORIUM HVAC PEER REVIEW
Washington, DC

KINGDOM FELLOWSHIP – AME CHURCH
MECHANICAL, ELECTRICAL, AND PLUMBING PEER REVIEW
Beltsville, MD

ENOCH PRATT FREE LIBRARY HISTORIC RENOVATION
Baltimore, MD

NATIONAL ACADEMY OF SCIENCES HISTORIC RENOVATION
Washington, DC

SMITHSONIAN INSTITUTION NATIONAL POSTAL MUSEUM HISTORIC RENOVATION
Washington, DC

FOLGER SHAKESPEARE LIBRARY HVAC SYSTEMS IMPROVEMENTS
Washington, DC

SAGAMORE SPIRIT DISTILLERY

PEER REVIEW OF HVAC, ELECTRICAL AND PLUMBING

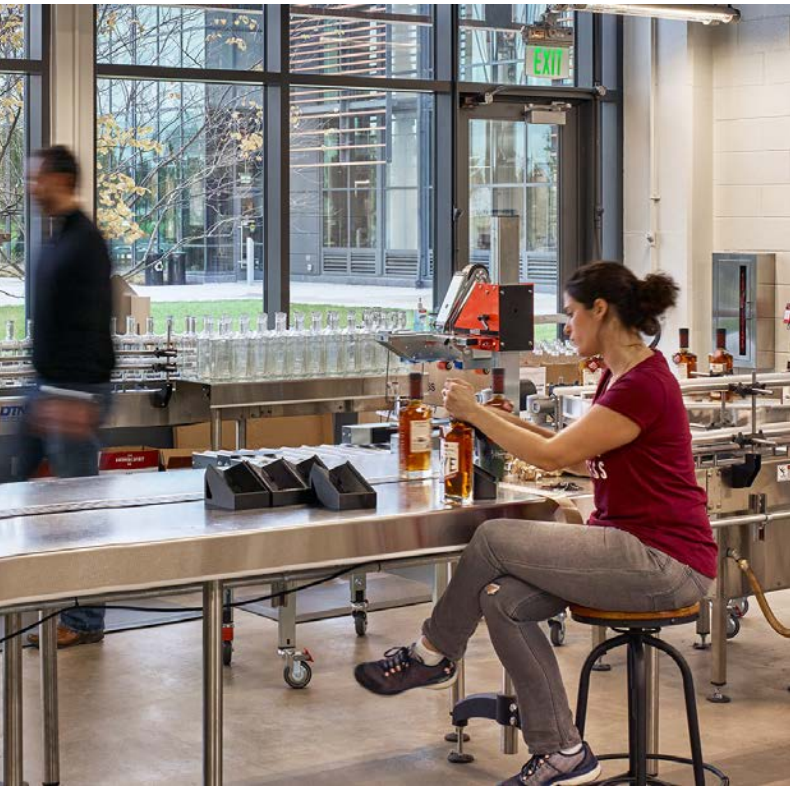
LOCATION
Baltimore, MD

GROSS SQUARE FOOTAGE
60,000 GSF

CONSTRUCTION COST
Confidential

COMPLETION DATE
2016

SERVICES PROVIDED
HVAC, Electrical, Plumbing, and Commissioning Peer Review



Hired by the project's architect, Ayers Saint Gross (ASG), Mueller was tasked to conduct a peer review of design and construction documents for this new production facility, located in downtown Baltimore.

Having worked with ASG as their leading engineering firm on many projects, ASG's team was confident of Mueller's technical qualifications, expertise, and skills to closely review and provide feedback on the project's HVAC, electrical, and plumbing drawings and specifications.

Mueller's engineers reviewed drawings and specifications to ensure compliance with codes, industry standards, and general design practices. We also evaluated and commented on the project's commissioning report and processing engineering coordination plan. After our review, we produced red lines on each drawing set, along with a summary of our findings in a detailed memo to the architect. A summary of our review comments is provided below.

- Our HVAC peer review touched on around 25 different areas of concern, from the correct use of symbols, ventilation, and building loads, to the building's elevators, DOAS units, and cooling tower design.
- Our electrical peer review noted the "drawings revealed the lack of quality review which can lead to many RFIs and change orders during construction." Concerns noted included the correct coordination and identification of symbols, light fixtures missing designations and circuits, to drawing detailed designations missing from the plan and electrical equipment shown with no circuits.

- Our plumbing system review noted that it “appears no quality control was performed,” and “some inaccurate/incomplete details [were] provided.” We further noted, “Poor coordination between plumbing piping plans, their associated riser diagrams, fixture and equipment schedules.”

After submitting our initial comments to the architect, the project’s engineer proceeded with addressing Mueller’s recommendations. However, the architect retained Mueller to conduct a “follow up review” of the engineer’s revised drawings. A copy of our peer review comments are provided in our proposal.

Sagamore Spirit Distillery combines a sophisticated whiskey production facility, including the world’s only handmade 40-foot, mirrored finished copper column still, with an interactive visitor experience on a five-acre waterfront campus in Baltimore.

The campus is comprised of three buildings: a distillery building dedicated to the making of the whiskey; a processing building with areas for bottling, barreling, tasting, and retail; and a waterfront restaurant building with a whiskey bar overlooking the distillery.

The on-campus water tower holds spring water transported from nearby Sagamore Farm.

The three buildings boast floor-to-ceiling glass windows to allow visitors to see the whiskey production and display the outdoor courtyards and waterfront.

THE PHILLIPS COLLECTION

HVAC SYSTEMS ASSESSMENT PEER REVIEW

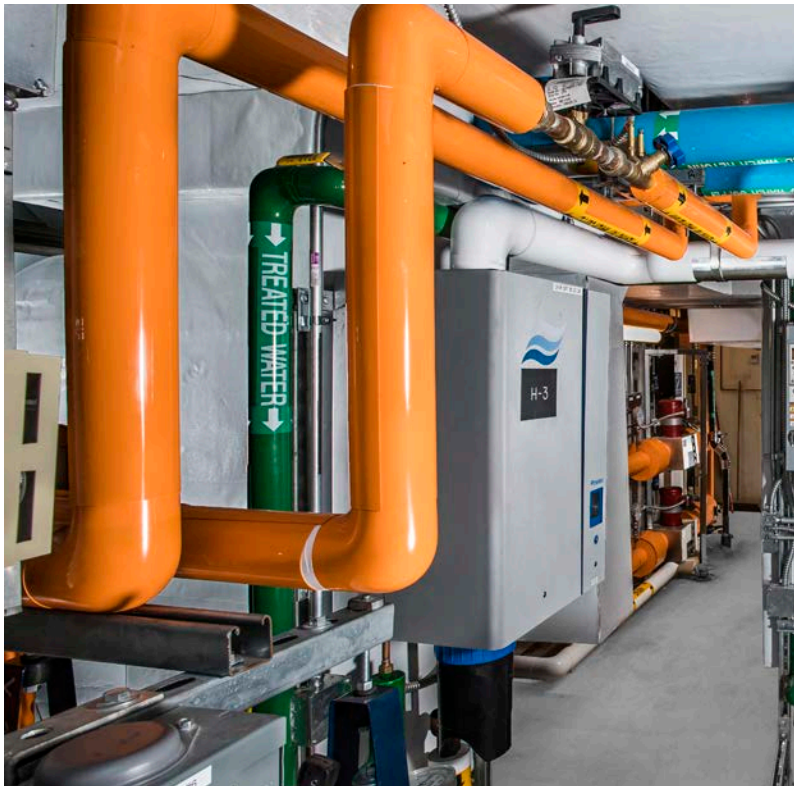
LOCATION
Washington, DC

GROSS SQUARE FOOTAGE
60,000

CONSTRUCTION COST
$6.5 Million

COMPLETION DATE
2018

SERVICES PROVIDED
HVAC Peer Review; Mechanical, Electrical, Plumbing, and Fire Protection Engineering

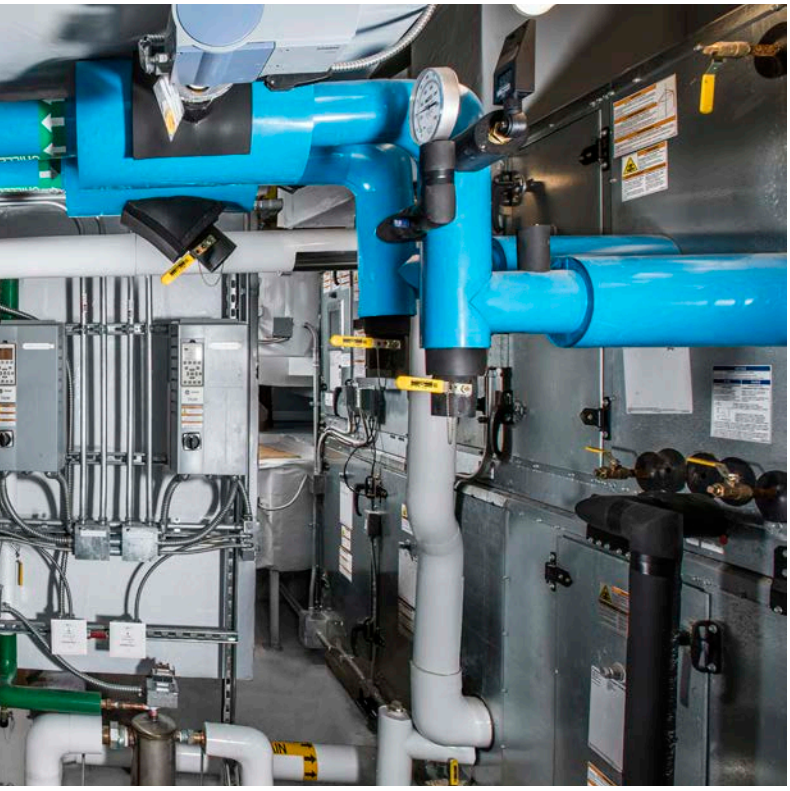


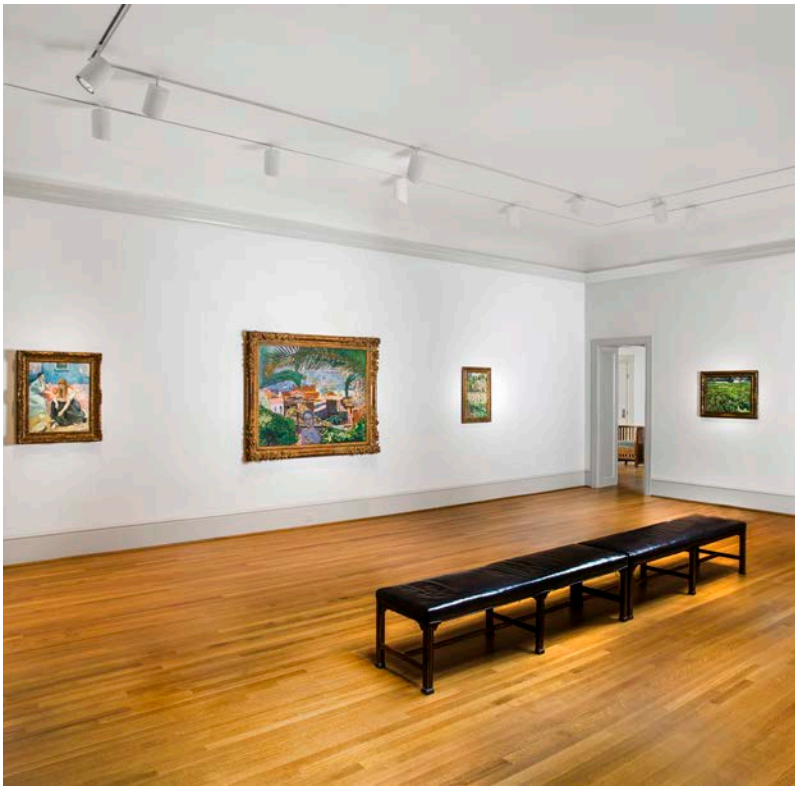
Known as “America’s First Museum of Modern Art,” the Phillips Collection, located near Dupont Circle in downtown Washington, DC, intended to undergo an extensive modernization to improve the thermal performance in the museum’s original 1897 building.

Contracted by the lead architect, Bowie Gridley Architects, in 2014, Mueller conducted an exhaustive site visit and walk through of the building’s existing HVAC systems, documenting, noting, and assessing conditions of the equipment. Also, the architect requested Mueller’s engineers complete a peer review and analysis of the “HVAC System Assessment Study,” which had been prepared by a different architecture and engineering team. Our team also met with the lead director and facilities team members at the Phillips Collection.

Within a month of conducting our walk through and the analysis of the assessment study, Mueller prepared a detailed memo, communicating the findings of our peer-review evaluation, which, in part, entailed the following:

- Confirmation of the engineering design solutions presented in the study.
- Recommendation of providing new mechanical equipment in the penthouse which “would extend the anticipated service life of HVAC equipment.”
- Preparation of the removal of occupants and artwork during the construction period due to the magnitude of the scope and aggressive construction schedule.
- Replacement of the chilled water plant as “bid alternate work,” to help maintain the costs of the project’s budget.
- Confirmation of replacement of the cast iron boiler with two high-efficiency boilers and recommendation of a new boiler flue that would be needed and appropriate costs incorporated.





In our peer review, Mueller's engineers also outlined a detailed approach for handling the museum's new air handling units. We offered options and suggestions as alternatives to those design solutions outlined in the study.

When evaluating the cost estimate for the project, Mueller's team generally concurred with the study's projected budget for HVAC; however, we proposed several items for consideration, based on our design recommendations, to ensure the owner received quantifiable pricing.

After completing and submitting our peer review to the architect, Mueller was then hired to serve as the lead mechanical, electrical, plumbing, and fire protection engineer on this renovation project. The renovation replaced dated building systems with energy-efficient new systems. Mueller's engineering solutions included the following highlights:

- 100-percent outside air handling system with an exhaust air energy recovery wheel serving multiple variable-volume air handling units that provided conditioned air to new direct digital-controlled, zone-level, air terminal units
- New, architecturally screened, high-efficiency chiller fitted with sound-attenuating components, as well as a pair of high-efficiency condensing hot water boilers with heating water pumps.
- The new building automation system, as well as upgrades to the existing fire suppression, fire alarm, electrical power, lighting, and plumbing systems.

The project was officially completed in June 2018.

FROM *PAPYRUS*, THE OFFICIAL MAGAZINE OF THE INTERNATIONAL ASSOCIATION OF MUSEUM FACILITY ADMINISTRATORS (IAMFA) ON MUELLER'S WORK AT THE PHILLIPS COLLECTION.

Protecting The Phillips Collection

Thermal Upgrade Enhances Historical D.C. Building

By Steven Gillis

A comprehensive upgrade to The Phillips Collection's historical house gallery in Washington, D.C., has provided the museum with a state-of-the-art digitized temperature and humidity control system designed to enhance visitor comfort and protect the art collection for future generations. The project was completed in June 2018, well in advance of The Phillips Collection's centennial in 2021. Although galleries within the house were closed, the museum remained open during the renovation, providing access to collections as well as to a full complement of programs.

A Distinctive Setting

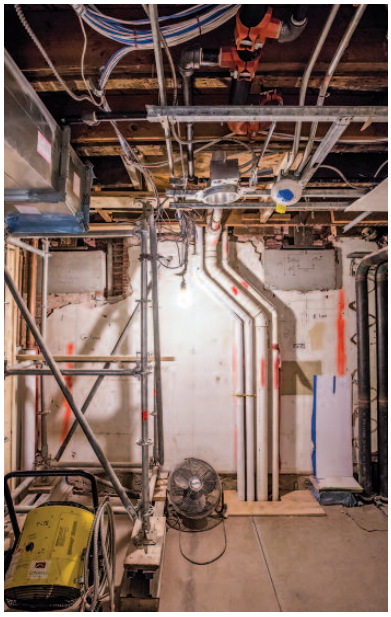
The Phillips Collection, known as "America's First Museum of Modern Art," is located in the Dupont Circle neighborhood of northwest Washington, D.C. The museum houses paintings by Pierre-Auguste Renoir, including the iconic *Luncheon of the Boating Party*, as well as works by Mark Rothko, Paul Cézanne, Pierre Bonnard, Claude Monet, Edgar Degas, Paul Klee, Georgia O'Keeffe, Vincent van Gogh, Richard Diebenkorn, and many other notable Impressionists and contemporary artists.

The Phillips Collection maintains three connected buildings—the Sant Building, the Goh Annex, and the circa-1897 Georgian Revival home of museum founder Duncan Phillips—in addition to a former carriage house now converted into the University of Maryland Center for Art and Knowledge at The Phillips Collection. The renovation project primarily focused on the original, four-story house, which has served as the museum's home since it opened in 1921. Here, dated building systems were replaced with energy-efficient new systems that will improve temperature and humidity control, create zone-based flexibility, and minimize long-term maintenance.

Upgrading Temperature and Humidity Control

Highlights of the renovation included equipping the gallery and related support spaces with modern, energy-efficient HVAC systems, including a 100% outside air-handling system with an exhaust-air energy-recovery wheel. The system serves multiple variable-volume air-handling units that provide conditioned air to new direct digital-controlled, zone-level, air-terminal units. The major HVAC systems and related air-terminal units are located in a new architectural penthouse that removed the original roof structure and associated roof-mounted HVAC systems.

A new, architecturally screened, high-efficiency chiller fitted with sound-attenuating components was also provided. The chiller is sized for the full load of the Phillips house and will serve as a back-up to the chiller plant on the roof of the Goh Annex. A pair of new, high-efficiency, condensing hot-water boilers with heating water pumps are also located in the new penthouse.



DAVID MADISON PHOTOGRAPHY/CONSIGLI CONSTRUCTION

New HVAC systems being installed.

DAVID MADISON PHOTOGRAPHY/CONSIGLI CONSTRUCTION

Upgrade in process at the Phillips house.

The new air-terminal units with hot-water reheat coils provide individual zone control, and were connected to existing duct distribution systems to the fullest practical extent, while new supply grilles and return grilles were added to improve air distribution. The air-handling units serving the gallery spaces are fitted with modulating humidifiers served by a new treated-water system.

A new building automation system has also been provided to serve the Phillips house systems, and has been integrated into the existing system in the Goh Annex and Sant building. Additional upgrades included modifications to the existing fire suppression, fire alarm, electrical power, lighting, and plumbing systems to suit the renovation requirements.

A Team Effort

The mechanical, electrical, and plumbing engineering firm of Mueller Associates supported Bowie Gridley Architects on the project, coordinating closely to ensure that the historical character of the building was not compromised. Existing drawings lacked detail and challenged the design and construction team to route the new systems to suit the existing and variable structural features of the original building. The team's use of Revit® software for the 3-D building model facilitated the design development and coordination of the disciplines as the project progressed.

Bowie Gridley Architects' design of a mansard-style, copper-shingle-clad rooftop penthouse received neighborhood support and the approval of the D.C. Historic Preservation Review Board. The new penthouse encloses the majority of the new mechanical equipment and zone reheat coils and humidifiers, which is a vast improvement over the original system with rooftop air-handling units, exposed ducts above the roof that hindered personnel access, and zone-level reheat coils and humidifiers above the ceilings of the historical building. Improved staff administrative support space was created on the top floor below the new penthouse.

The team also included Consigli Construction, a construction management firm that has renovated many American museums along the East Coast; Simpson Gumpertz & Heger Inc. for structural engineering; and JM Zell Partners as the owner's representative. Understanding the historical character of this project, the team worked very closely to reconcile hidden and unforeseen conditions that were discovered as the solid finishes of this historic structure were unveiled.

"Doing this important work in advance of the museum's centennial lays the groundwork to improve the visitor experience and ensure the preservation of the collection for future generations of art lovers and enthusiasts," said Thomas D. Rutherfoord, Jr., trustee and chair of the buildings and grounds committee for The Phillips Collection.

Steve Gillis, PE is a vice-president with Mueller Associates. He served as project manager for the mechanical, electrical, and plumbing services for the renovation.

DAVID MADISON PHOTOGRAPHY/CONSIGLI CONSTRUCTION

Roof-mounted HVAC systems being installed.

BALTIMORE HORSESHOE CASINO

PEER REVIEW OF HVAC AND PLUMBING DRAWINGS

LOCATION
Baltimore, MD

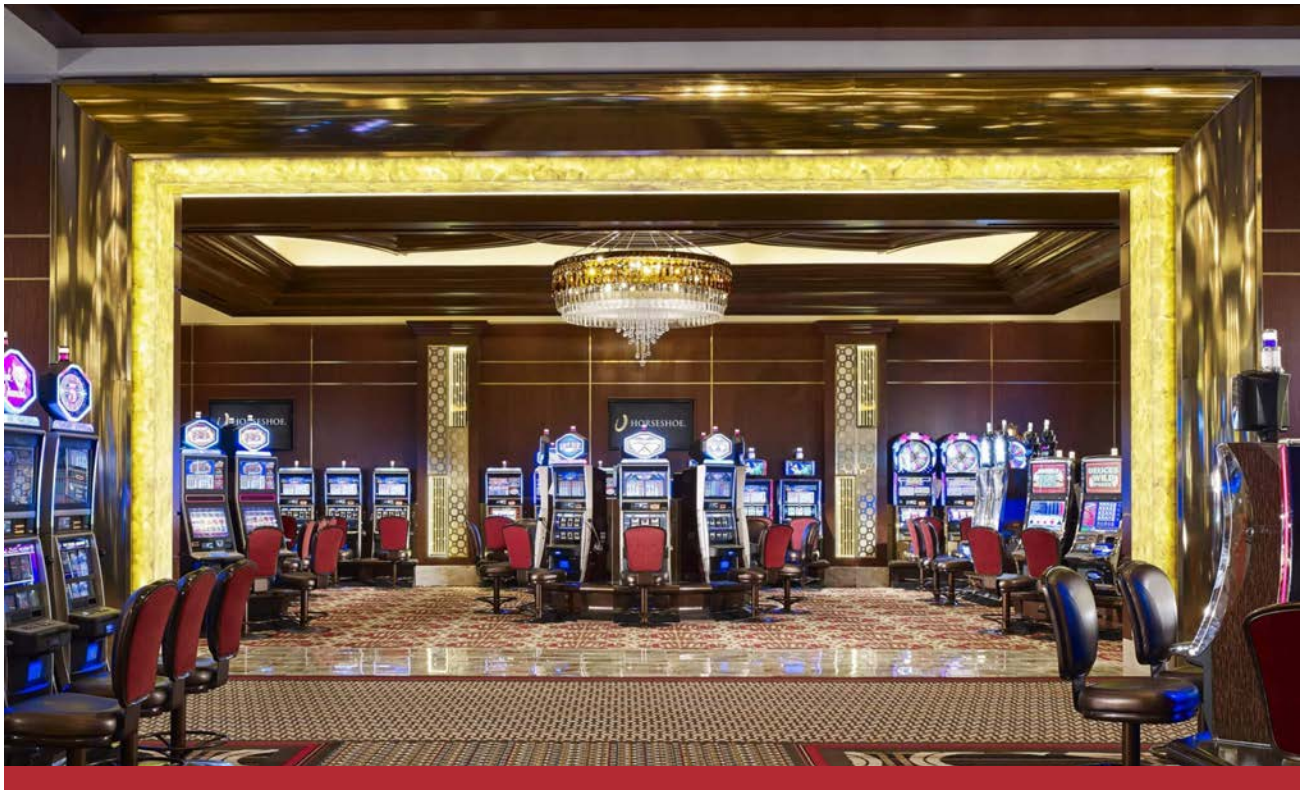
CONSTRUCTION COST
$442 Million

SERVICES PROVIDED
HVAC and Plumbing Peer Review

GROSS SQUARE FOOTAGE
300,000

COMPLETION DATE
2014


forty
YAMAHA



Caesar's Entertainment contracted with JBA Consulting Engineers to serve as its primary engineering firm to design the new Baltimore Horseshoe Casino. The urban casino is located in downtown Baltimore and capitalizes on connectivity with existing, neighboring hospitality, and professional sports venues. Neighboring venues include M&T Stadium, home of the NFL Baltimore Ravens, and Camden Yards, home of the MLB Baltimore Orioles.

JBA subsequently requested Mueller to provide third-party peer review services of the project's 60% HVAC and plumbing drawings. JBA provided Mueller with PDFs of the drawings, which our team reviewed to ensure compliance with codes, industry standards, and general design practices.

The drawings detailed a three-level casino space, along with a multipurpose room, restaurants, poker, high limit, food court, and back-of-house support areas. Mueller's mechanical and plumbing engineers reviewed drawings of the following:

- Level 1 – 125,000 square feet
- Level 2 – 125,000 square feet
- Level 3 – 60,000 square feet

Also, there was a two-level Central Utility Services Building that included the HVAC central plant, electrical rooms, and back-of-house storage areas. Mueller's mechanical and plumbing engineers reviewed drawings of the following:

- Level 1 – 10,000 square feet
- Level 2 – 3,500 square feet

GEORGETOWN UNIVERSITY

YATES FIELD HOUSE NATATORIUM HVAC PEER REVIEW

LOCATION
Washington, DC

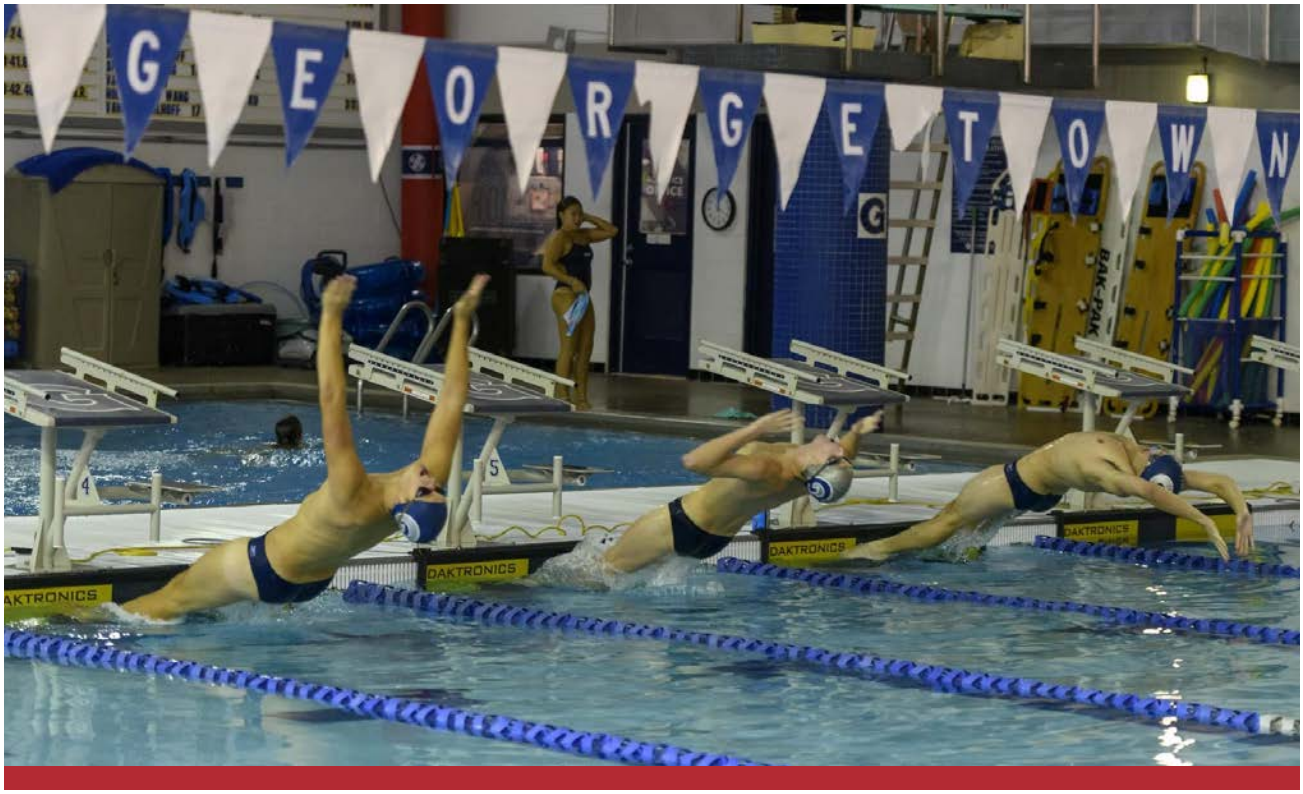
CONSTRUCTION COST
N/A

SERVICES PROVIDED
HVAC Peer Review

GROSS SQUARE FOOTAGE
10,500

COMPLETION DATE
2005


JOHN CARROLL
FOVNDER



Mueller Associates performed a peer-review of the evaluations and recommendations contained in a report to improve the indoor air conditions within the Yates Field House natatorium area. A report provided by JVP Engineers, dated July 1, 2005, provided evaluations and recommendations to improve the indoor air conditions within the natatorium area of Georgetown University's Yates Field House.

Contracted by Georgetown University – a long-term client of Mueller's – we first performed a field survey of the area to observe existing conditions related to the heating, ventilation, and air conditioning systems serving the existing space. We also reviewed a 48-page "Evaluation of HVAC System" report, , and conducted a back check of the calculations and methodology used by the engineer-of-record for developing its recommendations contained in its report.

Mueller's team then prepared a written letter report and memo containing our peer-review comments, along with recommendations and suggestions for the management, administration, and quality control of the project.

The origin of the study and Mueller's third-party peer review began because of discomfort exhibited by users and visitors to the natatorium. In our review of the engineer-of-record report, we noticed several glaring ommissions, including a lack of "focus on means and methods" associated with the root causes of the problems. Mueller's memo outlined a series of recommendations and steps for the owner and engineering firm to take before proceeding with HVAC system improvements. Several areas we focused on included water temperature and indoor air condition temperatures; re-check of load calculations; and size and capacity of the outside air intake and associated ductwork, to name a few.

A copy of Mueller's memo, detailing our summary and peer review of the engineering report, is provided in our proposal.

KINGDOM FELLOWSHIP AME CHURCH

MECHANICAL, ELECTRICAL, AND PLUMBING PEER REVIEW

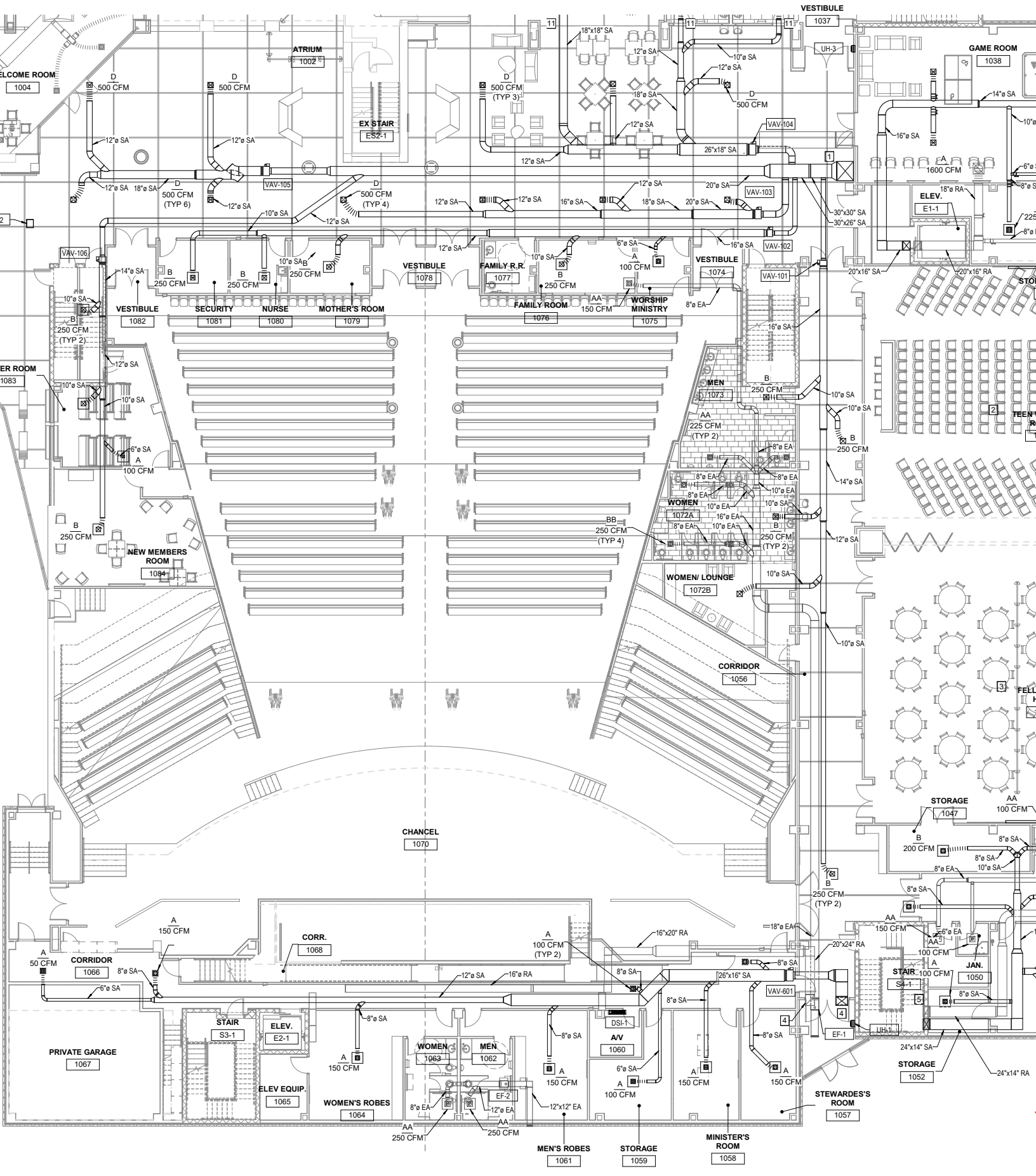
LOCATION
Beltsville, MD

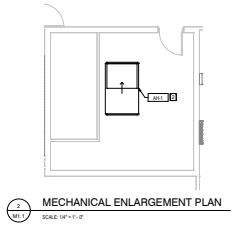
GROSS SQUARE FOOTAGE
80,000

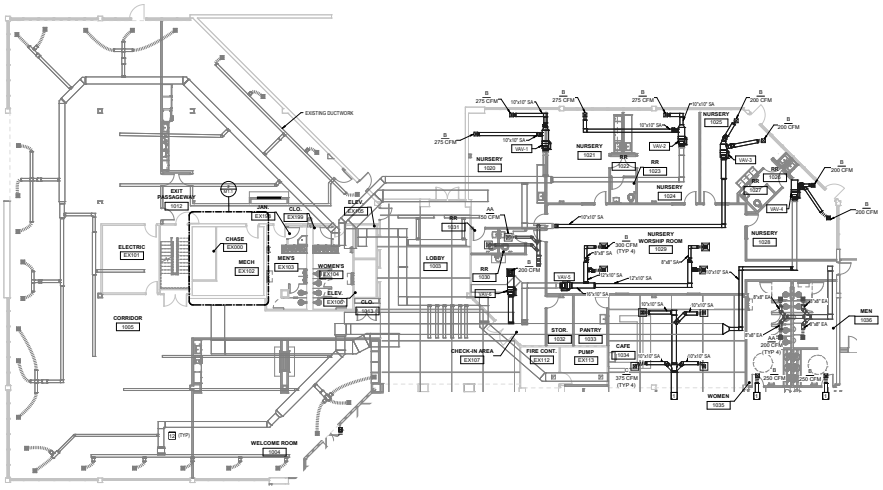
CONSTRUCTION COST
TBD

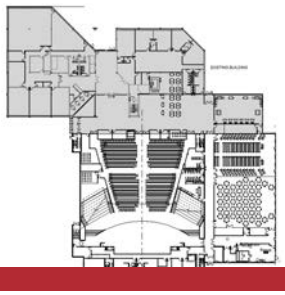
COMPLETION DATE
2020

SERVICES PROVIDED
Mechanical, Electrical, and Plumbing Peer Review


VESTIBULE
1037
GAME ROOM
1038
ATRIUM
1002
EX STAIR
ES2-1
VAV-104
VAV-105
VAV-103
VAV-102
VAV-101
ELEV.
E1-1
VESTIBULE
1078
FAMILY R.R.
1077
FAMILY ROOM
1076
WORSHIP MINISTRY
1075
VESTIBULE
1074
VESTIBULE
1082
SECURITY
1081
NURSE
1080
MOTHER'S ROOM
1079
MEN
1073
WOMEN
1072A
WOMEN/ LOUNGE
1072B
NEW MEMBERS ROOM
1084
CORRIDOR
1056
CHANCEL
1070
STORAGE
1047
CORRIDOR
1066
CORR.
1068
STAIR
S3-1
ELEV.
E2-1
PRIVATE GARAGE
1067
ELEV EQUIP.
1065
WOMEN
1063
MEN
1062
WOMEN'S ROBES
1064
A/V
1060
MEN'S ROBES
1061
STORAGE
1059
MINISTER'S ROOM
1058
STEWARDES'S ROOM
1057
STAIR
S4-1
JAN.
1050
STORAGE
1052
VAV-601
DSI-1
EF-1
EF-2
UH-1
UH-3







Approached by the owner's representative on the project, Marc G. Anderson Company (MGAC), Newman Architects hired Mueller to provide third-party peer review services for the expansion of the Kingdom Fellowship AME Church. The purpose of the review was to ensure a complete and accurate set of MEP drawings for bidding purposes.

Mueller's engineers reviewed the project's 50% and 100% final construction drawings. In doing so, our team reviewed the drawings for conformance with local codes, as well as constructability, maintainability, and operability. We also sought to ensure the drawings were in keeping with local industry standards and general design practices.

Per our agreement with the architect and the owner's representative, Mueller's deliverables included redlines of the drawings, along with the completion of the review log, outlining our team's recommendations. Due to Mueller's work on this project, the owner's representative recommended the hiring of another MEP firm to complete the project, as the original engineer's work did not conform to the project's design principles and goals, as well as demonstrate compliance with building codes and general engineering practices.

A copy of Mueller's redline comments on a set of HVAC drawings, along with an excerpt from our review log, are provided in our proposal.

ENOCH PRATT FREE LIBRARY

HISTORIC RENOVATION

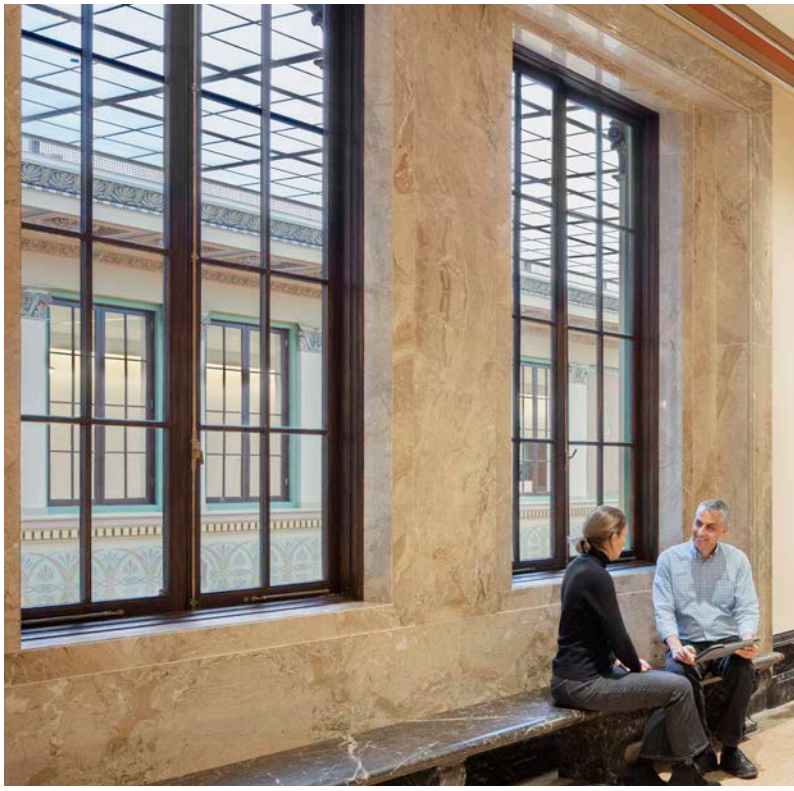
LOCATION
Baltimore, MD

GROSS SQUARE FOOTAGE
300,000

CONSTRUCTION COST
$115 Million

COMPLETION DATE
2019

SERVICES PROVIDED
Mechanical, Electrical, Plumbing, and Fire Protection Engineering



The Enoch Pratt Free Library is the oldest public library system in the country and its flagship Central Library building is one of Baltimore's most cherished and historic landmarks.

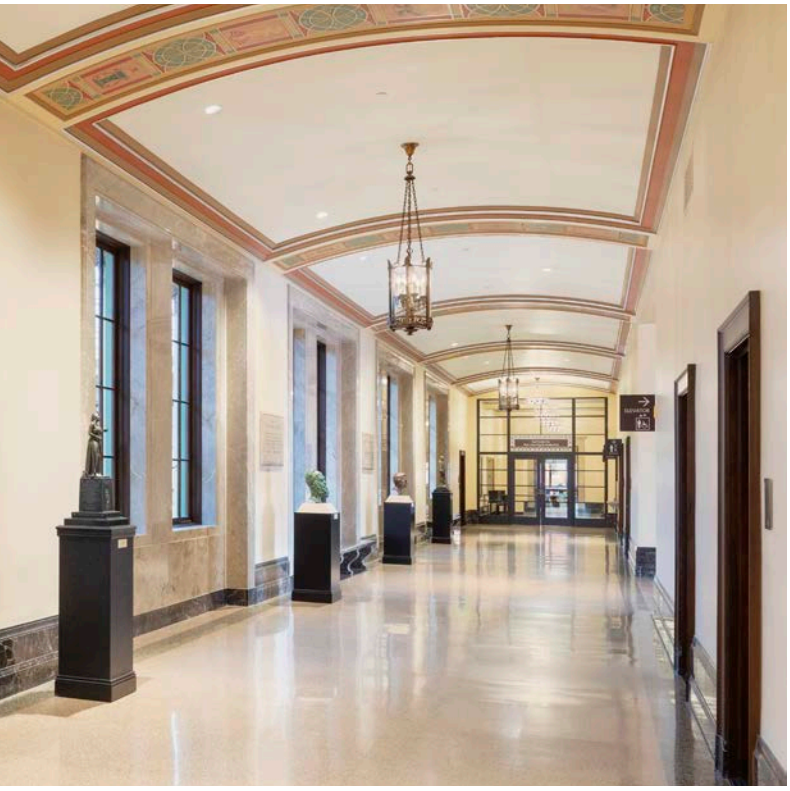
Originally built in 1933, it houses nearly two million books and a special collection of rare books, maps, and other documents dating back to the 17th century.

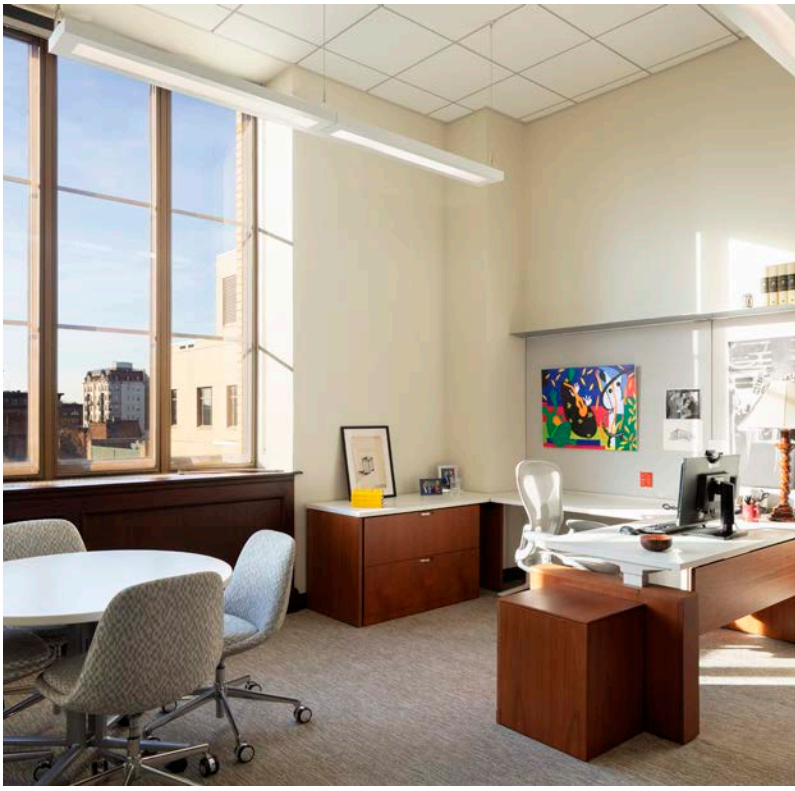
The Art Deco-style building features a majestic central hall, ornate ceilings, murals, large display windows, and other elegant architectural details throughout the nearly 300,000 square-foot building.

Clearly showing its age, both in terms of structure and systems, and in its ability to accommodate the needs of 21st-century library programming, the Pratt embarked on long-planned renovation to modernize its systems, increase energy efficiency, restore the Central Hall, and create new and expanded spaces for its employees and the visiting public.

Throughout the Pratt's multi-phased addition and renovation projects, Mueller Associates was in charge of proposing and designing a combination of mechanical, electrical, and fire protection systems. Mueller's team designed the MEP systems for the new Annex Building, which comprised approximately 50,000 square feet and connected to the historic Central Library. Consisting of four levels, the Annex houses the most technologically advanced and sensitive program areas.The Annex building opened in 2003.

Beginning in 2014, the Pratt initiated the second phase of its historic modernization and renovation plan. Mueller's scope involved the design and engineering of new HVAC, plumbing, electrical, fire protection, security, data, and communications systems. All existing heating, ventilating, and air conditioning equipment was removed and replaced. New custom factory-fabricated air





handling units were provided on the roof. Other equipment was installed in the existing basement and penthouse mechanical rooms.

Among the most challenging aspects of the renovation was the design of all-new heating, ventilating, and air conditioning systems, to improve energy efficiency and create a more comfortable environment for the building's occupants and visitors. Mueller's design approach entailed the fitting of modern HVAC equipment into limited spaces with minimal impact on the historic structure.

New mechanical systems include high-performance variable air volume, demand-controlled ventilation air and waterside energy recovery, dedicated heat recovery chiller, variable volume pumping, low-temperature heating water, and demand-based controls.

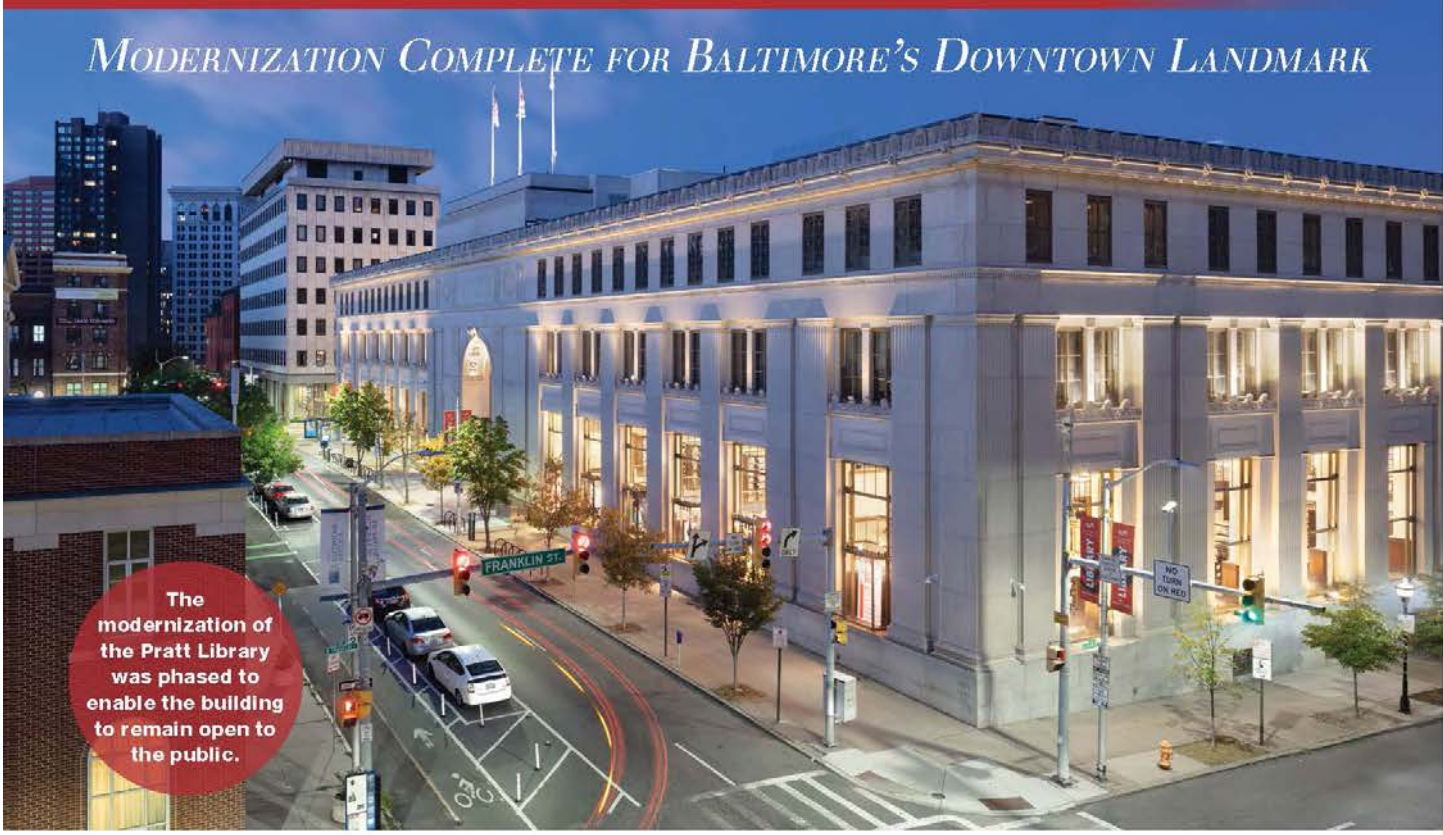
The electrical service for the building was upgraded with new equipment to change the building voltage from 208 to 460. LED lighting was provided where appropriate. Lighting controls include daylight harvesting, dimming, occupancy/vacancy sensors, preset scenes, and time clock for public spaces. Each row of book stacks has individual occupancy sensors.

Extensive coordination between the historic architecture and the mechanical systems was required to maintain aesthetics while providing new HVAC, plumbing, and sprinkler systems. Mueller's team worked closely with the project's preservation team when designing the replacement of MEP and life safety systems and restoring historic lighting and decorative finishes.

FROM MUELLER'S NEWSLETTER, *MOMENTUM*, ON THE RENOVATION OF THE HISTORIC, ART-DECO STYLE ENOCH PRATT FREE LIBRARY.

The Enoch Pratt Free Library Shines Again

Modernization Complete for Baltimore's Downtown Landmark



The modernization of the Pratt Library was phased to enable the building to remain open to the public.

One of downtown Baltimore's most popular landmarks, the Enoch Pratt Free Library has served local residents and scholars since its opening in 1886. After the original structure on the site was razed in 1931, the current Art Deco-style building opened in 1933, offering nearly 300,000 square feet of space on seven levels for books, documents, maps, photographs, and rare collections. The library is the flagship of the city's library system and the designated Maryland State Library Resource Center.

Among the oldest free public libraries in the U.S., the Pratt Library welcomes more than two million visitors a year. In addition to open stack areas and reading rooms, a large portion of the building is dedicated to a central book repository through which librarians access books for users and interlibrary lending. The building has seven elevators as well as eight dumbwaiters that facilitate retrieval of the books.

Modernizing the "People's University"

In the late 1990s, administrators of the Pratt Library determined that the massive building, also known as the "People's University," required a comprehensive modernization to upgrade systems and meet the programming and technological demands of a 21st-century library environment. With budget management and a need to keep the library open to the public among the long-term objectives, the renovation was divided into two major phases. In the first phase, the team of Ayers Saint Gross and Mueller Associates designed a 50,000-square-foot, four-level addition, known as the Annex Building, that connects to the Central Library and accommodates many of the most sensitive program areas, including the African-American Collection, the Maryland Collection, the Mencken Collection, Special Collections, and Rare Books. The Annex Building was built on top of the Library for the Blind and Physically Handicapped, which remained open during construction.

The second phase began in 2014, addressing the Central Library's main building. Working with Beyer Blinder Belle (BBB) as lead architect and Ayers Saint Gross as managing architect, Mueller Associates designed new mechanical, electrical, and fire protection systems for the building. With limited as-built drawings available, Mueller's team created a detailed 3D Revit model using a point cloud laser scan of the building, and verified existing conditions with an extensive field survey. System testing, including orthoscopic wall probes, duct leakage testing, duct interior sampling, and pipe wall thickness testing, determined concealed distribution locations and conditions.

An Intricate Puzzle

Designed to LEED® Silver standards, the renovation presented an intricate puzzle. The project replaced all of the existing HVAC and electrical equipment and also removed obsolete equipment, including chillers and cooling towers, that had been out of service for years but had remained in place until the renovation began. Requirements included the installation of the modern equipment into limited spaces while protecting the building's historic interiors, including decorative plaster,

elaborate millwork, ornate ceilings, and other distinctive finishes. The 1950s-era fluorescent lighting was replaced with restored or replicated historic fixtures using energy-efficient LEDs.

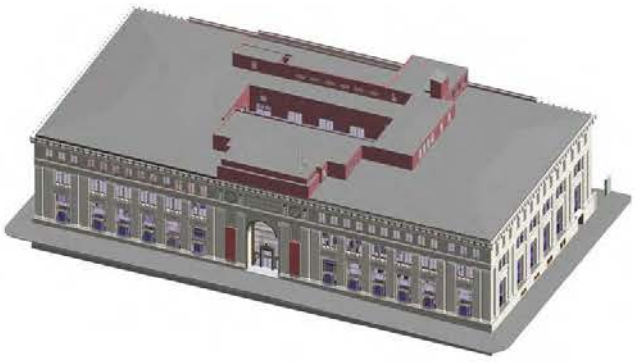
The project included a new building automation system and lighting controls with daylight harvesting and occupancy sensors. The design strategies are estimated to reduce energy use by nearly a third over the building's previous performance.

"It was challenging to install the new equipment, route ductwork and wiring, and integrate fire protection sprinklers within this historic building," says Darren Anderson, PE, LEED AP BD+C, project manager and associate with Mueller. "It's a grand space, but our opportunities to integrate the new systems into existing walls, floors, and ceilings were very limited. The work we put into the initial analysis and 3D model paid off. The installation went in largely as we designed it—the issues we ran into during construction were minimal."

"In the early design phases, Mueller and BBB's extensive coordination efforts to verify existing conditions helped confirm our assumptions for routing all new utilities within the historic fabric," said Jean Campbell, AIA, LEED AP BD+C, a senior associate with Beyer Blinder Belle. "This successful collaboration is evident in this transformational renovation."

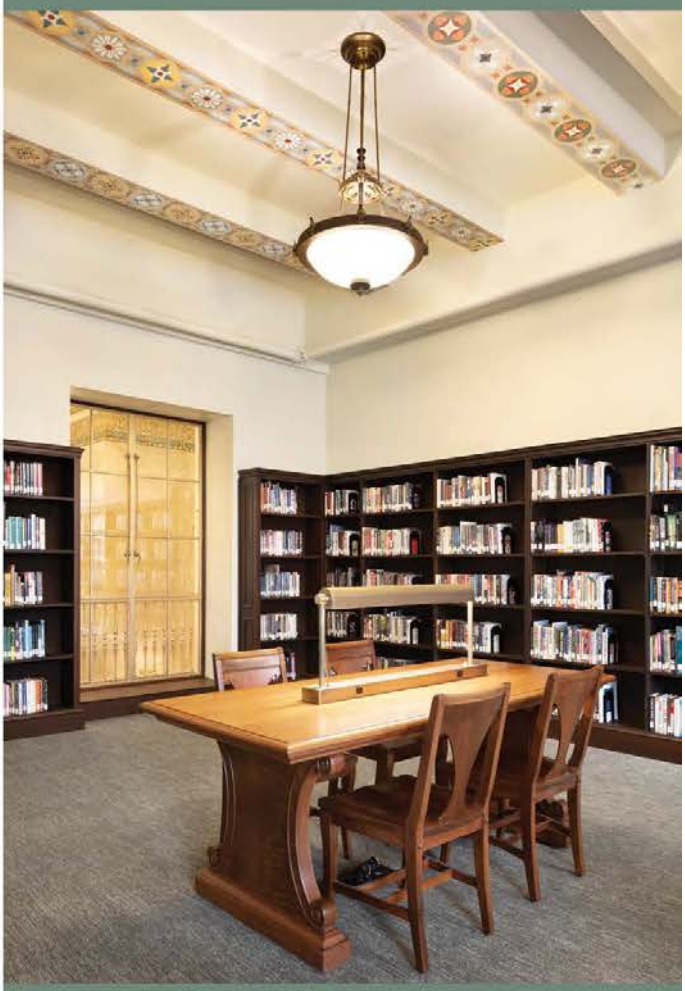
"I walked through the public spaces of the building during the ribbon-cutting celebration. Even with the doors constantly open, the temperature and humidity felt consistently comfortable throughout."

—Darren Anderson, Mueller Project Manager



"Mueller gave us an excellent design for the Pratt. They have a well-rounded team—everyone in mechanical, electrical, and fire protection engineering was very competent. Mueller provided some of the best drawings I've ever seen—a renovation of an occupied, historic building is challenging but they had obviously done their homework and were responsive throughout construction."

John Rota, Senior MEP Manager
Gilbane Building Company



Known as the "people's university," founder Enoch Pratt envisioned a free library where citizens could educate themselves, stating "My library shall be for all, rich and poor without distinction of race or color." The building's grand Central Hall (pictured on front cover) is now a multipurpose event space.

NATIONAL ACADEMY OF SCIENCES

HISTORIC RENOVATION

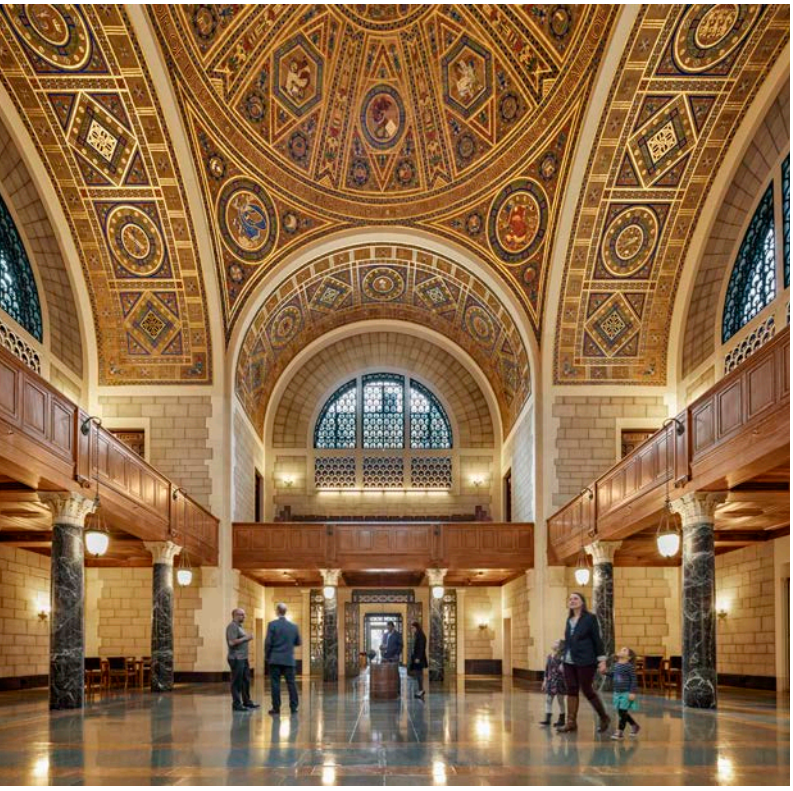
LOCATION
Washington, DC

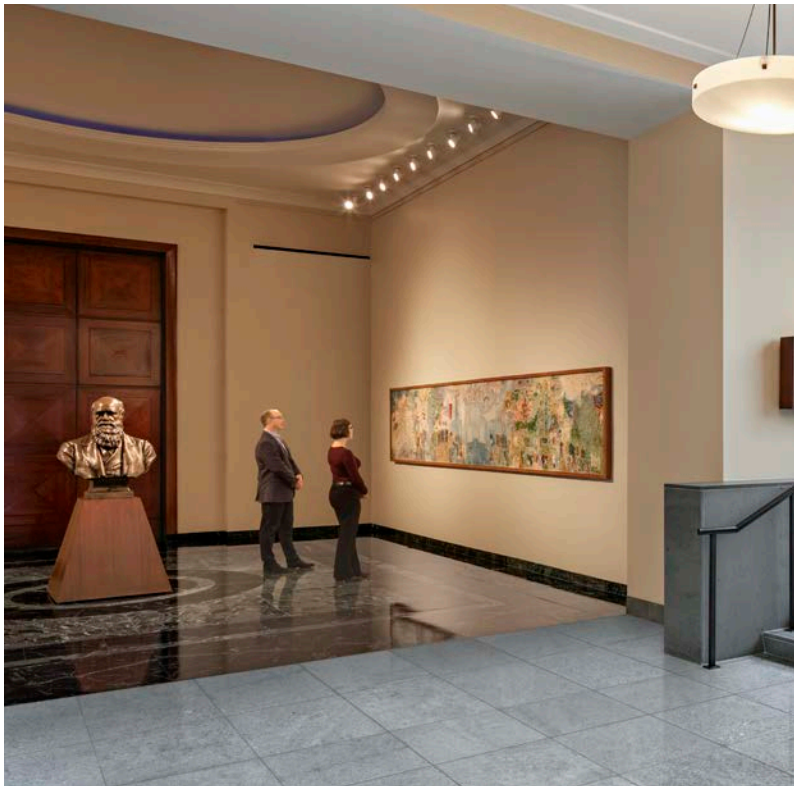
GROSS SQUARE FOOTAGE
190,000

CONSTRUCTION COST
$50 Million

COMPLETION DATE
2013

SERVICES PROVIDED
Mechanical, Electrical, and Plumbing Engineering





The National Academy of Science's monumental historic headquarters occupies a prominent location along the National Mall and is listed in the National Register of Historic Places.

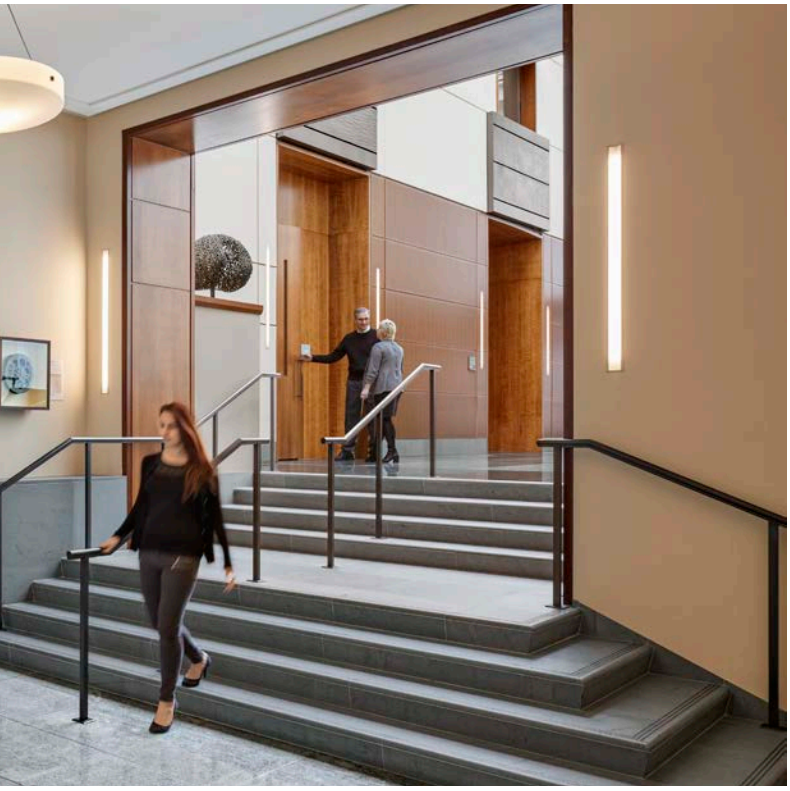
The project comprised the upgrade and expansion of the 190,000 gsf. facility that is the headquarters and conference center for scientific and technology-related research and included the preservation of the building's historic features while adding contemporary amenities.

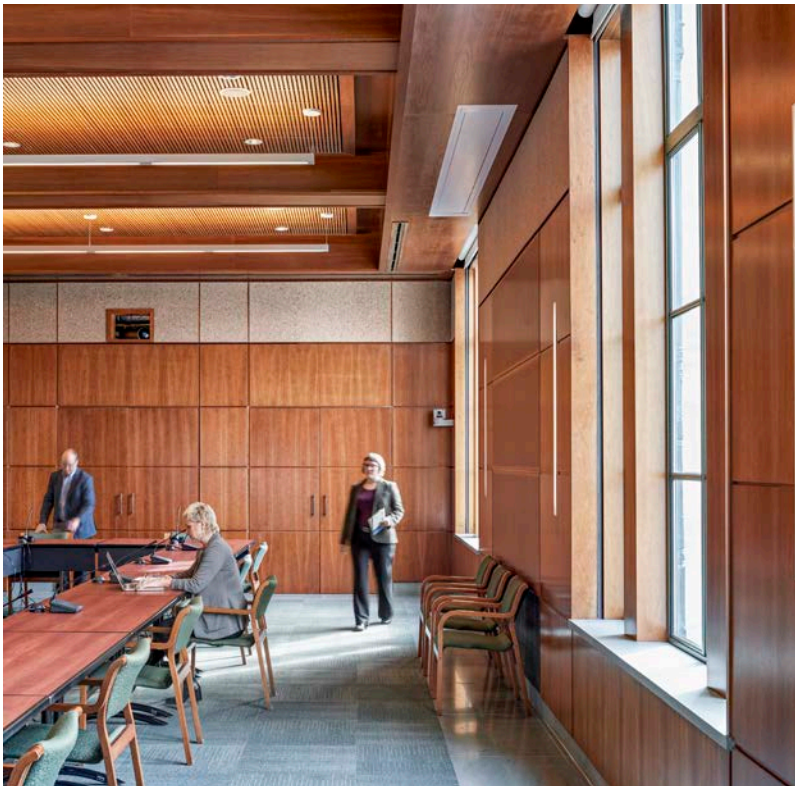
Spaces include 153 offices that cover more than 64,000 aquare feet, meeting rooms, a 500-seat auditorium, workspace for 140 staff, a cafeteria and library. Throughout the year, the building hosts many different events from small meetings to large annual conferences and events.

The building required extensive updating to modernize building systems, accessibility, and functionality. Revit® was a critical tool, enabling Mueller's engineers to route new mechanical/electrical systems throughout the historic structure, including challenging, constricted spaces.

The existing HVAC systems were replaced due to their age, condition, and inadequacy to properly condition (ventilate, heat and cool) the spaces they serve. Chilled water is now utilized for cooling and dehumidification within the building. A new 560-ton high efficiency modular centrifugal water-cooled chiller, four (4) cooling towers, and distribution pumps were provided. GSA steam generates heating water for the facility. Three steam to hot water converters (8,500 MBH total capacity) with distribution pumps were also provided.

Other engineering highlights encompassed extensive new sustainability and energy conservation measures and equipment. Certified LEED Gold, the design implements daylight harvesting, building integrated





photovoltaics (translucent skylights in the atrium that also act as solar panels), solar thermal domestic water heating, demand-controlled ventilation systems for public spaces, low flow plumbing fixtures, dedicated outside air systems for office areas, dedicated heat recovery chiller, individual office temperature control, exhaust air energy recovery, and steam condensate energy recovery.

The building was also expanded to improve circulation, add meeting areas, and improve access for visitors entering the public galleries and auditorium.

The project, which is highly visible along Constitution Avenue, won many awards, including the D.C. Award for Excellence in Historic Preservation.

"We are always pleased with Mueller's work. They are thorough in their review and understanding of existing systems, savvy with technical and design solutions, meet their deadlines, and their follow-through is very strong. All of the attributes came into play in the renovation of the National Academy of Sciences project."

LARRY BARR, AIA | PRESIDENT, QUINN EVANS

SMITHSONIAN INSTITUTION

NATIONAL POSTAL MUSEUM HISTORIC RENOVATION

LOCATION
Washington, DC

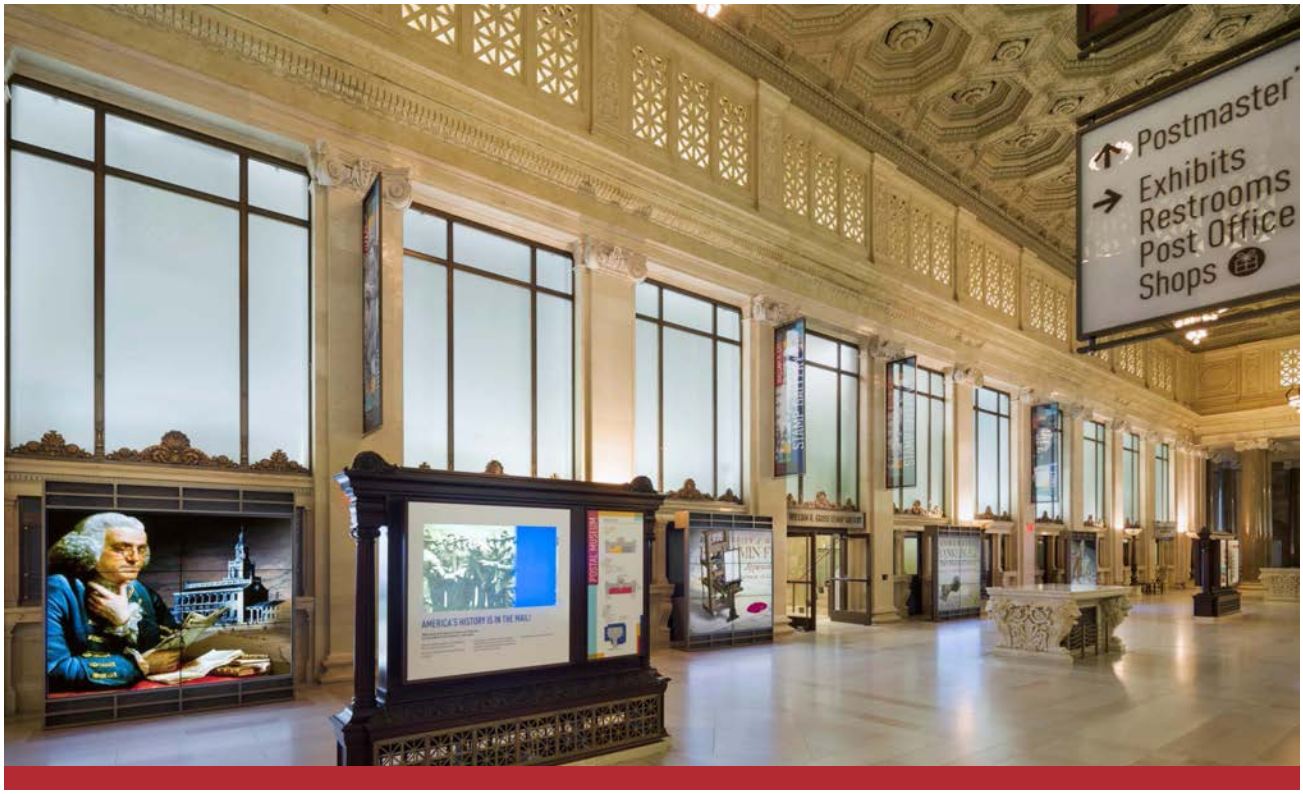
GROSS SQUARE FOOTAGE
13,700

CONSTRUCTION COST
$9.5 Million

COMPLETION DATE
2013

SERVICES PROVIDED
Mechanical, Electrical, and Plumbing Engineering


MACAU, CHINA
CELEBRATE!
USA
PROJECT MERCURY
Fox in Socks
POSTAGE
LIBERTY
USA 20c
al of Honor
USA
29
USA
25
24 CENTS
WORLD OF STAMPS
1840
ONE PENNY
1847
FIRST U.S. STAMPS
The Idea Catches On
Who invented the stamp?
What is a stamp?
What you find may surprise you.



The William H. Gross Stamp Gallery at the National Postal Museum is set in Washington, D.C.'s historic Postal Square building. The renovation and interior fit-out of the circa-1914 space created a 14,000-square-foot exhibition area that chronicles the first 100 years of U.S. postage stamp history. The LEED-Gold project includes public and traveling exhibit space, educational space, and restoration of the historic postmaster suite.

The strategic integration of new high-performance engineering systems and artful enhancement of high-character architectural fabric highlights and protects the world's largest philatelic gallery and the second-most valuable collection of artifacts in the Smithsonian system. The restoration of spaces whose character had been compromised by previous renovations won approvals and applause from the required review agencies.

The design balances the requirements of a "black box" for exhibits - to control light, temperature, humidity, and security for the protection of the artifacts - and the desire to reveal the historic architecture and the original oversized windows. This required meticulous planning and coordination of all new MEP and other engineering systems to spotlight architectural details and enhance the exhibit space.

The stewardship and care of the gallery's historic artifacts and collection was of the utmost importance to the museum's curators. The design team provided protection during construction as well as designed advanced measures for monitoring for future water penetration and leaks.

FOLGER SHAKESPEARE LIBRARY

HVAC SYSTEMS IMPROVEMENTS

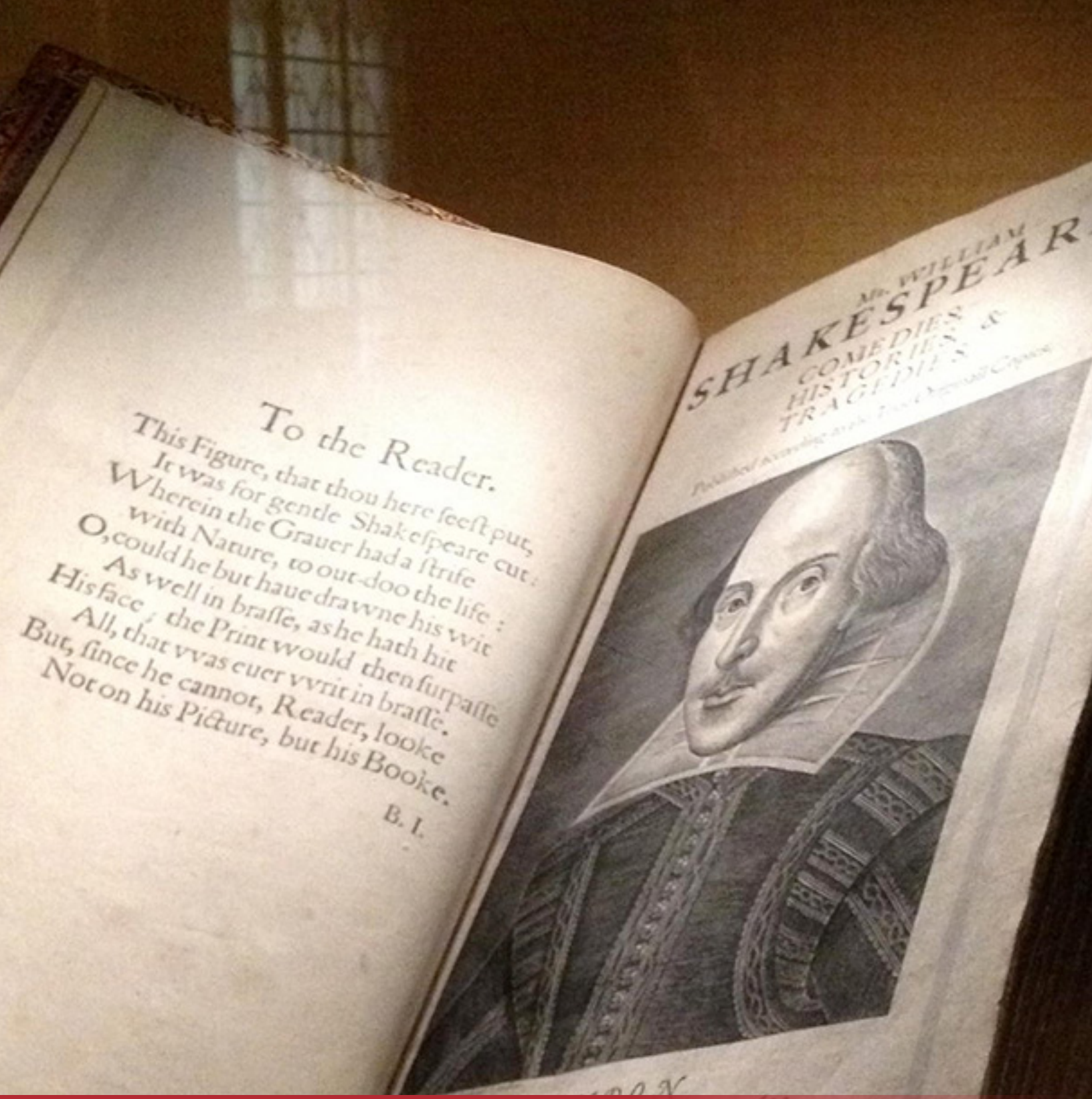
LOCATION
Washington, DC

CONSTRUCTION COST
$1.5 Million

SERVICES PROVIDED
Mechanical Engineering

GROSS SQUARE FOOTAGE
52,270

COMPLETION DATE
2012



"Temperature and humidity control are key to maintaining valuable artifacts. We want to be sure to preserve the collection for future generations."

DAVID CONINE | HEAD OF FACILITIES, THE FOLGER SHAKESPEARE LIBRARY

The Folger Shakespeare Library, which opened in 1932 in on Capitol Hill in Washington, DC, is home to the world's largest collection of Shakespeare's works, including 82 of the "First Folios."

The Library contracted with Mueller to address its challenges with temperature and humidity fluctuations that had been damaging these pieces.

RARE COLLECTIONS STORAGE AREAS & EXHIBITION HALL

Mueller provided modifications to two (2) existing air handling units that serve the New Reading Room and one (1) unit that serves the 3,564 gsf Exhibition Hall to improve temperature and humidity control. Both of these spaces have a dense and highly variable occupancy. Mueller also provided professional engineering services to replace the outdoor air unit and provided a low temperature chilled water system to allow for proper humidity control. The building remained occupied during construction.

REMOVAL OF WATER PIPING FROM DECK B COLLECTIONS

Mueller provided new automatic temperature control zones for the Conference, Offices and Tea Room, new lighting for the Deck B collection spaces, and relocated storm water piping throughout.

REVIT MODELING OF EXISTING CONDITIONS FOR MASTER PLAN

This project comprises the incorporation of the mechanical, electrical, plumbing, and fire protection (MEP/FP) systems into an architectural building information model (BIM). The purpose of this task is to provide the 66,000 gsf Folger Shakespeare Library with a model to use for future master planning.

Preserving the Works of Shakespeare

By Jessica Lavin Reid

What do an IAMFA sponsorship, social media, and Shakespeare have in common? They're all essential to the story of Mueller Associates' current engineering services for the Folger Shakespeare Library in Washington, D.C. This beautiful, historic building is home to the world's largest collection of Shakespeare's works, including 82 of the "First Folios"—the first printing of the English poet and playwright's collected works. These and other centuries-old books, manuscripts, playbills, and paintings draw visitors and scholars from all over the world to this renowned museum, educational center, and performing arts venue.

The Folger Shakespeare Exhibition Hall.

IAMFA Networking

As marketing director for Mueller Associates—a Baltimore-based mechanical/electrical engineering firm that specializes in museums and cultural facilities—I became a member of IAMFA in 2011. Mueller has been an active sponsor and supporter of IAMFA for many years. Once I became involved, I quickly learned that the organization provides an ideal networking environment—both in person and online—to help consultants connect with museum organizations.

Our firm's relationship with the Folger Shakespeare Library is a good case in point. In the summer of 2011, Melody Fetske, the library's director of finance and administration, posted an inquiry on IAMFA's LinkedIn site, one of the organization's social media tools for members. IAMFA's LinkedIn discussion group offers facility managers and other members an opportunity to share questions, concerns, and lessons learned, while also providing referrals and suggestions.

Melody's inquiry focused on engineering consultants that specialize in environments for collections and rare materials. Thanks to the online discussion and related member recommendations, we were able to follow-up and meet with Melody as well as David Conine, the library's head of facilities, to discuss their needs for building system improvements.

Increasing the Preservation Index

"The Folger Shakespeare Library is well known for its important collection of Shakespearean works," says David Conine. "As IAMFA members know and frequently discuss, temperature and humidity control are key to maintaining valuable artifacts. We want to be sure to preserve the collection for future generations."

With support from two grants from the National Endowment for the Humanities, the Folger Shakespeare Library has been able to plan and implement a multi-phase improvement program highlighted by numerous upgrades to its air-handling units. The building, which opened in 1932 on Capitol Hill, has mechanical/electrical systems that date to the 1970s. A 2010 assessment by the Image Permanence Institute (IPI) evaluated the library's lower-level vault environment, where the First Folios and other significant materials are maintained, using the Institute's time-weighted preservation index (TWPI).

"We wanted to monitor the areas where we preserve books, and examine the extremes of summer humidity and the dry air of winter," says Conine. "We used a PEM (Preservation Environment Monitor) Datalogger, which measured the temperature and humidity every five minutes, then created a 30-minute average data point. From there we were able to graph highs, lows, and fluctuations."

IPI's analysis suggested that redesign of the cooling coil in the dedicated ventilation air handling unit serving the vault area, and the addition of a booster chiller, would help maintain more effective temperature and humidity control by depressing the dew point in the vaults, which is vital to increasing the TWPI. Our team at Mueller, under the leadership

of Project Manager Daniel Carmine and Mechanical Project Engineer Paul Czajkowski, then conducted a thorough study that included schematic design for the upgrade, equipment needed, a schedule, and cost estimates for the proposed work.

The team investigated the feasibility of several different options for performing dehumidification and air conditioning (depressing the dew point to 35°F), because this is a very energy-intensive process. Options included a patented liquid desiccant process, a solid desiccant process, and conventional vapor compression mechanical refrigeration (a glycol chiller). Due to numerous site constraints, the only feasible option was the glycol chiller. As a matter of energy conservation, wrap-around heat pipes were also considered, but our team determined they would not be feasible due to space constraints.

"The IPI analysis found that the air-handling unit that provides outdoor air, or ventilation, for the four air-handling units serving the multi-room vault area was not sufficiently dehumidifying that air," says Czajkowski. "Humid summers and dry winters in Washington, D.C. are challenging. During our study, we found that the existing dedicated ventilation air unit was not capable of being retrofited with a re-designed cooling coil for the extreme requirements; and that a new air-handling unit, pumps, piping, and control systems were needed, including an air separator, glycol feed system, and buffer tank. The new air-handling unit will subcool the air to 35°F to get the moisture out using glycol supplied from the new chiller. In addition, the chiller was specified and piped as a heat-recovery chiller, with its water-cooled condenser piping connected into the building heating water system, so it has the potential to be much more sustainable and energy-efficient."

After completing the design of the improvements for the vault area, Mueller began to explore other climate-control issues in the Library's Reading Room and Exhibition Hall. "Again, with these spaces, our focus was on 'depressing the dew point', and removing moisture from the air in the summer and adding moisture in the winter," says Czajkowski. "The overall goal is to increase the preservation index." The work to improve conditions in these large spaces involved modifications to three additional air-handling units.

The Folger Shakespeare Reading Room.

Minimizing Disruption

Throughout the planning process for all of the improvements, Melody Fetske and David Conine emphasized the importance of keeping spaces open and accessible as much as possible, to avoid interrupting the activities of scholars and visitors. Much of the work has been done through construction shifts that began as early as 2 a.m. to allow for normal operations during the day. For the Reading Room, contractors have often worked on weekend shifts, clearing out of the space by 6 a.m. on Monday mornings.

For Paul Czajkowski at Mueller, the compressed schedule is just one of many unique features of the complex work for the Folger Shakespeare Library. "It's a fascinating, historical environment," he says. "The building finishes include many fine woods and millwork, special features like balconies, and intricate spaces that we needed to work around. The engineering challenges we've addressed at the Folger Shakespeare Library required us to draw upon our decades of museum environmental control projects. But I've never worked with such intense requirements—we're taking the air in the vault spaces all the way down to 35 degrees to wring out the moisture before we bring it back up. This has been one of the most exciting projects I've ever worked on during my 33 years with Mueller."

Jessica Lavin Reid is Director of Marketing & Business Development at Mueller Associates, Inc. Consulting Engineers based in Baltimore, Maryland, USA, and can be reached at JReid@MuellerAssoc.com.

THIRD-PARTY PEER REVIEWS

ANTICIPATED CONCEPTS AND METHODS OF APPROACH

Having a third-party review team that specializes in HVAC engineering and the detailed consultation of the mechanical systems in a historic building, such as Building Four, will be a major asset to the project.

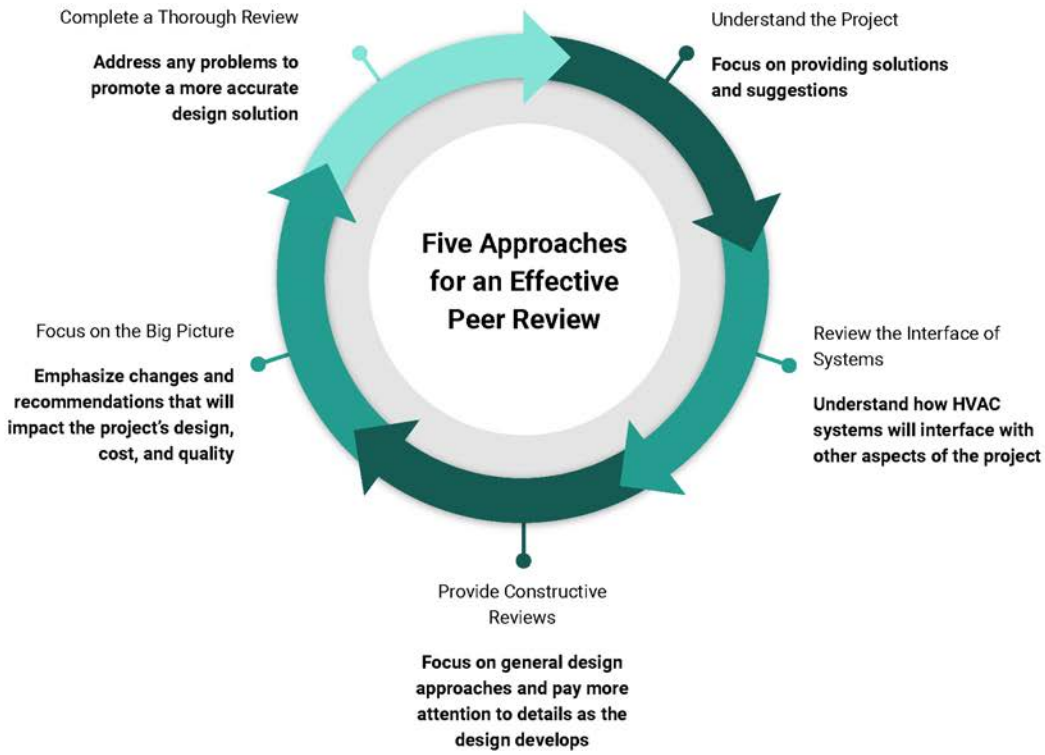
As a professional engineering firm, with more than fifty years of experience, we recognized too often, in the typical design process of a project, many of the crucial details of the design may be left to the very end of the process. Relying on the subcontractor specialists and last-minute reviews of construction document drawings increase overall project costs. Additional design challenges, construction sequencing, constructability, and post-occupancy maintenance create unnecessary deferred expenses.

Mueller's overall approach focuses on our engagement in the earliest stages of design, because the detailing of a project offers the most challenging part of the design and construction process. Understanding most projects necessitate the integration of multiple sub-consultants even into single areas of a project's space results in the need for clarity of the design documents.

For the Agency's Building Four peer review, Mueller's methodology will ensure the project details begin to be addressed as close to the beginning of the design process as possible. We propose this approach because so many design and costing decisions are too often made in the latter stages of design and too close to the development of construction documents. *Mueller's engineers put significant effort into reviewing the details of the design and the cost estimates throughout the early design phases, rather than wait until the completion of construction documents.*

Another area that creates the potential for design and construction issues is that details often end up being "recycled" from other past projects that may not even resemble the customized design required for a historical building, like Building Four. Mueller's expertise in working on similar building types underscores the engineering solutions that are best able to meet the building's needs.

An asset Mueller's third-party peer review services bring to the Building Four project is our five-decades of experience designing and engineering HVAC solutions on similar projects in size, scope, and scale. We recognize the importance of identifying the crucial details in the early part of the design process, and recognize how to review for construction sequencing, constructibility, and post-occupancy maintenance.



As illustrated above, Mueller's approach is based on five key concepts that we have developed through our five decades of experience and best practices from working with our clients.

FIVE APPROACHES FOR AN EFFECTIVE PEER REVIEW FOR BUILDING FOUR

1. **Understand the Project**: Mueller's engineers focus on providing solutions and suggestions, rather than finding and identifying problems. We will take the time to meet with the Agency's representatives and the architecture team after contract award, to review the project's scope, understand its goals and objectives, and establish a collective approach on areas such as communication, documentation, timeline, and deliverable expectations. Each project is unique and different. While we come to the table with our shared experiences, our goal is to immerse ourselves in the Building Four project supporting the Agency and architect.

2. **Review the Interface of Systems**: Simply reviewing a set of HVAC drawings will not uncover potential design or construction challenges to the project. Going from a macro to a micro level, we will want to understand how the proposed HVAC systems will interface with the other aspects of the Building 4 project.

3. **Provide Constructive Reviews**: When performing peer reviews, our engineers remain cognizant that the design documents are most likely not yet complete; for example, we will avoid providing the Agency and architect with an exhaustive list of items that need to be addressed but already know they have not been incorporated into the design. Reviews at the schematic design stage will, for instance, focus on general design approaches. As the design moves through the design development and construction document phases, our approach becomes more attentive to addressing items that have not already been identified, along with identifying obscure, easy-to-miss, details.

THIRD-PARTY PEER REVIEWS

ANTICIPATED CONCEPTS AND METHODS OF APPROACH

4. **Focus on the Big Picture**: Before adding comments on a set of drawings or drawing conclusions, we will take a big-picture perspective to the Agency's project. Throughout our peer reviews and interactions with the Agency and the architect, Mueller's engineers will ask themselves: "How will this impact the cost, time, or quality of the project?" and "Will the project's contractor, or subcontractors, require an answer to this question to perform their work?" If the answer to either of these questions is "Yes," then Mueller's team will submit our comment or concern, within the design documents, a written memo, and communications with the Agency and architect team. Otherwise, if the answer is "No," our engineers know such a comment may be a waste of the design team's time, which can be better spent on the actual design of the project.

5. **Complete a Thorough Review**: Whether the review period may take weeks or months, Mueller's engineers understand that every hour spent planning and reviewing the thoroughness of the project's design, process, and documentation will save additional time in the latter stages of the project. Addressing any problems early in the project will result in fewer change orders and more accurate bid prices from contractors. A thorough review is always complete when comments, concerns, and suggestions are incorporated into the final design documents in time to bid.

BENEFITS OF MUELLER'S PEER REVIEW SERVICES

When adhering to Mueller's approach in conducting peer review services, the benefits include the following:

- Developing a design solution that meets the owner's goals and objectives, serves the needs of the building's occupants, and is maintainable by the facility's management team.

- Reducing change orders issued resulting from re-work (either in design or construction), as our engineers seek to identify potential problems and work with the owner and architect to resolve them before errant work is performed.

- Gaining additional time to review and negotiate change order pricing from general contractors and subcontractors; when any design challenges are brought up during work, time constraints may force the owner to hastily approve these requests, even when they are excessive.

- Avoiding delays caused by problems discovered during construction; the time it takes to examine a problem and devise a solution may be chronically slow, or even halt, progress, ultimately driving up the project's cost.

WRITTEN REPORTS OF THIRD-PARTY PEER REVIEWS

On the following pages, please find written reports from the following projects:

- Peer Review of HVAC, Electrical and Plumbing Drawings, Sagamore Distillery, Baltimore, MD
- Peer Review of HVAC System Assessment Report, The Phillips Collection, Washington, DC
- Peer Review of HVAC and Plumbing Drawings, Horseshoe Casino, Baltimore MD
- Peer Review, Evaluation of HVAC System, Yates Field House Natatorium, Georgetown University, Washington, DC
- Peer Review, Mechanical, Electrical, and Plumbing, Kingdom Fellowship, AME Church in Beltsville, MD

As illustrated, in most instances, Mueller provided written memos outlining our findings, recommendations, comments, and suggestions. We also developed hand-written notes or red-lined the project drawings. Concerning the peer review for the Kingdom Fellowship AME Church, the owner's representative and architect opted to use templates from the International Energy Conservation Code and Fuel Gas Code Plan Review Record.

For the Agency's Building Four project, during the initial kick-off meeting with the owner and architect, Mueller's team will discuss the preferred format for its peer review reports. A standardized presentation of Mueller's review will be utilized for each submission and may entail any of the following:

- Mueller memo outlining general and specific comments and notes
- Red-lined comments and notes on PDFs of drawings, accessible and viewable in Adobe Acrobat or Bluebeam
- Matrix or table listing drawing sheet number along with Mueller's comments and notes, along with recommendations or suggestions
- Backup documentation and supporting information, as relevant

Upon submission of each report, Mueller's peer review team would seek to conduct a meeting with the owner and architect. Our team would initiate, organize, and run the meeting whereby we go through each of our comments, respond to questions, and further discuss other topics about the project's latest design efforts.

Mueller

Memo

To: Joel Fidler

From: Todd Garing

cc: Jeffrey Edwards, Carl Canatella, Michael Monti

Date: February 12, 2016

Project Title: Sagamore Distillery MEP Peer Review

Project No.: 16-102-00

Subject: Summary of Sagamore Distillery MEP Peer Review

Dear Joel,

Attached and below is a summary of the peer review. We will send you scanned copies of our comments. In short, it appears a quality assurance review needs to be performed to make the documents clear, concise, and coordinated. The documents are beyond 50% complete, but are well short of 95% complete in our opinion. The actual completion percentage depends on the answers to some of our questions.

HVAC Summary:

1. Is cooling tower sized for the restaurant? Will the restaurant load be ~100 tons? If full 250 tons required, increase water flow rate to match AVA WSHP GPM/Ton.
2. Coordinate symbols used throughout drawings with legend.
3. Radiant slab layout does not appear to be coordinated with other disciplines. Also, show slab piping on plans.
4. Ventilation:
    a. Ventilation calcs need to account for ventilation effectiveness of the air distribution.
    b. How is make-up air provided for spaces with exhaust fans that do not have make-up air above area louvers? Overall building should be positively pressurized.
    c. When exhaust fans are running, WSHPs will not control space temperature (they are not sized to heat/cool the required make-up air). Depending on when exhaust fans are used, this could be a concern – High temp/humidity in summer and low tem/humidity in winter. If it is cold enough outside, indoor temperatures could get below freezing.
5. Are ductless split systems on standby power? If not, why can't WSHPs be provided instead?
6. Elevators appear to be machine room-less, but there will still be a controller closet that needs conditioning. Locating an AC unit within an elevator hoist way will make it difficult to maintain, and may not even need cooling – coordinate with elevator manufacturer.
7. Building loads are ~400 /ton, which does not appear adequate Review loads.

8. Provide ultra fine sand filter for cooling tower loop.
9. Coordinate temperatures scheduled for boilers with sequences of operation.
10. Need minimum flow provisions for condenser loop.
11. Sequences need to be coordinated with plans and equipment.
12. Why do DOAS units operate 24/7? Is this a 24/7 facility?
13. Cooling tower design should be piped to sanitary.
14. Cooling tower CWS piping elevation between cooling tower and pumps suction must be below the bottom of the cooling tower.
15. Verify split system pipe runs are within manufacturer guidelines.
16. Low ambient operation for cooling mode in VRF systems typically not available.
17. Conference room in distillery could be noisy with the WSHPs installed above.
18. Louvers appear to be undersized. For louvers less than 10,000, look at an actual louver selection to account for border area, etc.
19. Verify locations of risers are in locations acceptable with architect.
20. Verify coordination with architecture and structural.
21. DOAS exhaust is labeled return on some plans and exhaust on others. There are other inconsistencies as well.
22. Indicate piping between split system indoor and outdoor units.

Electrical Summary:

Review of the electrical and fire alarm drawings revealed the lack of quality review which can lead to many RFIs and change orders during construction. The following are some of the items noted:

1. Symbols don't always match the symbols used in plan.
2. Many misspelled words.
3. Many light fixtures on plans with no type designation and no circuit.
4. Drawing notes listed but not found in plan.
5. Drawing detail designations not agreeing with the detail.
6. Disconnect switches shown in plan but not connected to anything.
7. Equipment shown in plan with no circuit.
8. Panelboard schedule does not match electrical riser.
9. Site plan has note saying "HAVE STRUCTURAL SIZE POLE BASE."

The following are Code violations:

1. Site plan shows four 90-degree bends in underground ducts for service to each building. BGE allows no more than three 90-degree bends in service ducts.
2. Kill switches are missing at exits from the Boiler Room.
3. Fire alarm manual pull stations are missing at many exits from buildings.
4. GFCI receptacles are missing from elevator pit and elevator machine room.

Review of electrical Division 26 and fire alarm Section 283111 specifications indicates lack of quality review. The following are some of the items noted:

1. Many of the electrical sections are referenced but not included.

2. Words are run together with no space.
3. Many misspelled words.
4. References to systems, products and equipment not in project.
5. One section not formatted correctly.
6. Spec lists fire code of Baltimore County but project is in Baltimore City.

Plumbing System:

1. Appears no quality control was performed.
2. Some inaccurate/incomplete details provided.
3. Incomplete plans of plumbing piping systems, notes, etc.
4. Poor coordination between plumbing piping plans, their associated riser diagrams, fixture and equipment schedules.
5. Some inconsistencies of presentation between the two buildings.
6. Would estimate drawings are 70-75% complete.

Mueller

1401 S. Edgewood Street
Baltimore, Maryland 21227
410.646.4500 tel
410.646.4738 fax
www.muellerassoc.com

January 29, 2015

Mr. Calvert S. Bowie, AIA, NCARB
Bowie Gridley Architects
1010 Wisconsin Avenue, NW
Washington, DC 20007

Reference: The Phillips Collection, Washington, DC
HVAC System Upgrade

Subject: HVAC System Report Peer Review
Letter-report Summarizing Findings

Dear Cal:

In accordance with our proposal (#14-10-9R1, dated October 21, 2014), Mueller Associates has performed a macro-level peer review/analysis of the HVAC System Assessment Study – Final Report dated July 01, 2014, prepared by Samuel Anderson Architects and McClure Engineering Associates. We also attended a site visit on December 17, 2014, to familiarize ourselves with the building and its existing HVAC systems. During the December 17th visit, we had a meeting with Messrs. Dan Datlow and Huy Huynh of The Phillips Collection, and Mr. Leon Chatelain III, of your office. As proposed, we are providing this letter-report of thoughts and findings from our evaluation.

General Items/Summary:

- We believe that the referenced HVAC Systems Assessment Study is thorough, and that the recommended HVAC concepts are appropriate design solutions.
- Three primary HVAC issues noted in the report are: (1) the existing HVAC systems and equipment are at the end of their anticipated lives; (2) they have been installed in such a way that makes them very difficult to service and maintain; (3) they have not been effective in providing steady, reliable museum grade climate control. Based on our site visit, we concur with these assessments.
- The HVAC Systems Assessment Study indicates the follow goals and guiding principles for the HVAC system design:
  - Maintain steady temperature and humidity in all served spaces
  - Segregate mechanical equipment from other functions (in the basement & in a new penthouse)
  - Provide rational redundancy of systems
  - Pre-treat outdoor ventilation air to provide improved climate control and energy efficiency
  - Improve equipment serviceability
  - Mitigate risk of leaks onto collections and occupied spaces
  - Provide new air distribution strategy for the Music Room – to solve the "hot box" problem there
  - Improve air device layouts in spaces to provide more even air distribution and improved (steadier) conditions

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All of the suggested goals are relevant and important for this facility. We would include an additional goal:

- Utilize robust, institutional grade equipment that will provide a long, reliable service life

- We strongly agree with the recommendation of providing a new mechanical penthouse for the proposed HVAC equipment. The penthouse would extend anticipated service life of HVAC equipment. It also would improve equipment serviceability, and would reduce the amount of mechanical equipment and piping in occupied spaces.

- Design Conditions: The gallery design conditions indicated in the report (70^0F, 50%RH summer 70^0F, 45%RH winter) are appropriate. During our site visit, it was reported that a façade renovation was recently completed and a humidification study was performed. It has reportedly been determined that the building envelope is suitable for maintaining 45%RH winter humidification.

  ASHRAE notes the following classes of control for museums and galleries (Refer to Table 3 from 2011 ASHRAE HVAC Applications, Chapter 23). While the conditions indicated above are appropriate, (and we recommend designing the HVAC systems with capability to achieve these goals), it might be possible to operate the systems for less stringent conditions in order to save energy.

Table 3 Temperature and Relative Humidity Specifications for Collections

Type	Set Point or Annual Average	Maximum Fluctuations and Gradients in Controlled Spaces			Collection Risks and Benefits
		Class of Control	Short Fluctuations plus Space Gradients	Seasonal Adjustments in System Set Point	
General Museums, Art Galleries, Libraries, and Archives	50% rh (or historic annual average for permanent collections)	**AA** Precision control, no seasonal changes, with system failure fallback	±5% rh, ±4°F	Relative humidity no change Up 9°F; down 9°F	No risk of mechanical damage to most artifacts and paintings. Some metals and minerals may degrade if 50% rh exceeds a critical relative humidity. Chemically unstable objects unusable within decades.
All reading and retrieval rooms, rooms for storing chemically stable collections, especially if mechanically medium to high vulnerability.	Temperature set between 59 and 77°F *Note*: Rooms intended for loan exhibitions must handle set point specified in loan agreement, typically 50% rh, 70°F, but sometimes 55% or 60% rh.	**A** Precision control, some gradients or seasonal changes, not both, with system failure fallback	±5% rh, ±4°F	Up 10% rh, down 10% rh Up 9°F; down 18°F	Small risk of mechanical damage to high-vulnerability artifacts; no mechanical risk to most artifacts, paintings, photographs, and books. Chemically unstable objects unusable within decades.
			±10% rh, ±4°F	RH no change Up 9°F; down 18°F	
		B Precision control, some gradients plus winter temperature setback	±10% rh, ±9°F	Up 10%, down 10% rh Up 18°F, but not above 86°F	Moderate risk of mechanical damage to high-vulnerability artifacts; tiny risk to most paintings, most photographs, some artifacts, some books; no risk to many artifacts and most books. Chemically unstable objects unusable within decades, less if routinely at 86°F, but cold winter periods double life.

- Project Schedule & Phasing: The HVAC System Assessment report recommends that all occupants and artwork be relocated during construction period. Due to the magnitude of the scope, we concur with this approach. The report indicates a construction period of 120 days, which seems optimistic/aggressive. Based on email correspondence from Mr. Anderson, we understand that the 120 days was proposed as a "hard construction" phase to be preceded by a soft construction phase of up to six months, during which submittals, fabrication, and delivery would all take place. It was also noted that effective use of pre-work and off-site fabrication would be required in order to achieve the 120 day hard construction schedule. We recommend that a Construction Manager and/or scheduler be included as part of the team during the Construction Documents phase to further develop the project timeframe, and to provide additional input on methodology for controlling project schedule and minimizing impact on operations.

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Chilled Water Plant:

- The House building is provided with chilled water from air-cooled chillers located on the roof of Goh Building. The chillers appear to be in good condition. An air-cooled chiller on the roof of the House building serves as back-up to the main Goh plant (Trane Intellipak Model CGAFC60; nominal 60 ton capacity). The HVAC System Assessment report recommends replacement to the House chiller, and recommends use of the chiller for back-up and supplemental capacity as needed. We concur with this approach. However, we believe the replacement of this chiller could be documented as "bid alternate work" as a means of controlling the project budget, due to the fact that replacement of this chiller could be executed as an independent project at a later date – with minimal impact on operations.

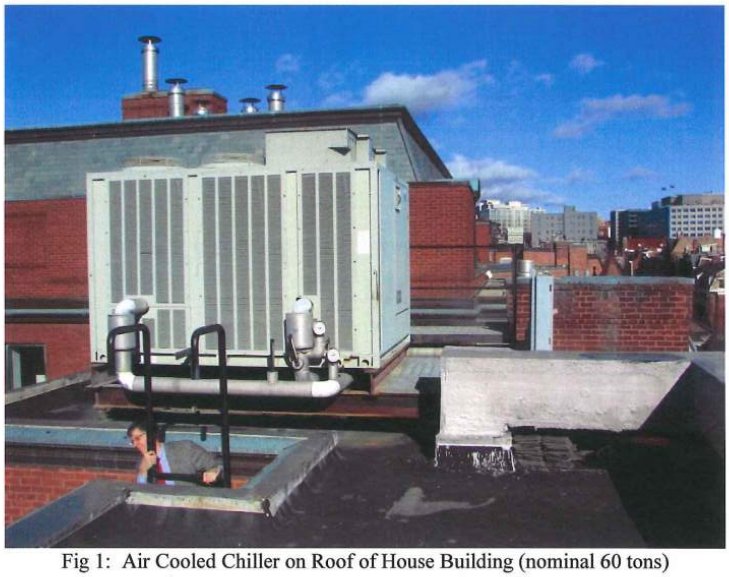

Fig 1: Air Cooled Chiller on Roof of House Building (nominal 60 tons)

Heating Water Plant:

- The House is served by a single cast iron heating boiler (Weil-McLain Model LGB-8; 641MBH output) that is near the end of its anticipated service life. The boiler represents a "single point of failure" and does not provide adequate redundancy for the heating system.
- The HVAC System Assessment report recommends replacement of the cast iron boiler with two high efficiency condensing boilers. We concur with this approach, as it would provide improved efficiency, and would also provide a measure of redundancy. The boilers could also be specified with back-up propane firing capability, if reliability of the natural gas service is of concern.
- The report does not mention that the boiler flue would need to be replaced with new super-ferritic stainless steel flue, and new stainless steel liner would be required in the masonry chimney in order to accommodate the condensing boilers. The project cost estimate should be investigated to determine if the necessary boiler flue scope is included.

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Fig 2: Cast Iron Heating Water Boiler

Fig 3: Electric Humidification Steam Boiler

Humidification Steam Systems:

- Humidification steam for the House is provided by one electric steam boiler (Coates/CAM Industries Model 108) that is near the end of its anticipated service life. The electric boiler is a costly means of generating steam, and it also represents a single point of failure.
- The HVAC System Assessment report recommends a new gas-fired steam boiler that would be tied-in to the existing steam system at Goh Addition. The steam system would be connected to humidifiers in new air handling units in the proposed penthouse. Individual gas-fired humidifiers are proposed for the two air handling units located in the basement.

HVAC Air Distribution Systems:

- The six existing air handling units (Bohn commercial packaged units) serving the House are commercial grade equipment that are beyond anticipated service life
- The air handling units located on the roof are in poor condition, and service access is compromised. It is necessary to walk across the ductwork routed on the roof to access the units, which results in inconvenient and unsafe conditions.

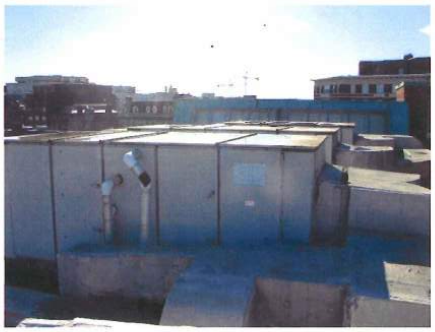

Fig 4: Air Handling Units on Roof

Fig 5: Ductwork on Roof Impedes AHU Access

- VAV boxes and reheat coils are located in ceiling bulkheads on the 4th floor, and service access is problematic. The HVAC System Assessment report suggests locating VAV boxes and reheat coils in the proposed penthouse for improved access. We strongly concur with this recommendation.
- The HVAC System Assessment report recommends replacement of the air handling units with six new units. One of the units (AHU-6) is proposed as a dedicated ventilation outdoor air unit for AHU-3, 4 & 5. We concur with the proposed air handling unit approach. The dedicated ventilation unit (with energy wheel) is an energy efficient and effective means of managing ventilation for the facility. Also the zoning proposed for the air handling units appears to be appropriate.

Fig 6: Multiple Bulkheads and Access Panels at 4th Floor

- Our comments and suggestions on the air handling unit approach include the following:
  - The report indicates that AHU-6 could be de-energized during unoccupied periods to minimize energy consumption. This approach requires further evaluation; it might be necessary to operate AHU-6 during unoccupied periods to provide adequate building pressure, and to provide make-up air for exhaust systems.
  - An Alternate #2 is discussed for future creation of a conservation studio on the south end of the 4th floor. Special exhaust hoods for the studio would reportedly require 6000 CFM of exhaust air. A dedicated make-up air unit would be required. Capacity of the boiler and chiller plants would need to be considered to accommodate this make-up air unit (and associated plant costs should be included in the Alternate #2 budget)
  - The report proposes that VAV boxes in the new system would turn-down to approximately 80% of design flow for energy savings. Impact on space air distribution and ability to maintain gallery design conditions will need to be considered; it may not be feasible to reduce flow.
  - Air distribution in the Music Room is problematic. Both the supply and return air devices are located near the floor of the Music Room, and "short-circuiting" of air flow is an apparent problem. Maintaining design temperature conditions in the Music Room has reportedly been problematic. The HVAC System Assessment report recommends a displacement air approach, with low supply diffusers, and high return grilles near ceiling level. The displacement air approach is an appropriate solution for the Music Room, however the supply air temperature and flow rate must be carefully designed. It is likely that the scheduled performance of AHU-2 (serving the Music Room) will need to be modified so that a larger CFM of supply air can be provided to the space at a higher supply air temperature.

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Fig 7: Music Room

Fig 8: Supply & Return Grilles in Music Room in Close Proximity

- The air flow diagrams for AHU-1 and AHU-2 on Drawing M-5.1 of the HVAC System Assessment report need further evaluation. The section of AHU-2 that supplies outdoor ventilation air to AHU-1 will require a fan, and the outdoor air duct connection to AHU-1 needs to be on the inlet side of the plenum fan
- In general, we recommend that the scheduled CFM of all gallery air handling systems be further evaluated during design phase. A higher air change rate, with supply air temperatures that are closer to the space setpoint temperature, would result in more stable space temperature conditions.
- Redundant fans should be considered in air handling units for reliability. Also supply air ducts in the penthouse could be interconnected to allow for back-up in event that an air handling unit is down for servicing.

Fan coil units:

- The HVAC System Assessment report recommends replacement of fan coil units serving the 2nd and 4th floor bridges. We concur with this recommendation; the units were observed to be in poor condition during our site visit.

Fig 9: Corroded Fan Coil Unit at Bridge

Exhaust Systems:

- The HVAC System Assessment report recommends replacement of rooftop exhaust fans, and modification of exhaust discharge so that it is remote from air handling unit intakes. We concur with this recommendation.

Fig 10: Toilet Exhaust Fan Discharging at AHU Inlet

Automatic Temperature Controls:

- The existing HVAC control system is an antiquated Honeywell pneumatic system. The HVAC System Assessment report recommends complete replacement of the pneumatic controls with a new direct digital control (DDC) system that is compatible with the existing DDC controls in Goh and Sant buildings. We strongly concur with this recommendation.

Fig 11: Antiquated Honeywell Pneumatic Control Panel

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Project Construction Cost Estimate:

- According to the information presented in the referenced Anderson/McClure report, the estimated total construction cost for Base Bid services is approximately $4,464,000. The total construction cost including alternates for rooftop mechanical room and floors 3 & 4 renovations is approximately $7,003,000. The MEPF scope comprises approximately 54% of construction cost. The line item cost for HVAC system upgrade is $1,620,000 for the "Base Bid (with Rooftop Mechanical Room), and $1,759,800 for Alternate #1 (No Rooftop Mechanical Room). No detailed line item breakdown was provided for our evaluation. However, the general magnitude of the HVAC cost appears to be appropriate to the scope. It is reasonable that the Base Bid HVAC cost is lower than the Alternate #1 HVAC cost; without a rooftop mechanical room, weather protection for equipment and systems would result in higher costs.

- The following items should be considered for the HVAC cost estimate:
  - The cost of new stainless steel boiler flue and chimney liner should be included
  - Air handling unit costs will need to be re-evaluated if it is necessary to increase CFM and/or provide redundant fans
  - Alternate #2 cost (make-up air unit for Conservation Studio) should include cost impact on boiler and chiller plant capacity
  - Cost of General Conditions and Construction Management might need re-evaluation if construction period is anticipated longer than 120 days

We look forward to working with you on this important project. Please contact me should you require additional information or have any questions or comments regarding this report.

Sincerely,

MUELLER ASSOCIATES, INC.

John W. Morris

John W Morris, P.E., CCS, $LEED_{AP}$
Vice President

JWM:
attachments
cc: RAM, KHR, TJG

Mueller

Memo

To: Ron Edwards, JBA Consulting Engineers

From: Todd Garing, PE

cc: Jeffrey Edwards

Date: February 19, 2013

Project Title: Horseshow Casino Baltimore

Project No.: 13-107-00

Subject: Mechanical Peer Review

Dear Ron,

Per our proposal, dated February 15, 2013, Mueller Associates has conducted a peer review for professional engineering services for the Horseshoe Casino in Baltimore. After receipt of the 60% construction mechanical and plumbing drawings, a summary of Mueller's findings is below.

HVAC Review

1. Is duct seal class indicated in specs?
2. Make sure the duct material schedule is coordinated with spec.
3. Indicate positive or negative pressure class in duct material schedule.
4. What are permitted transverse duct joints?
5. Define acoustic requirements on drawings
    a. Indicate and schedule sound attenuators
    b. Indicate extend of sound lining per legend
    c. Coordinate penetration and equipment details with specs
6. Welded joints for dishwasher ductwork? Kitchen exhaust?
7. Provide access doors in grease ducts.
8. In grease duct description, "installation" is spelled wrong.
9. Consider using double thickness turning vanes.
10. Are mechanical generate notes 2 – 4 applicable?
11. Check with structural engineer, for seismic criteria (usually on their cover sheet), but typically seismic restraints are not required for MEP systems. Once you have criteria, look up requirements in IBC and referenced structural standards.
12. Consider digital scrolls and EC supply fan motors for computer remote/Liebert units.
13. If submitting for LEED (and we assume Silver is the minimum requirement because of Baltimore City regulations) make sure filters are minimum MERV 8 for Liebert and other units, and MERV 13 for units with OA.

14. Consider restrained spring isolations for roof-mounted equipment (such as PCU's) in lieu of spring rails.
15. Is all exterior piping heat traced?
16. Typical Baltimore design conditions are 95/78 summer and 0 degrees Fahrenheit winter. Humidification is not typically provided for winter. Suggest loads and equipment be based on these.
17. Piping is typically specified with 3' of cover (below grade) to be below the frost line.
18. Why are equipment schedules based on based on 100' above sea level? Baltimore is approximately at sea level.
19. Consider eliminating flexible connectors not in mechanical rooms or other exposed areas. Also, piping NPS 2 and lower is typically flexible enough if hangers within 50 feet of equipment are vibration isolation type.
20. Make sure gas trains are code and insurance underwriting compliant.
21. Why on the AHU schedule are there commas only for the supply CFM, and not for return or OA CFM?
22. Are Liebert and heat pumps provided with R-410A? Will affect LEED credit.
23. Details:
    a. Exhaust fans show backdraft dampers. Is this in addition to motor operated dampers show on control schematics?
    b. Duct supports may need lateral support – ask structural engineer to review
    c. Delete flex conn at FCU's and heat pumps and provide pipe vibration hangers. Small flex connections are prone to failure.
    d. Provide pit plugs at boiler supply/return.
    e. Seismic restraints likely not required.
    f. Provide put plug symbols consistent with legend.

July 12, 2006

Dr. Cris Morjan, P.E.
Georgetown University
3700 "O" Street, NW
Washington, DC 20057

Reference: Georgetown University
Yates Field House - Natatorium

Dear Cris:

This letter-report summarizes our peer-review of the evaluations and recommendations contained in the "Evaluation of HVAC System" Report, dated July 1, 2005 as prepared by JVP Engineers.

The JVP Report is very well documented, and includes concise supporting data and calculations that substantiate the basis for the proposed recommended corrective measures to improve the existing HVAC system serving the natatorium space. From our peer-review of the JVP Report, we offer the following comments:

1. The JVP Report depicts that the space occupants often complain about burning eyes and breathing difficulties attributed to high chloramine concentrations. No other typical natatorium related problems, such as environmental discomfort, mold growth, and condensation forming on windows, are described in the JVP Report. Even though the JVP Report includes references to discussions with the existing water treatment company for the pool, the report does not specifically focus on means and methods to reduce the presence of high chloramines levels during the occupied periods through water treatment improvements. The JVP Report correctly notes that pool water treatment could effectively reduce the experienced high chloramines levels, and that the focus of the JVP Report was to address the HVAC related issues. As such, Mueller recommends that a thorough review and analysis of the existing water treatment strategy be reviewed, and alternative strategies be pursued directly with various water treatment suppliers. From possible water treatment improvements, the experienced high chloramines problems could be significantly reduced to an acceptable level.

2. In regards to the ventilation and air distribution deficiencies noted in the JVP Report, Mueller concurs with the rationale and basis for the recommended improvements to the HVAC system. These recommendations include:
    a. Increasing the total air flow rate serving the pool and deck area via motor/fan modifications within the existing PoolPak air handling unit. Mueller recommends that the manufacturer confirm that the proposed equipment modifications are within the recommended operating limits of the equipment, particularly the fit of potentially larger fan motors, fan wheels/drives designed for new duty (e.g. air flow rate and total developed pressure requirements), unit filtration, and dehumidification

capability. Calculations depicting new fan performance ratings were not included in the JVP Report, and not reviewed.

b. Replacing the existing fabric supply duct system to reduce the short circuiting of supply air to the return air, and provide corrosion resistant metal ductwork suitably sized for the proposed increased supply air flow rates.
c. Modifying the air distribution system served through the existing PoolPak system to improve directional control and to supply the majority of air along the west exterior glass wall and return through new high and low return ductwork along the east side of the pool and deck area (ahead of the support and spectator mezzanine level). Mueller recommends that the proposed supply ductwork along the north wall in the vicinity of the diving pool be reviewed to minimize the potential for short-circuiting with the new return ductwork – need to confirm throw and pattern adjustment features of the planned supply air devices.
d. Adding a new supplemental air handling unit, and a new supply and return air ductwork distribution system to serve the mezzanine and spectator level.
e. Providing the code-required outdoor air flow rates for both the pool-and-deck area, and the mezzanine-spectator area.

3. Before the design work for the HVAC Improvements is finalized, Mueller recommends the following:
    a. GU to confirm that the design water temperature conditions are 80°F.
    b. GU to confirm that the design ambient indoor air conditions are 82°F at 60% relative humidity.
    c. GU to confirm that the spectator occupancy is 75 people. JVP should confirm code compliance with DCRA.
    d. JVP to confirm the design-to evaporation rates, and confirm that the existing unit can adequately meet the total dehumidification design load attributed to evaporation, occupant load, and ventilation air. JVP calculated a design evaporation rate of 215 lbm/hour based on the ASHRAE equation, which is very close to the estimated load through the PoolPak software of 219 lbm/hour. Please note, however, that the JVP calculations are based on an air velocity at the water surface of 5 feet per minute. When reviewing the calculated total dehumidification load of 295 lbm/hour (219 from pool evaporation, 10 from 40 people, and 66 from 5400 cfm of ventilation air) for the pool-and-deck area, this calculated load is greater than the “as-built” scheduled unit dehumidification load of 236 lbm/hour information contained in the report’s reference section. From reviewing the PoolPak web site information, the listed capacity of the PoolPak SWHP 220 is 254 lbm/hour, which is less than the calculated load. Is additional dehumidification planned through the new supplemental unit? Has PoolPak confirmed actual capacity of the SWHP 220 unit can be increased beyond published data?
    e. JVP to re-check the load calculations, particularly the glass input information (not included in the JVP Report) for each alternative load condition. When comparing the glass loads for the “combined deck & mezzanine condition” and the “deck space only conditions”, a load difference of ~31,500 BTU per hour at the same peak load and time conditions exist between the different output information developed from the Trace load program.
    f. JVP to confirm size and capability of the outside air intake and associated ductwork to meet the proposed increased air flow rates to prevent excessive water penetration during rain conditions and frictional losses.

A multi-step approach to correct the high chloramine concentrations being experienced in the natatorium is recommended. The first step should be to investigate and develop improvements in the pool water chemical and filtration systems, operation, and maintenance. Should improvements in the pool water treatment fail to satisfactorily reduce the high chloramines levels, the next step should be to replace the existing supply air ductwork. Lastly, a new supplemental air handling unit should be provided, as well as the associated new supply/return/outside air ductwork, piping, electrical, and automatic temperature controls. Additionally, the return ductwork modifications for the existing PoolPak unit would occur during this last step when the supplemental unit is added.

Please contact me should you have any questions or comments regarding this matter.

Sincerely,

MUELLER ASSOCIATES, INC.

Steven A. Gillis, P.E.
Project Manager

cc: Ken Rock - Mueller

KF AME- DRAWING REVIEW LOG

50% Construction Documents	
ITEM	DESCRIPTION
1	Indicated pipe material list indicates use of PVC pipe for domestic water. Per applicable plumbing code, WSSC, PVC piping is not approved for use in domestic water distributions systems.
2	Indicated calcuation schedules for new and renovation work, indicates use of GPM values for estimating CW/HW/sanitary demands. Per WSSC code, cold/hot/drainage fixures should be used to estimate utility demands.
3	Occupancy loads are not provided for determining correct type and number of required plumbing fixtures.
4	Indicated Note #2 of Plumbing Gen Notes lists the incorrect plumbing code to be followed. The correct plumbing code that needs to be followed is the 2018 Edition of the Washington Suburban Sanitary Commission (WSSC) Plumbing & Fuel Gas Code.
5	The number of plumbing fixtures indicated in plumbing fixture counts do not match number of fixtures listed in the new/renovation fixure calculation schedules.
6	Please correct mis-spelled words.
7	Graphic scales should be added to all floor plans.
8	The indicated dom. HW heater detail does not indicate the use of an ASSE 1017 thermostatic mixing vlave. It is suggested to provide an ASSE 1017 TMV at water heater to control temperature of distributed hot water to plubing fixtures to prevent scalding along with providing point of use ASSES 1070 TMVs at public lavatories, hand sinks etc. In accordance with Legionella prevention guideines, it is recommended to have water heater store water @ 140 deg F, distribute HW @ 130 deg F (via ASSE 1017 TMV), and have HW recirculation loop set for 125 deg F. Minimizing HW & HWR loops dead-legs is also recommended while helping to prevent Legionella in dom. HW system.
9	Per plans and water riser diagrams, the intended design for dom. HW & HWR piping systems do not comply with the international energy conservation code that limits the pipe length or maximum volume of hot water to be delivered to a plumbing fixure requiring hot water.
10	Please provide north arrows on floor plans and/or key plans.

MECHANICAL GENERAL NOTES

NOTE NUMBER	NOTE
1	DUCT FABRICATION AND INSTALLATION SHALL CONFORM TO THE "HVAC DUCT CONSTRUCTION STANDARDS AS PUBLISHED BY S.M.A.C.N.A. LATEST EDITION.
2	ALL BRANCHES TO DIFFUSERS AND REGISTERS SHALL BE SUPPLIED WITH MANUAL VOLUME DAMPERS. ALL DAMPERS THAT ARE INACCESSIBLE SHALL BE PROVIDED WITH REMOTE OPERATORS SIMILAR TO VENTLOK 677-PLAIN FINISH
3	ALL MISCELLANEOUS METAL, ANGLES, BRACING OR SUPPORTS EXPOSED TO THE WEATHER SHALL BE GALVANIZED IRON OR BLACK IRON PAINTED WITH ONE COAT OF RUST INHIBITING PAINT AND ONE COAT OF GRAY PRIMER.
4	PENETRATIONS IN FIRE-RESISTIVE WALLS, PARTITIONS AND FLOORS WHERE PROTECTED OPENINGS ARE REQUIRED SHALL BE FIRE STOPPED USING APPROVED MATERIALS, INTEGRITY AND PREVENTING THE MOVEMENT OF HOT FLAMES OR GASES THROUGH THE VOID SPACES BETWEEN PENETRATING MATERIALS AND WALLS, PARTITIONS AND FLOORS WHEN TESTED IN ACCORDANCE WITH ASTM STANDARD E-814 OR U.L. STANDARD 1479.
5	ALL SUPPLY AND RETURN DUCTWORK AND PIPING SHALL BE INSULATED. INSULATION SHALL HAVE A FLAME SPREAD OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING OF NOT MORE THAN 50 WHEN TESTED AS A COMPOSITE INSTALLATION INCLUDING INSULATION FACING MATERIALS, TAPE, AND ADHESIVE.
6	FLEXIBLE DUCTS SHALL BE SUPPORTED AT OR NEAR MID-LENGTH WITH 2" WIDE 28 GUAGE STEEL HANGER COLLAR ATTACHED TO THE STRUCTURE WITH AN APPROVED DUCT HANGER. INSTALLATION SHALL MINIMIZE SHARP RADIUS TURNS OR OFFSETS. THE MAXIMUM LENGTH CONNECTING TO TERMINAL OUTLETS SHALL BE 6'-0".
7	CONSTRUCTION PRESSURE CLASSIFICATION: SUPPLY AND RETURN DUCT TO BE 1" STATIC PRESSURE CONSTRUCTION. DUCT LEAKAGE TEST NOT REQUIRED. RETURN AND EXHAUST DUCT TO BE 1" STATIC PRESSURE CONSTRUCTION, UNLESS OTHERWISE NOTED. DUCT LEAKAGE TEST NOT REQUIRED UNLESS OTHERWISE NOTED.
8	DIMENSIONS SHOWN ON DRAWINGS ARE CLEAR INSIDE DIMENSIONS.
9	FOR AV ROOMS THE REFRIGERANT SUPPLY AND SUCTION LINES, THE POWER AND CONTROL CABLES AND THE CONDENSATE DRAIN PIPING SHALL BE CONTAINED IN A SINGLE CONDUIT PENETRATION.
10	CONTRACTOR SHALL COORDINATE ACTUAL LOCATIONS OF EQUIPMENT, STRUCTURAL BRACING , AND UTILITY REQUIREMENTS WITH OTHER TRADES.
11	ALL EQUIPMENT SHALL BE PROVIDED WITH MANUFACTURER'S HIGHEST EFFICIENCY MOTOR OPTION.
12	ROUND DUCT MAY BE USED IN PLACE OF SQUARE OR RECTANGULAR DUCT. ROUND DUCT SHALL BE SIZED USING A DUCTULATOR WITH FRICTION LOSS OF 0.08" TO 0.10" PER 100 FEET OF DUCT.
13	ALL WORK SHALL CONFORM TO THE APPLICABLE FEDERAL, STATE, AND LOCAL CODES.

Define locations on plans.

steel

Repetitive - Return is covered twice. Delete one.

Should this say "sleeve"? Do not put condensate piping and wiring in same conduit.

Check this. 1" static pressure ductwork seems low for extensive ductwork systems. Some systems traverse multiple floor levels. Some serve VAV boxes and/or Zone Dampers. Such systems typically require higher pressure ductwork.

Also limit velocities.

If it fits.

Where sound lining is shown, these shall be the clear air side dimensions.

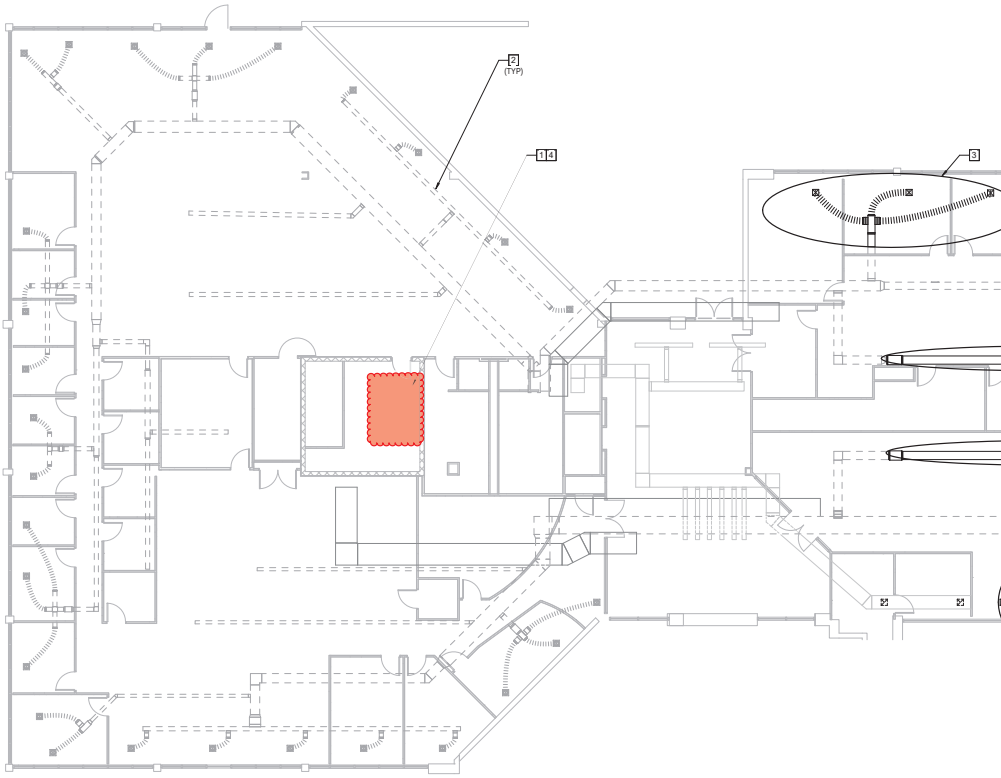
Potentially conflicting with the EERs indicated on the equipment schedules.

MECHANICAL ABBREVIATIONS

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
A	AMPS	LDB	LEAVING DRY BULB
AC	AIR CONDITIONER	lps	LITERS PER SECOND
AMB	AMBIENT	LVG	LEAVING
APD	AIR PRESSURE DROP	LWB	LEAVING WET BULB TEMPERATURE
APPROX.	APPROXIMATE	LWT	LEAVING WATER TEMPERATURE
ATFP	ANTI TERRORISM FORCE PROTECTION	MAX	MAXIMUM
BTUH	BRITISH THERMAL UNIT'S PER HOUR	MBH	1,000 BRITISH THERMAL UNITS PER HOUR
C	CENTIGRADE	MCA	MAXIMUM CURRENT AMPS
CAP	CAPACITY	MERV	MINIMUM EFFICIENCY REPORTING VALUE
CC	COOLING COIL	MFG	MANUFACTURER
CFM	CUBIC FEET PER MINUTE	MIN	MINIMUM
CHW	CHILLED WATER	mm	MILLIMETER
CHWR	CHILLED WATER RETURN	MOCP	MAXIMUM OVERCURRENT PROTECTION
CHWS	CHILLED WATER SUPPLY	MPS	MEDIUM PRESSURE STEAM
COP	COEFFICIENT OF PERFORMANCE	MTD	MOUNTED
CR	CONDENSATE RETURN	MU	MAKE-UP
CU	CONDENSING UNIT	NC	NOISE CRITERION
CW	COLD WATER	NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
DDC	DIRECT DIGITAL CONTROL	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
D/L	DOOR LOUVER	NMCI	NAVY MARINE CORPS INTRANET
DSD	DUCT SMOKE DETECTOR	O & M	OPERATION AND MAINTENANCE
DX	DIRECT EXPANSION	OBD	OPPOSED BLADE DAMPER
(E)	EXISTING	OSA	OUTSIDE AIR
EA	EXHAUST AIR	Pa	PASCALS
EAT	ENTERING AIR TEMPERATURE	PD	PRESSURE DROP
EDB	ENTERING DRY BULB TEMPERATURE	PH	PHASE
EER	ENERGY EFFICIENCY RATIO	PRV	PRESSURE REDUCING / RELIEF VALVE
EF	EXHAUST FAN	PSI	POUNDS PER SQUARE INCH
EL	EXPANSION LOOP	QTY	QUANTITY
ENT	ENTERING	RA	RETURN AIR
EQUIP	EQUIPMENT	REF	REFERENCE
ESP	EXTERNAL STATIC PRESSURE	REQ'D	REQUIRED
EWB	ENTERING WET BULB TEMPERATURE	RF	RETURN FAN
EWT	ENTERING WATER TEMPERATURE	RLA	RUNNING LOAD AMPS
F	FAHRENHEIT	RP	RECIRCULATING PUMP
FC	FAN COIL	RPM	REVOLUTIONS PER MINUTE
FLA	FULL LOAD AMPS	SA	SUPPLY AIR
FT HD	FOOT HEAD	SEER	SEASONAL ENERGY EFFICIENCY RATIO
GAL	GALLON	SF	SUPPLY FAN
GALV	GALVANIZED	SJ	SEISMIC JOINT
GLYR	GLYCOL RETURN	SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION
GLYS	GLYCOL SUPPLY	SQ FT	SQUARE FOOT
GPM	GALLONS PER MINUTE	T	TRAP
HHW	HEATING HOT WATER	TAB	TEST AND BALANCE
HHWR	HEATING HOT WATER RETURN	TSP	TOTAL STATIC PRESSURE.
HHWS	HEATING HOT WATER SUPPLY	T'STAT	THERMOSTAT
HP	HEAT PUMP	TYP	TYPICAL
HP	HORSEPOWER	U/C	UNDERCUT
HR	HOUR	U/G	UNDERGROUND
HSPF	HEATING SEASONAL PERFORMANCE FACTOR	UFC	UNIFIED FACILITIES CRITERIA
HV	HEAT VENTILATOR	UON	UNLESS OTHERWISE NOTED
HW	HOT WATER	V	VOLTAGE / VOLTS
HX	HEAT EXCHANGER	VAV	VARIABLE AIR VOLUME
Hz	HERTZ	VE	VEHICLE EXHAUST SYSTEM
in-wg	INCHES WATER GAUGE	VFD	VARIABLE FREQUENCY DRIVE
in (")	INCHES	W/	WITH
IPLV	INTEGRATED PART LOAD VALUE	WB	WET BULB
IRH	INFARED HEATER	WPD	WATER PRESSURE DROP
LAT	LEAVING AIR TEMPERATURE		
LBS	POUNDS		

MECHANICAL LEGEND

☒	SUPPLY DIFFUSER
⧅	RETURN / EXHAUST REGISTER
1i / 200 CFM / XXX	DIFFUSER / REGISTER TAG
	BALANCE DAMPER
	FIRE DAMPER
⊗	ROUND SUPPLY DUCT RISER
⊠	RECTANGULAR SUPPLY DUCT RISER



1
M0.2
MECHANICAL FIRST LEVEL DEMO PLAN
SCALE: 1/8" = 1' - 0"

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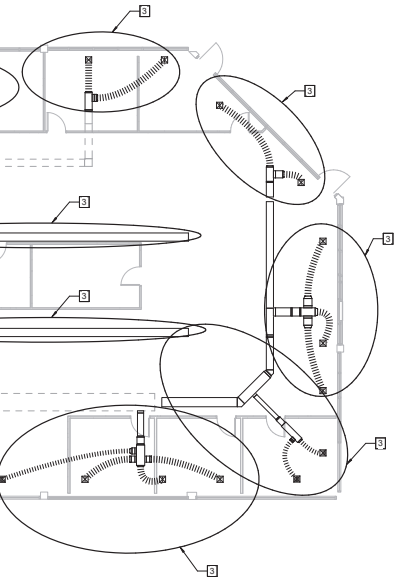
Show the work on the plans. Also define how to handle refrigerant recovery. Define demolition scope for ATC.

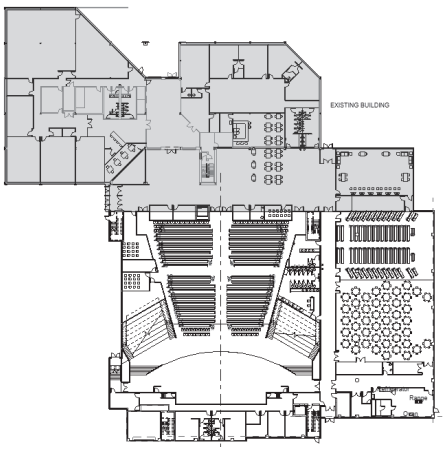
Define demolition scope for ATC. If there is a hot water reheat coil, piping, and ATC valve to be removed also define scope. If there is an electric reheat coil to be removed coordinate with electrical.

Not biddable. Show the work on the plans and document the work with enough information so that contractor can understand sizes, quantities, etc.

PHASE 1 MECHANICAL WORK:

1. REMOVE EXISTING AC UNIT (WATER SOURCE HEAT PUMP).
2. EXISTING MECHANICAL EQUIPMENT, DUCTWORK, AIR DISTRIBUTION AND ACCESSORIES ARE TO REMAIN, UON.
3. REMOVE EXISTING VAV BOX, DOWNSTREAM DUCTWORK, AND AIR DISTRIBUTION.
4. REMOVE CONDENSER WATER SUPPLY AND RETURN LINES IN FIRST FLOOR MECHANICAL ROOM. CAP MAIN LINES AT ENTRY TO MECHANICAL ROOM.





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CONSTRUCTION DOCUMENTS (50)% PHASE 1 - IGMP SET

KINGDOM FELLOWSHIP - AME

11700 BELTSVILLE DRIVE
BELTSVILLE, MD 20705

MECHANICAL FIRST LEVEL DEMO PLAN

REVISIONS

Date	Description	#

DRAWN BY: TS
CHECKED BY: JS
PROJECT NO.: 89-1318
DATE: 2020-03-27
CERTIFIED BY:

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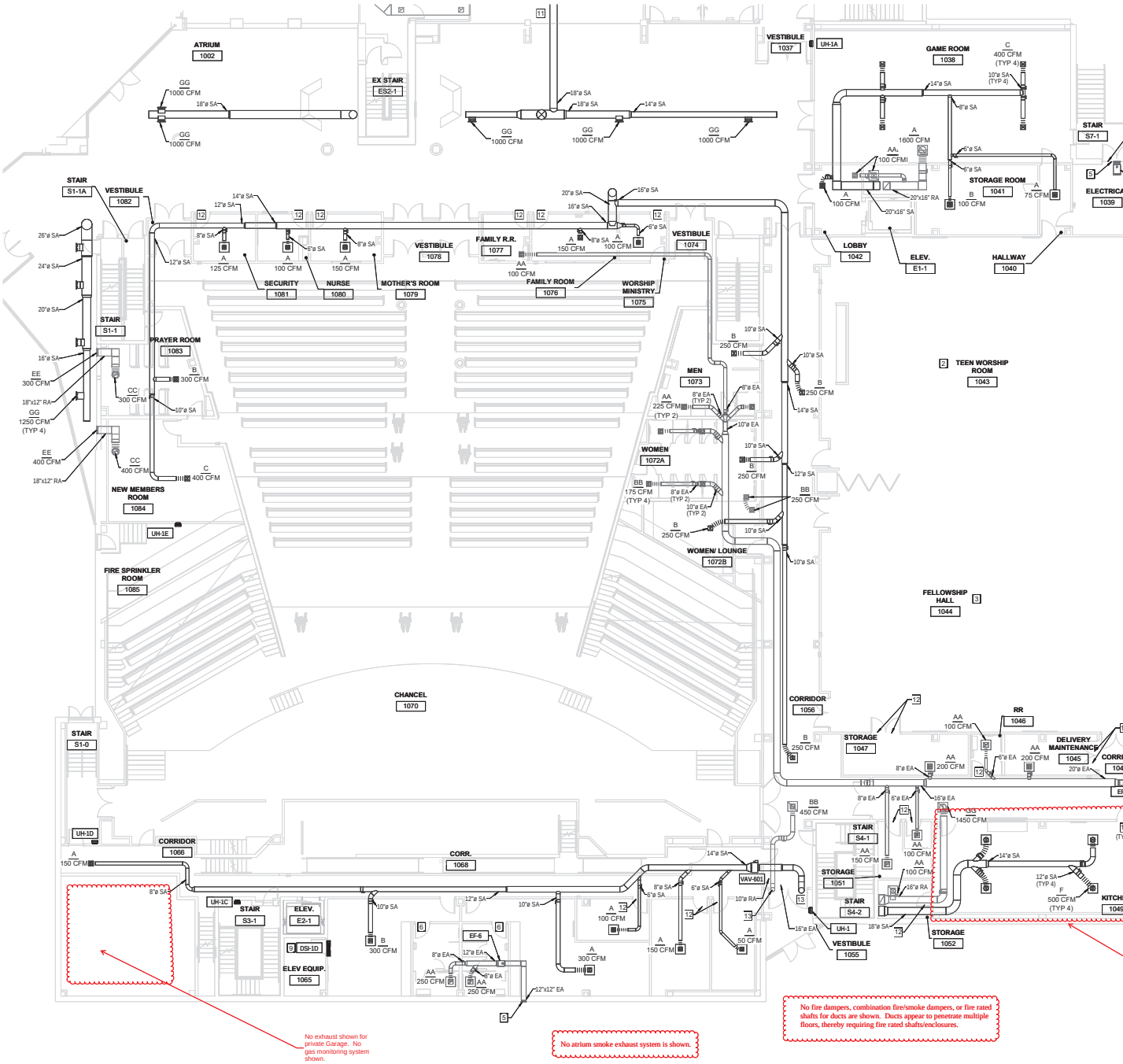
M0.2



1 M1.2 MECHANICAL FIRST LEVEL NEW CONSTRUCTION PLAN

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

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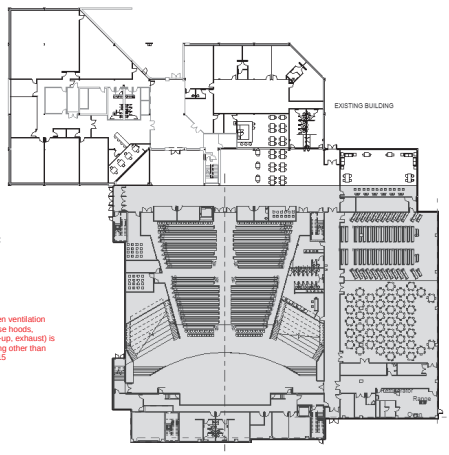
KEYNOTES:

1. FOR DUCT SUPPORTS, SEE 10/M5.1.
2. FOR TEEN WORSHIP AIR DISTRIBUTION LAYOUT, SEE M1.3.
3. FOR FELLOWSHIP HALL AIR DISTRIBUTION LAYOUT, SEE M1.3.
4. FOR VAV BOX INSTALLATION, SEE 9/M5.1.
5. PROVIDE LOUVER WITH 2 SQ. FT. FREE AREA.
6. PROVIDE 18X18 DOOR LOUVER.
7. FOR AIR DISTRIBUTION CONNECTION, SEE 1/M5.1.
8. FOR HANGING EQUIPMENT MOUNTING DETAIL, SEE 6/M5.1.
9. FOR WALL MOUNTED FAN COIL MOUNTING, SEE 7/M5.1.
10. FOR DUCT TAKE-OFFS, SEE 8/M5.1.
11. FOR CONTINUATION , SEE M1.1.
12. PROVIDE 1" DOOR UNDERCUT.
13. UP TO ROOF MOUNTED AC UNIT.
14. PROVIDE FULLY LOUVERED DOOR
15. CONTRACTOR SHALL INSTALL OWNER PROVIDED EXHAUST FAN AND MAKEUP AIR UNIT FOR GREASE HOOD. CONTRACTOR SHALL PROVIDE AND INSTALL ALL DUCTWORK BETWEEN THE HOOD AND THE UNITS. COORDINATE WITH KITCHEN CONSULTANT PLANS.
16. PROVIDE LOUVER WITH 4 SQ. FT. FREE AREA.

Kitchen ventilation (grease hoods, make-up, exhaust) is missing other than note 15

EF-5



Kitchen ventilation (grease hoods, make-up, exhaust) is missing other than note 15

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KINGDOM FELLOWSHIP - AME

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BELTSVILLE, MD 20705

MECHANICAL FIRST LEVEL NEW CONSTRUCTION PLAN

REVISIONS

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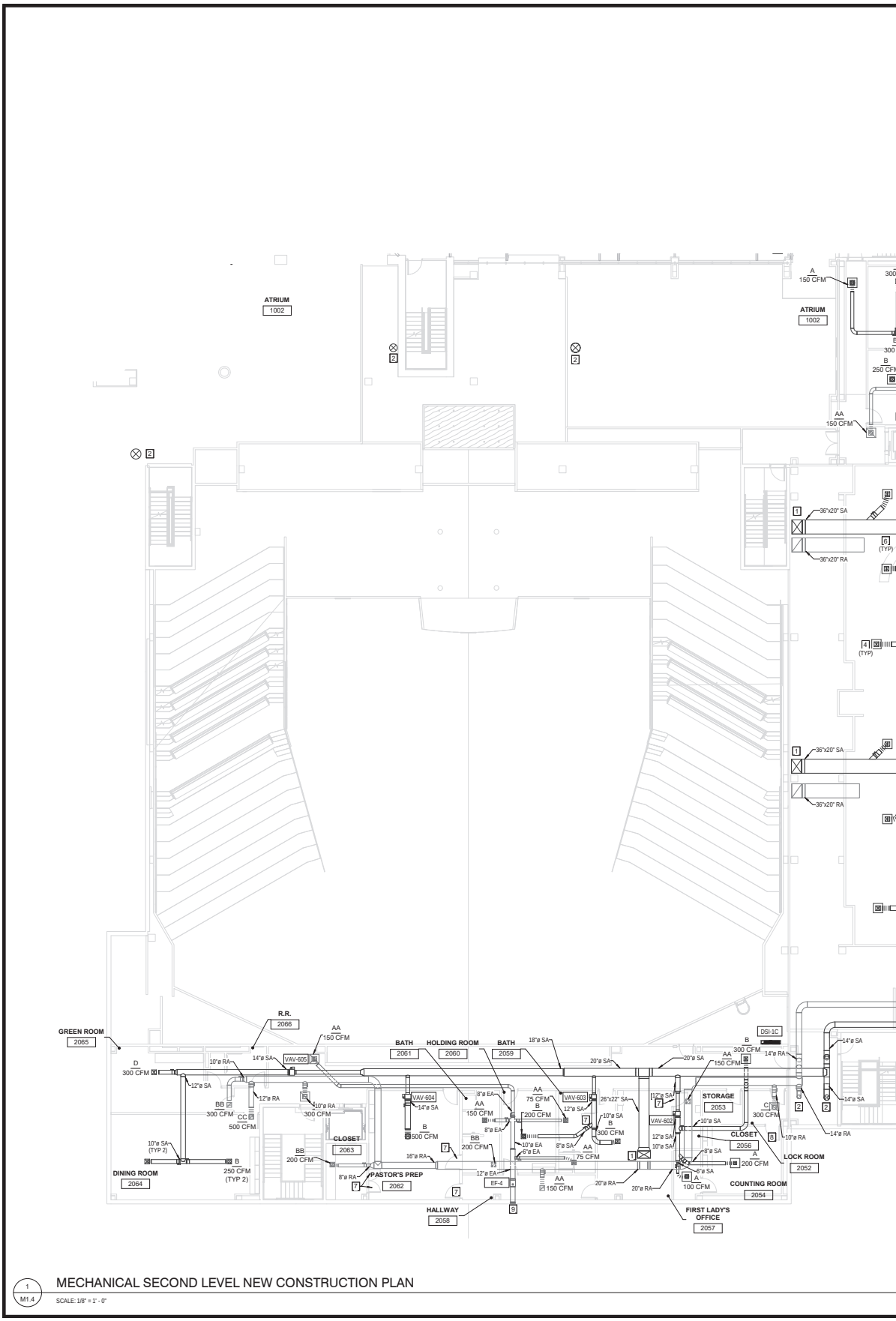
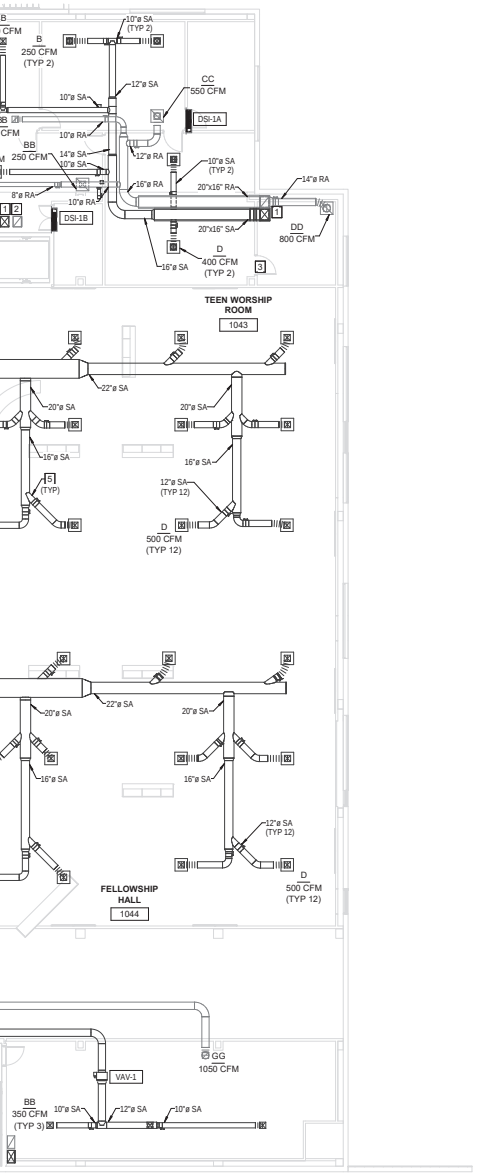
M1.2


ATRIUM
1002
ATRIUM
1002
GREEN ROOM
2065
R.R.
2066
BATH
2061
HOLDING ROOM
2060
BATH
2059
CLOSET
2063
PASTOR'S PREP
2062
DINING ROOM
2064
HALLWAY
2058
STORAGE
2053
CLOSET
2056
LOCK ROOM
2052
COUNTING ROOM
2054
FIRST LADY'S OFFICE
2057
VAV-605
VAV-604
VAV-603
VAV-602
EF-4
DSI-1C
36"x20" SA
36"x20" RA
MECHANICAL SECOND LEVEL NEW CONSTRUCTION PLAN
SCALE: 1/8" = 1' - 0"

KEYNOTES:

1. UP TO AC UNIT ON ROOF.
2. DUCT DOWN TO LEVEL BELOW.
3. PROVIDE 24X24 DOOR LOUVER.
4. FOR AIR DISTRIBUTION, SEE 1/M5.1
5. FOR DUCT TAKE-OFFS, SEE 8/M5.1.
6. FOR DUCT SUPPORTS, SEE 10/M5.1.
7. PROVIDE 1" DOOR UNDERCUT.
8. PROVIDE 12X12 DOOR LOUVER.
9. PROVIDE LOUVER WITH 1 SQ. FT. FREE AREA.



No atrium smoke exhaust system is shown.

No fire dampers, combination fire/smoke dampers, or fire rated shafts for ducts are shown. Ducts appear to penetrate multiple floors, thereby requiring fire rated shafts/enclosures.

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MECHANICAL SECOND LEVEL NEW CONSTRUCTION PLAN

REVISIONS

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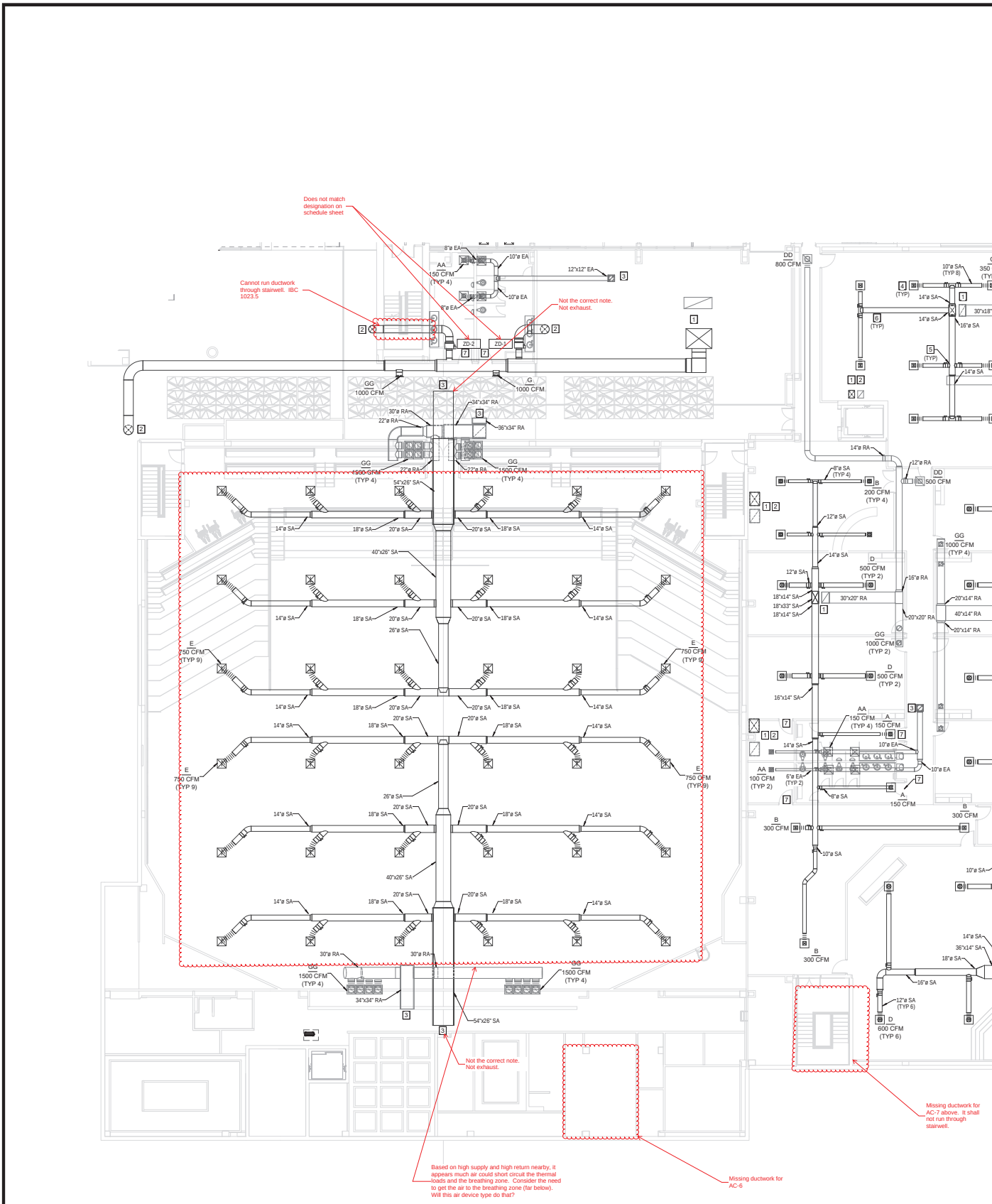
M1.3



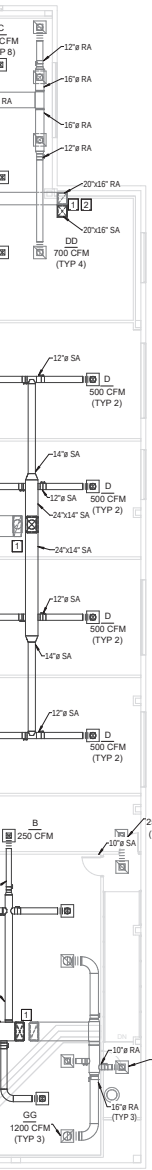
1 M1.6 MECHANICAL THIRD LEVEL NEW CONSTRUCTION PLAN

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

3/27/2020 6:14:48 PM

KEYNOTES:

1. UP TO AC UNIT ON ROOF.
2. DUCT DOWN TO LEVEL BELOW.
3. UP TO EXHAUST FAN.
4. FOR AIR DISTRIBUTION, SEE 1/M5.1
5. FOR DUCT TAKE-OFFS, SEE 8/M5.1.
6. FOR DUCT SUPPORTS, SEE 10/M5.1.
7. PROVIDE 1" DOOR UNDERCUT.



No atrium smoke exhaust system is shown.

No fire dampers, combination fire/smoke dampers, or fire rated shafts for ducts are shown. Ducts appear to penetrate multiple floors, thereby requiring fire rated shafts/enclosures.

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MECHANICAL THIRD LEVEL NEW CONSTRUCTION PLAN

REVISIONS

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DATE: 2020-03-27
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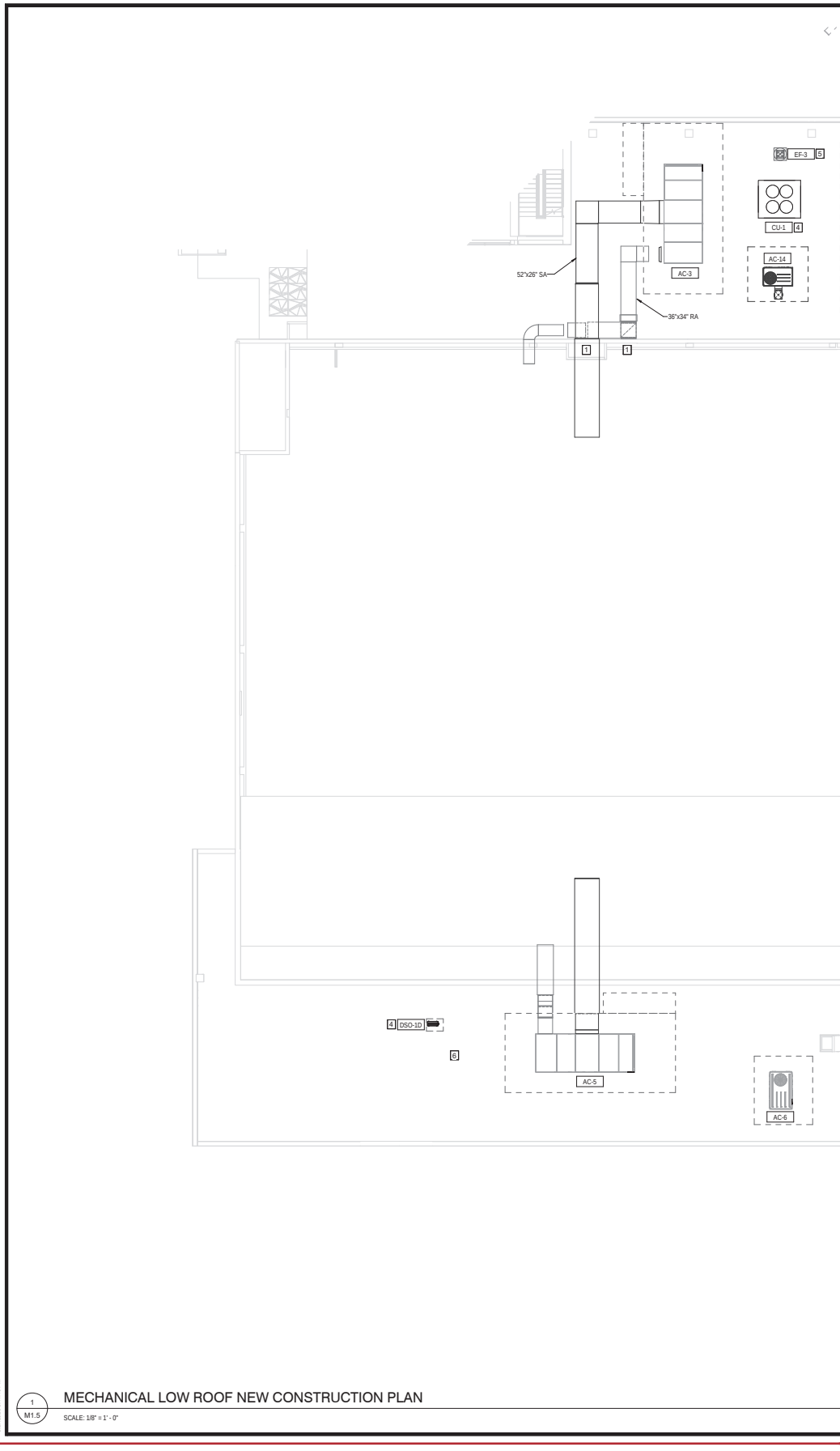
SHEET NO.
M1.4



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M1.5

MECHANICAL LOW ROOF NEW CONSTRUCTION PLAN

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

KEYNOTES:

1. FOR CONTINUATION, SEE 1/M1.4.
2. FOR ROOFTOP PACKAGED AIR CONDITIONER DETAIL, SEE 2/M5.1.
3. FOR ROOF MOUNTED RECTANGULAR DUCT DETAIL, SEE 4/M5.1.
4. FOR CONDENSER MOUNTING, SEE 3/M5.1.
5. FOR EXHAUST FAN MOUNTING, SEE 5/M5.1.
6. PROVIDE CODE COMPLAINT ELEVATOR SHAFT VENTILATION SYSTEM.

Provide guards or fall protection where required by proximity to roof edge. IMC 2015 304.11

Show AC condensate piping. Define discharge locations.

Show refrigerant piping.

No atrium smoke exhaust system is shown.

No fire dampers, combination fire/smoke dampers, or fire rated shafts for ducts are shown. Ducts appear to penetrate multiple floors, thereby requiring fire rated shafts/enclosures.

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MECHANICAL ROOF PLAN

REVISIONS

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PROJECT NO. 89-1318
DATE: 2020-03-27
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M1.5

UNIT HEATER

DESCRIPTION		ELECTRICAL DATA				APPROX. WEIGHT	REMARKS
SYMBOL	EQUIPMENT	AMPS	kW	VOLTS	PHASE		
UH-1x	UNIT HEATER - ELECTRIC TRANE: UHA 02	10	2.0	208	1	25	WALL MOUNTED WITH INTEGRAL THERMOSTAT

AIR DISTRIBUTION SCHEDULE

SYMBOL	MAKE & MODEL	AIRFLOW (CFM)	SIZE (IN)	REMARKS
A	KRUEGER SERIES 1240	75 - 175	8x8	STEEL SUPPLY DIFFUSER WITH WHITE FINISH, NO OBDs, 24x24 FILLER PANEL FOR T-BAR MOUNTING (WHERE REQUIRED)
B	KRUEGER SERIES 1240	200 - 300	10x10	STEEL SUPPLY DIFFUSER WITH WHITE FINISH, NO OBDs, 24x24 FILLER PANEL FOR T-BAR MOUNTING (WHERE REQUIRED)
C	KRUEGER SERIES 1240	300 - 400	12x12	STEEL SUPPLY DIFFUSER WITH WHITE FINISH, NO OBDs, 24x24 FILLER PANEL FOR T-BAR MOUNTING (WHERE REQUIRED)
D	KRUEGER SERIES 1240	400 - 600	14x14	STEEL SUPPLY DIFFUSER WITH WHITE FINISH, NO OBDs, 24x24 FILLER PANEL FOR T-BAR MOUNTING (WHERE REQUIRED)
E	KRUEGER SERIES 1240	600 - 800	18x18	STEEL SUPPLY DIFFUSER WITH WHITE FINISH, NO OBDs, 24x24 FILLER PANEL FOR T-BAR MOUNTING (WHERE REQUIRED)
F	KRUEGER SERIES 1240P	400 - 600	14x14	PERFORATED FACE DIFFUSER WITH WHITE FINISH, NO OBDs, 24x24 FILLER PANEL FOR T-BAR MOUNTING (WHERE REQUIRED)
G	KRUEGER SERIES DMD	1000 - 1400	36x6	DUCT MOUNTED DRUM LOUVER WITH WHITE FINISH PROVIDE WITH EXTRACTOR. POINT 30° DOWN.
AA	KRUEGER SERIES S80H	50 -250	10x10	STEEL RETURN REGISTER WITH WHITE FINISH, NO OBDs, 24x24 FILLER PANEL FOR T-BAR MOUNTING (WHERE REQUIRED)
BB	KRUEGER SERIES S80H	250 - 350	12x12	STEEL RETURN REGISTER WITH WHITE FINISH, NO OBDs, 24x24 FILLER PANEL FOR T-BAR MOUNTING (WHERE REQUIRED)
CC	KRUEGER SERIES S80H	400 - 600	14x14	STEEL RETURN REGISTER WITH WHITE FINISH, NO OBDs, 24x24 FILLER PANEL FOR T-BAR MOUNTING (WHERE REQUIRED)
DD	KRUEGER SERIES S80H	600 - 800	18x18	STEEL RETURN REGISTER WITH WHITE FINISH, NO OBDs, 24x24 FILLER PANEL FOR T-BAR MOUNTING (WHERE REQUIRED)
EE	KRUEGER SERIES S80H	450 - 650	18x12	SIDEWALL RETURN REGISTER WITH WHITE FINISH, NO OBDs
FF	KRUEGER SERIES S80H	650 - 900	24x18	SIDEWALL RETURN REGISTER WITH WHITE FINISH, NO OBDs
GG	KRUEGER SERIES S80H	1000 - 1500	24x24	STEEL RETURN REGISTER WITH WHITE FINISH, NO OBDs, 24x24 FILLER PANEL FOR T-BAR MOUNTING (WHERE REQUIRED)

AIR CONDITIONER EQUIPMENT SCHEDULE

DESCRIPTION		ELECTRICAL DATA		SUPPLY FAN			EXHAUST FAN			CAPACITIES								
										SENSIBLE	TOTAL	EFFICIENCY	HTG OUT	EFFCIENCY	SF FLOW	SF ESP	EF FLOW	AMBIEN
SYMBOL	MAKE & MODEL	MCA	MOP	HP	VOLTS	PHASE	HP	VOLTS	PHASE	(MBH)	(MBH)	(MIN)	(MBH)	(%)	(CFM)	(" H20)	(CFM)	SUMMER DB
AC-1	AIR CONDITIONER TRANE: YCD480	88	100	10	460	3	1.5	460	3	380	475	11.4 IEER	280	80	13,000	2.0	13,000	91
AC-2	AIR CONDITIONER TRANE: YSH180	31	40	5	460	3	-	-	-	144	180	12.2 IEER	280	80	6,000	1.5	-	91
AC-3	AIR CONDITIONER TRANE: YCH480	88	100	10	460	3	1.5	460	3	380	475	11.4 IEER	280	80	13,500	2.0	13,500	91
AC-4	AIR CONDITIONER TRANE: YSH180	31	40	5	460	3	-	-	-	144	180	12.2 IEER	280	80	6,000	1.5	-	91
AC-5	AIR CONDITIONER TRANE: YCH480	88	100	10	460	3	1.5	460	3	380	475	11.4 IEER	280	80	13,500	2.0	13,500	91
AC-6	AIR CONDITIONER TRANE: YHC120	22	25	3	460	3	1.0	460	3	96	120	12.7 IEER	120	80	4,500	2.5	-	91
AC-7	AIR CONDITIONER TRANE: YSC060	13	15	1	460	3	-	-	-	48	60	14 SEER	100	80	2,000	1.5	-	91
AC-8	AIR CONDITIONER TRANE: YSC060	13	15	1	460	3	-	-	-	48	60	14 SEER	100	80	2,000	1.5	-	91
AC-9	AIR CONDITIONER TRANE: YSC120	22	25	3	460	3	-	-	-	96	120	12.7 IEER	160	80	4,000	1.5	-	91
AC-10	AIR CONDITIONER TRANE: YSC120	22	25	3	460	3	-	-	-	96	120	12.7 IEER	160	80	3,850	1.5	-	91
AC-11	AIR CONDITIONER TRANE: YSC120	22	25	3	460	3	-	-	-	96	120	12.7 IEER	160	80	4,000	1.5	-	91
AC-12	AIR CONDITIONER TRANE: YSC060	13	15	1	460	3	-	-	-	48	60	14 SEER	100	80	2,000	1.5	-	91
AC-13	AIR CONDITIONER TRANE: YSC090	18	20	1	460	3	-	-	-	72	90	12.7 IEER	160	80	2,800	1.5	-	91
AC-14	AIR CONDITIONER TRANE: YSC060	13	15	1	460	3	-	-	-	48	60	14 SEER	100	80	2,550	1.5	-	91

AIR CONDITIONER REMARKS
1. SUPPLY FAN WITH PREMIUM EFFICIENT MOTOR.
2. SUPPLY FAN WITH VARIABLE FREQUENCY DRIVE.
3. DX COOLING COIL.
4. 0-100% MODULATING ECONOMIZER.
5. LOW LEAK DAMPERS FOR ECONOMIZER.
6. COMPARATIVE ENTHALPY ECONOMIZER CONTROL.
7. ROOF CURB.

AIR CONDITIONER REMARKS (CONT.)
8. MODULATING GAS-FIRED HEATING.
9. DEMAND CONTROL VENTILATION.
10. MULTIPLE STAGED COMPRESSORS.
11. CONDENSER COIL WITH HAIL GUARD.
12. FROSTAT REFRIGERANT CONTROL.
13. BACNET COMMUNICATION CARD.
14. CONVENIENCE OUTLET.

AIR CONDITIONER REMARKS (CONT.)
15. DEHUMIDIFICATION OPTION - HOT GAS RE-HEAT
16. MULTI-ZONE VAV CONTROLS
17. BAROMETRIC RELIEF
18. VARIABLE COOLING CAPACITY

By this schedule, it would appear schematic diagram and the plumb

SPLIT SYSTEM AC EQUIPMENT SCHEDULE

DESCRIPTION		ELECTRICAL DATA		SUPPLY FAN			EXHAUST FAN			CAPACITIES								
										SENSIBLE	TOTAL	EFFICIENCY	HEATING	EFFICIENCY	SF FLOW	SF ESP	EF FLOW	AMBIEN
SYMBOL	MAKE & MODEL	MCA	MOP	HP	VOLTS	PHASE	HP	VOLTS	PHASE	(MBH)	(MBH)	(MIN)	(MBH)	(%)	(CFM)	(" H20)	(CFM)	SUMMER DB
AH-1	AIR HANDLER TRANE: CSAA	--	--	25	460	3	-	-	-	380	475	-	-	-	16,000	3.0	-	91
CU-1	CONDENSING UNIT TRANE: 40-TON	64	80	-	460	3	-	-	-	380	475	11.4 IEER	-	-	-	-	-	91

AC UNIT REMARKS
1. SUPPLY FAN WITH PREMIUM EFFICIENT MOTOR.
2. SUPPLY FAN WITH VARIABLE FREQUENCY DRIVE.
3. DX COOLING COIL.
4. VARIABLE COOLING CAPACITY.
5. 3000-HOUR COATING ON CASING AND COILS

VARIABLE AIR VOLUME SCHEDULE

SYMBOL	MAKE & MODEL	SIZE	CFM			MAX S.P. ("WG)	HEATING (MBH)	EAT	HEATING (kW)	ELECTRICAL DATA		
			MAX	MIN	HEAT					VOLTAGE	AMPS	PHASE
						AC-1						
ZD-101	ZONE DAMPER	22	4000	1000	-	0.1	-	-	-	-	-	-
ZD-102	ZONE DAMPER	12	2000	500	-	0.1	-	-	-	-	-	-
						AC-6						
VAV-601	VAV BOX WITH ELECTRIC REHEAT	10	1050	315	525	0.25	17	65	5.0	277	20	1
VAV-602	VAV BOX WITH ELECTRIC REHEAT	08	600	200	300	0.25	10	65	3.0	277	12	1
VAV-603	VAV BOX WITH ELECTRIC REHEAT	08	500	150	250	0.25	8	65	2.5	277	10	1
VAV-604	VAV BOX WITH ELECTRIC REHEAT	08	500	150	250	0.25	8	65	2.5	277	10	1
VAV-605	VAV BOX WITH ELECTRIC REHEAT	08	800	240	400	0.25	13	65	4.0	277	15	1
VAV-606	VAV BOX WITH ELECTRIC REHEAT	10	1050	315	525	0.25	17	65	5.0	277	20	1
						AH-1						
VAV-1	VAV BOX WITH ELECTRIC REHEAT	08	550	165	275	0.25	11.9	50	3.5	277	13.0	1
VAV-2	VAV BOX WITH ELECTRIC REHEAT	06	275	90	140	0.25	6.5	65	2.0	277	8.0	1
VAV-3	VAV BOX WITH ELECTRIC REHEAT	06	275	90	140	0.25	6.5	65	2.0	277	8.0	1
VAV-4	VAV BOX WITH ELECTRIC REHEAT	06	400	120	200	0.25	8.5	65	2.5	277	10.0	1
VAV-5	VAV BOX WITH ELECTRIC REHEAT	06	400	120	200	0.25	8.5	65	2.5	277	10.0	1
VAV-6	VAV BOX WITH ELECTRIC REHEAT	10	1200	360	600	0.25	25	65	8.0	460	11.0	3
VAV-7	VAV BOX WITH ELECTRIC REHEAT	06	200	60	100	0.25	5.0	65	1.5	277	6.0	1

NOTE: VAV BOXES WITH ELECTRIC HEATERS SHALL INCLUDE TRANSFORMER, DISCONNECT SWITCH, & CONTROLS.

Does not match designation on plans

Heat?

Control sequence indicates 55 F air leaving cooling coil and 50 F leaving gas heater. These will be the air temperatures entering the reheat coil. If 65 F air was used to calculate the reheat coil capacities, the coils are likely undersized.

Recommendation: Use 50 F for air temperature entering reheat coils and size/select them accordingly. If the gas heaters at the respective AC/AH units are capable of discharging at 55F, then 55F could be used for the air temperature entering reheat coils.

Confirm the VAV minimum air flows provide ventilation air at code mandated rates, accounting for the rate of OA entering the AH/AC Unit at the minimum unit supply air flow rate. Refer to related comment on control diagram for AH/AC Unit

Confirm the AH/AC Unit can turn down at least as far as the sum of the minimum air flow rates of its connected VAVs.

Confirm that the minimum air flow, the heating airflow, and every intermediate (modulating) air flow rate is adequate to keep its associated heating output kW from overheating/burning up the coil. Confirm with coil manufacturer's requirements for minimum CFM per kW.

3/27/2020 6:14:49 PM

All units have the same entering conditions. This implies the same outdoor air fraction. This seems unlikely to be accurate when there are densely occupied spaces (Santuary, conference rooms) and other spaces that are not densely occupied. Check vs code-mandated ventilation rates - Chapter 4.

AIR TEMPERATURES (°F)											
WINTER	COOLING COIL				HEATING		AIR FILTERS		MIN OA (CFM)	APPROX WEIGHT (LBS)	REMARKS
DB	EDB	EWB	LDB	LWB	EDB	LDB	QTY	SIZE			
11	80	69	55	54	45	90	17	16x20x2	3,000	6500	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, & 18
11	80	69	55	54	45	90	8	20x25x2	1,200	3100	1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, & 17
11	80	69	55	54	45	90	17	16x20x2	3,000	6500	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, & 15
11	80	69	55	54	45	90	8	20x25x2	1,200	3100	1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, & 17
11	80	69	55	54	45	90	17	16x20x2	3,000	6500	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, & 15
11	80	69	55	54	52	90	4	20x25x2	1000	1600	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, & 18
11	80	69	55	54	45	90	2	20x35x2	600	650	1, 3, 4, 5, 6, 7, 11, 12, 13, 14, & 17
11	80	69	55	54	45	90	2	20x35x2	600	650	1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, & 17
11	80	69	55	54	52	90	4	20x25x2	1000	1600	1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, & 17
11	80	69	55	54	52	90	4	20x25x2	1000	1600	1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, & 17
11	80	69	55	54	52	90	4	20x25x2	1000	1600	1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, & 17
11	80	69	55	54	45	90	2	20x35x2	600	650	1, 3, 4, 5, 6, 7, 9, 11, 12, 13, 14, 15, & 17
11	80	69	55	54	52	90	4	16x25x2	400	1000	1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, & 17
11	80	69	55	54	45	90	2	20x35x2	600	1250	1, 3, 4, 5, 6, 7, 11, 12, 13, 14, 15, & 17

that only 4 units have gas-fired heaters (Remark No. 8). However, based on the ing drawings, numerous units use gas. Coordinate.

AIR TEMPERATURES (°F)											
WINTER	COOLING COIL				HEATING		AIR FILTERS		MIN OA (CFM)	APPROX WEIGHT (LBS)	REMARKS
DB	EDB	EWB	LDB	LWB	EDB	LDB	QTY	SIZE			
11	78	-	55	54	-	-	-	-	2,400	2500	1, 2, & 3
11	-	-	-	-	-	-	-	-	-	3000	4 & 5

EXHAUST FAN SCHEDULE

TION	ELECTRICAL DATA			CAPACITIES		APPROX WEIGHT	REMARKS
UIPMENT	HP	VOLTS	PHASE	CFM	ESP ("WG)		
N - INLINE : SQ-120-VG	1/2	115	1	1,000	0.75	75	PROVIDE WITH BACKDRAFT DAMPER, DISCONNECT, POTENTIOMETER MOUNTED ON FAN, MOUNTING BRACKETS & RUBBER ISOLATORS
N - ROOF : G-099-VG	1/4	115	1	800	0.5	75	PROVIDE WITH BACKDRAFT DAMPER, DISCONNECT, POTENTIOMETER MOUNTED ON FAN, AND ROOF CURB.
N - ROOF : G-099-VG	1/4	115	1	600	0.5	75	PROVIDE WITH BACKDRAFT DAMPER, DISCONNECT, POTENTIOMETER MOUNTED ON FAN, AND ROOF CURB.
N - INLINE : SQ-095-VG	1/4	115	1	450	0.5	75	PROVIDE WITH BACKDRAFT DAMPER, DISCONNECT, POTENTIOMETER MOUNTED ON FAN, MOUNTING BRACKETS & RUBBER ISOLATORS
N - INLINE : SQ-120-VG	1/2	115	1	1,000	0.75	75	PROVIDE WITH BACKDRAFT DAMPER, DISCONNECT, POTENTIOMETER MOUNTED ON FAN, MOUNTING BRACKETS & RUBBER ISOLATORS
N - INLINE : SQ-095-VG	1/4	115	1	500	0.5	75	PROVIDE WITH BACKDRAFT DAMPER, DISCONNECT, POTENTIOMETER MOUNTED ON FAN, MOUNTING BRACKETS & RUBBER ISOLATORS
N - INLINE : SQ-120-VG	1/2	115	1	2,000	0.75	75	PROVIDE WITH BACKDRAFT DAMPER, DISCONNECT, POTENTIOMETER MOUNTED ON FAN, MOUNTING BRACKETS & RUBBER ISOLATORS

MECHANICAL EQUIPMENT SCHEDULE

RIPTION	ELECTRICAL DATA			CAPACITIES			APPROX WEIGHT (LBS)	REMARKS
MAKE & MODEL	W	VOLTS	PHASE	COOLING (MBH)	HEATING (MBH)	SF FLOW (CFM)		
CTLESS SPLIT SYSTEM LL MOUNT FAN COIL ON	-	-	-	24	24	600	50	PROVIDE WIRED CONTROLLER WITH SCHEDULING, & CONDENSATE PUMP POWER INSIDE UNIT PER MFR INSTRUCTION
CTLESS SPLIT SYSTEM AT PUMP ON	--	208	1			-	150	PROVIDE WIND BAFFLE AND LOW AMBIENT KIT SEER=22.0, HSPF=9.5, MCA= 12, MOCP=15, AMBIENT CONDITIONS: SUMMER 91°F DB, 74°F WB; WINTER 11°F DB

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CONSTRUCTION DOCUMENTS (60)% PHASE 1 - IGMP SET

KINGDOM FELLOWSHIP - AME

11700 BELTSVILLE DRIVE
BELTSVILLE, MD 20705

MECHANICAL SCHEDULES

REVISIONS

Date	Description	#

DRAWN BY: TS
CHECKED BY: JS
PROJECT NO. 89-1318
DATE: 2020-03-27
CERTIFIED BY:

SHEET NO.
M6.1


There are no controls shown for Zone Dampers ZD-101 and ZD-102
3/27/2020 6:14:59 PM

DDC POINTS LIST

POINT NAME	REMARKS	POINT TYPE DIGITAL IN	DIGITAL OUT	ANALOG IN	ANALOG OUT
CLG-CMD	COOLING COMMAND				X
GAS-VLV	GAS HEATING CONTROL VALVE				X
FLTR-DP	FILTER DIFFERENTIAL PRESSURE	X			
SA-T	SUPPLY AIR TEMPERATURE			X	
SA-SD	SUPPLY AIR SMOKE DETECTOR	X			
SA-SD	SUPPLY AIR HIGH PRESSURE	X			
MA-T	MIXED AIR TEMPERATURE			X	
SF-SS	SUPPLY FAN START/STOP		X		
SF-AMP	SUPPLY FAN CURRENT			X	
SF-VFD	SUPPLY FAN SPEED				X
DPR-CMD	DAMPER COMMAND				X
EF-SS	EXHAUST FAN START/STOP		X		
EF-AMP	EXHAUST FAN CURRENT	X			
EF-VFD	EXHAUST FAN SPEED				X
RA-T	RETURN AIR TEMPERATURE			X	
RA-H	RETURN AIR HUMIDITY			X	

NOTES:

1. PROVIDE SMOKE DETECTORS ON UNITS OVER 2000 CFM. SMOKE DETECTOR SHALL BE HARDWIRED TO SHUT DOWN SUPPLY FAN UPON ACTIVATION. HARDWIRE TO VFD SAFETY CIRCUIT SO THEY CAN BE TESTED IN AUTO OR HAND.
2. HARDWIRED TO VFD SAFETY CIRCUIT
3. LOCATE 2/3 DOWN THE LONGEST DUCT RUN
4. PROVIDE LOW LEAKAGE DAMPERS WITH LESS THAN 3 CFM/SQ FT LEAKAGE AT 1" WG. DAMPER SHALL CLOSE AUTOMATICALLY UPON ACTIVATION OF THE HVAC SHUTDOWN BUTTON.

SEQUENCE OF OPERATIONS

THE UNIT SHALL BE ENABLED BY THE DDC SYSTEM BASED ON AN OWNER DEFINED TIME-OF-DAY SCHEDULE. ONE ENABLED, THE SUPPLY FAN SHALL START AND THE UNIT SHALL OPERATE ON IT'S INTERNAL CONTROLS TO MAINTAIN THE TEMPERATURE AND HUMIDITY SETPOINTS LISTED BELOW. WHEN THE UNIT IS SHUT DOWN, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED.

FANS:
THE SUPPLY FAN SHALL MODULATE TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT. THE POWER EXHASUT FAN SHALL MODULATE TO MAINTAIN THE BUILDING PRESSURE SETPOINT.
COOLING:
MODULATE TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT OF 55°F.

HEATING:
MODULATE TO MAINTAIN THE SUPPLY AIR TEMPERATURE OF 88°F. IF ANY ZONE CANNOT MAINTAIN SETPOINT FOR 15 MINUTES THE SUPPLY AIR TEMPERATURE SETPOINT SHALL INCREASE BY 5°F.
ECONOMIZER:
ENTHALPY CONTROL SHALL PROVIDE FREE COOLING WHEN AMBIENT CONDITIONS ALLOW.

SAFETIES AND ALARMS

RUN STATUS:
AN ALARM SHALL BE SENT TO THE DDC SYSTEM IF THE SUPPLY/RETURN FANS ARE COMMANDED ON AND THE STATUS IS OFF.

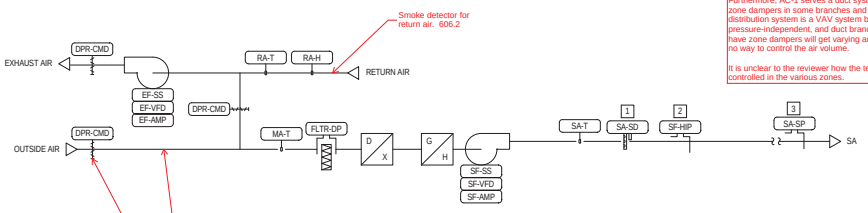
FILTER:
AN ALARM SHALL BE SENT TO THE DDC SYSTEM IF THE FILTER(S) DIFFERENTIAL PRESSURE EXCEEDS THE HIGH LIMIT SETTING.

SMOKE DETECTOR:
THE SMOKE DETECTOR SHALL SHUT DOWN THE FAN AND SEND A SUPERVISORY SIGNAL TO THE FIRE ALARM SYSTEM

This unit serves perimeter and interior zones. It is likely there will be a need for cooling in the interior zones at the same time there is a need for heating in the perimeter zones. The interior zones will likely not be cooled adequately if the supply air from AC-1 is elevated above 55F, and they will likely overheat. Conversely, if cooling governs, the perimeter zones will likely not be heated adequately, and will likey sub-cool.

Furthermore, AC-1 serves a duct system that has VAV zone dampers in some branches and not in others. This distribution system is a VAV system but it is not pressure-independent, and duct branches that do not have zone dampers will get varying amounts of air with no way to control the air volume.

It is unclear to the reviewer how the temperature is controlled in the various zones.



VARIABLE VOLUME AC UNIT CONTROL DIAGRAM (AC - 1)

SCALE: NONE

TYP 1

Provide controls that will maintain the minimum code-mandated ventilation rates (minimum OA) even while the total supply air is modulating. Account for the rate of OA entering the ACU at the minimum unit supply air flow rate. Measure the outdoor air and modulate dampers to ensure the minimum ventilation is provided at all operating conditions. Refer to related comment on Variable Air Volume Schedule.

DDC POINTS LIST

POINT NAME	REMARKS	POINT TYPE DIGITAL IN	DIGITAL OUT	ANALOG IN	ANALOG OUT
RM-T	ROOM TEMPERATURE			X	
RM-TSET	ROOM TEMPERATURE SETPOINT			X	
SA-CFM	SUPPLY AIRFLOW			X	
DPR-CMD	SUPPLY AIR DAMPER COMMAND				X
SA-T	SUPPLY AIR TEMPERATURE			X	

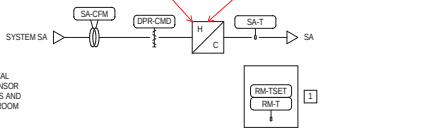
SEQUENCE OF OPERATION

DURING OCCUPIED HOURS, THE VAV DAMPER SHALL MODULATE BETWEEN THE MIN AND MAX AIRFLOW SETPOINTS TO MAINTAIN ROOM TEMPERATURE SET POINTS OF:

COOLING - 78°F (ADJUSTABLE)
HEATING - 68°F (ADJUSTABLE)

Provide sequence for heating if applicable. If heating coil is not applicable, delete from diagram.

Cycling single stage heaters will tend to result in space temperature fluctuations. Consider heaters with silicon controlled rectifier (SCR) controls. If SCR will not be used at least consider multiple stages.



NOTES

1. SEE MECHANICAL PLANS FOR SENSOR REQUIREMENTS AND LOCATION OF ROOM SENSORS.

VAV BOX CONTROL DIAGRAM

SCALE: NONE

TYP 2

There is also a VAV box control diagram on M8.1. If both diagrams are required, define where each one applies. If only one is required, delete the other one.

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CONSTRUCTION DOCUMENTS (50)% PHASE 1 - IGMP SET

KINGDOM FELLOWSHIP - AME

11700 BELTSVILLE DRIVE
BELTSVILLE, MD 20705

MECHANICAL CONTROLS

REVISIONS

Date	Description	#

DRAWN BY: TS
CHECKED BY: JS
PROJECT NO. 89-1318
DATE: 2020-03-27
CERTIFIED BY:

SHEET NO.

M8.2

COLLABORATIVE THIRD-PARTY PEER REVIEW MEETINGS

With a collaborative approach, we can customize our services to meet your needs.

As experienced peer reviewers and engineers, we know that the role of the reviewer may require as much flexibility as that of the designer. We pride ourselves on our ability to adapt to the needs of each client on a case-by-case basis while maintaining a high level of a thorough review. With a pragmatic attitude, we can assist the owner and design team in the implementation of peer review concepts.

With schedule-critical projects, we become a key part of the team and the solution, rather than simply operating strictly from a third-party perspective. Our experience as engineers for major architectural projects has helped us promote an interactive approach to performing peer reviews. For some projects, an "over the shoulder" method may be necessary, to provide critical feedback on a real-time basis, while others may require a more removed, "hands-off" approach. We always manage our peer review team to stay focused on the most critical elements of the design and analysis and to meeting our deadlines to provide timely resolutions with the design team.

When conducting peer review meetings, the general agenda includes the following tasks. However, these tasks will be more tailed specifically to the Agency's Building Four project, which we will agree upon during the project's initial kick-off meeting.

- Presentation of peer review findings and peer review report
- Check of HVAC engineering concepts
- Suggestions for value improvement
- Review of constructability, maintainability, ease-of-use, and biddability
- Review and confirmation of the owner's goals and objectives
- Understand and ensure the project assumptions and the project approach are being met
- Review HVAC design criteria and analysis/design methodology
- Review of any other HVAC reports
- Technical Review of the design and details of the proposed HVAC system
- Preparation and understanding of the next peer review report
- Follow-up meeting(s) with the design team to review and reconcile the peer review comments

CONSTRUCTION ADMINISTRATION PEER REVIEW

Mueller provides comprehensive engineering consulting services from conceptual design through project design, and construction administration and post-owner occupancy. Having acted as project managers, working directly with owners and general contractors on project types similar to Building 4, we bring unique expertise and capabilities, including an excellent track record in planning, design, and construction administration.

As the third-party peer reviewer for this project, during the construction phase of Building 4, we will work with the owner, architect, and contractor to monitor ongoing construction. At the Agency's discretion, Mueller's team can conduct on-site meetings and site observations to oversee the contractor's work to ensure proper construction techniques, materials, equipment, and personnel are employed throughout the project and monitor the contractor's progress and compliance with the Contract Documents. Our team will advise and remain a consultant to the Agency and the architect, providing our analysis on the contractor's sequence of operations and progress schedule.

As part of our construction administration services, Mueller's team can:

- Respond to necessary RFIs from the Agency or architect when relevant to Mueller's peer review recommendations or suggestions offered by our team during the design process
- Review the Contractor's schedule and construction means and methods
- Review periodic updates from the Agency and the architect
- Participate in a pre-construction conference at the site before the start of construction by the Contractor
- Visit the site, at the Agency's discretion, to observe progress and quality of the work
- Submit written reports of site visits and meetings, upon request
- Notify Agency in writing of any concerns regarding the Contractor's performance, when relevant to Mueller's peer review recommendations
- Make recommendations as to the correction of the deficiencies or defects, when relevant to Mueller's peer review deliverables
- Respond to Contractor's inquiries and questions and provide supplemental information as appropriate, when relevant to specific items noted by Mueller's team during the peer review process
- Assist in the review of the Contractor's requests for change orders, specific to areas in which Mueller's team offered comments or recommendations

QUALIFICATIONS, EXPERIENCE, AND PAST PERFORMANCE

Mueller is committed to providing a high level of responsive professional services in mechanical, electrical, plumbing, and fire protection engineering. For more than fifty years, clients have turned to us with their most challenging facility requirements, including environments that put MEP systems to the test. Our specialty is in the design and engineering of complex renovation, retrofit, and new construction projects for private, institutional, historic, and government clients.

Meeting our clients' needs through a customized approach allows us to incorporate the development and review engineering design documents, drawings, specifications, and cost estimates, as well as provide construction contract administration, that ultimately achieves the owner's objectives and goals.

Employing more than 40 professionals on staff, including mechanical and electrical engineers, our teams have worked on large and complex institutional building designs, in addition to small-scale interior renovations. On each project, our experienced principals oversee and remain involved. This level of involvement has resulted in well designed, well-coordinated, functional projects.

A distinction that underscores Mueller's unique qualifications is our experience, understanding, and approach to MEP engineering in historic buildings, particularly Art-Deco style architecture, like Building 4 at the West Virginia State Capitol Complex. We have worked closely with owners and architects to protect significant structures while incorporating modern, efficient systems that minimize maintenance and operating costs while prolonging the life of the building. We understand the systems designed for such buildings need to be of quality in keeping with the character of the buildings and to preserve their historical significance.

PROJECT TEAM

The proposed team to work with the Agency and architect on the peer review of Building 4 is led by **Mr. Todd Garing, PE, LEED AP BD+C**, who will serve as Principal-in-Charge. With close to three decades of experience, Mr. Garing specializes in understanding the complexity of designing MEP systems in historical building structures and how to protect these significant structures.

Working with Mr. Garing will be **Mr. Paul Czajkowski, PE**, Mueller's Chief Mechanical Engineer. With over 40 years of experience, the Agency will benefit from Mr. Czajkowski's subject matter expertise in the design of central HVAC systems on large-scale government, civic, institutional, and historic buildings.

Rounding out Mueller's team is **Mr. Carl Canatella, PE**, Mueller's Chief Electrical Engineer, who brings over 47 years of experience in consulting engineering and 4 years of experience in the manufacturing industries. Working in tandem with Mr. Czajkowski, Mr. Canatella will review any electrical drawings and specifications utilizing his technical expertise in primary and secondary electrical distribution systems.

STAFFING/PROJECT TEAM ORGANIZATIONAL CHART

Todd Garing, PE, LEED AP BD+C
Principal-in-Charge

Paul Czajkowski, PE
Chief Mechanical Engineer

Carl Canatella, PE
Chief Electrical Engineer

THIRD-PARTY PEER REVIEW EXPERIENCE

Mueller's third-party review experience has ranged from corporate and civic institutions to higher education and worship spaces. Our breadth of expertise demonstrates the level of trust clients have in the performance of Mueller's engineers. A list of Mueller's third-party peer review projects is provided below. More detailed information on a selection of these projects is offered in our proposal.

- Peer Review of HVAC, Electrical and Plumbing Drawings, Sagamore Distillery, Baltimore, MD
- Peer Review of HVAC System Assessment Report, The Phillips Collection, Washington, DC
- Peer Review of HVAC and Plumbing Drawings, Horseshoe Casino, Baltimore MD
- Peer Review, Chilled Water Plant Optimization, Central Plant, Georgetown University, Washington, DC
- Peer Review, Evaluation of HVAC System, Yates Field House Natatorium, Georgetown University, Washington, DC
- Peer Review, Mechanical, Electrical, and Plumbing, Kingdom Fellowship, AME Church in Beltsville, MD

Having a third-party review team that specializes in HVAC engineering and the detailed consultation of the mechanical systems in a historic building, such as the Agency's Building Four, will be a major asset to the project.

QUALIFICATIONS, EXPERIENCE, AND PAST PERFORMANCE

THIRD-PARTY PEER REVIEW APPROACH

Mueller's overall approach focuses on our engagement in the earliest stages of design. For the Building Four peer review, our team's methodology will ensure the project details are addressed as close to the beginning of the design process as possible. Mueller's engineers will put significant effort into reviewing the details of the design and the cost estimates throughout early desgin phases, rather than wait until the completion of construction documents.

The keys to developing a successful peer review for the Building Four project entails the following:

1. **Understanding the Project**: Focus on providing solutions and suggestions, rather than finding and identifying problems.

2. **Reviewing the Interface of Systems**: Understand how the proposed HVAC systems will interface with the other aspects of the Building Four renovation project.

3. **Providing Constructive Reviews**: Focus on general design approaches in the beginning and as the design moves through the design development and construction document phases our reviews will become more attentive to correcting items that have not already been identified, along with obscure, easy-to-miss, details.

4. **Focus on the Big Picture**: Emphasize changes and recommendations that will impact the project's design, cost, and quality.

5. **Complete a Thorough Review**: Address any problems so that fewer change orders and more accurate bid prices result from contractors.

REFERENCES

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Georgetown University
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202-687-8822
Mark.maning@georgetown.edu

Baltimore Museum of Art
Daniel Bleemke
Director of Facilities & Engineering
Baltimore Museum of Art
10 Art Museum Drive
443-573-1592
DBleemke@artbma.org

EXPRESSION OF INTEREST FORM

Purchasing Divison 2019 Washington Street East Post Office Box 50130 Charleston, WV 25305-0130	State of West Virginia Centralized Expression of Interest 02 — Architect/Engr	

Proc Folder: 727647

Doc Description: EOI: Third Party Peer Review Building Four

Proc Type: Central Contract - Fixed Amt

Date Issued	Solicitation Closes	Solicitation No	Version
2020-05-28	2020-06-24 13:30:00	CEOI 0211 GSD2000000005	1

BID RECEIVING LOCATION

BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR

Vendor Name, Address and Telephone Number:

Mueller Associates, Inc.
1336 Concourse Drive, Suite 100
Linthicum, MD 21090
410.646.4500

FOR INFORMATION CONTACT THE BUYER

Melissa Pettrey
(304) 558-0094
melissa.k.pettrey@wv.gov

Signature X Todd J. Harris FEIN # 52-1772965 DATE 6/24/2020

All offers subject to all terms and conditions contained in this solicitation

Page : 1 FORM ID : WV-PRC-CEOI-001

ADDENDUM ACKNOWLEDGMENT

Purchasing Divison
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Centralized Expression of Interest
02 — Architect/Engr

Proc Folder: 727647
Doc Description: Addendum No. 1 EOI: Third Party Peer Review Building Four
Proc Type: Central Contract - Fixed Amt

Date Issued	Solicitation Closes	Solicitation No	Version
2020-06-12	2020-06-24 13:30:00	CEOI 0211 GSD2000000005	2

BID RECEIVING LOCATION
BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR
Vendor Name, Address and Telephone Number:
Mueller Associates, Inc.
1336 Concourse Drive, Suite 100
Linthicum, MD 21090
410.646.4500

FOR INFORMATION CONTACT THE BUYER
Melissa Pettrey
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melissa.k.pettrey@wv.gov

Signature X Todd J. Harris FEIN # 52-1772965 DATE 6/24/2020
All offers subject to all terms and conditions contained in this solicitation

Page : 1 FORM ID : WV-PRC-CEOI-001

VENDOR PREFERENCE FORM

WV-10
Approved / Revised
06/08/18

State of West Virginia

VENDOR PREFERENCE CERTIFICATE

Certification and application is hereby made for Preference in accordance with ***West Virginia Code***, §5A-3-37. (Does not apply to construction contracts). ***West Virginia Code***, §5A-3-37, provides an opportunity for qualifying vendors to request (at the time of bid) preference for their residency status. Such preference is an evaluation method only and will be applied only to the cost bid in accordance with the ***West Virginia Code***. This certificate for application is to be used to request such preference. The Purchasing Division will make the determination of the Vendor Preference, if applicable.

1. **Application is made for 2.5% vendor preference for the reason checked:**
☐ Bidder is an individual resident vendor and has resided continuously in West Virginia, or bidder is a partnership, association or corporation resident vendor and has maintained its headquarters or principal place of business continuously in West Virginia, for four (4) years immediately preceding the date of this certification; **or,**

☐ Bidder is a resident vendor partnership, association, or corporation with at least eighty percent of ownership interest of bidder held by another entity that meets the applicable four year residency requirement; **or,**

☐ Bidder is a nonresident vendor which has an affiliate or subsidiary which employs a minimum of one hundred state residents and which has maintained its headquarters or principal place of business within West Virginia continuously for the four (4) years immediately preceding the date of this certification; **or,**

2. **Application is made for 2.5% vendor preference for the reason checked:**
☐ Bidder is a resident vendor who certifies that, during the life of the contract, on average at least 75% of the employees working on the project being bid are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; **or,**

3. **Application is made for 2.5% vendor preference for the reason checked:**
☐ Bidder is a nonresident vendor that employs a minimum of one hundred state residents, or a nonresident vendor which has an affiliate or subsidiary which maintains its headquarters or principal place of business within West Virginia and employs a minimum of one hundred state residents, and for purposes of producing or distributing the commodities or completing the project which is the subject of the bidder's bid and continuously over the entire term of the project, on average at least seventy-five percent of the bidder's employees or the bidder's affiliate's or subsidiary's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years and the vendor's bid; **or,**

4. **Application is made for 5% vendor preference for the reason checked:**
☐ Bidder meets either the requirement of both subdivisions (1) and (2) or subdivision (1) and (3) as stated above; **or,**

5. **Application is made for 3.5% vendor preference who is a veteran for the reason checked:**
☐ Bidder is an individual resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard and has resided in West Virginia continuously for the four years immediately preceding the date on which the bid is submitted; **or,**

6. **Application is made for 3.5% vendor preference who is a veteran for the reason checked:**
☐ Bidder is a resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard, if, for purposes of producing or distributing the commodities or completing the project which is the subject of the vendor's bid and continuously over the entire term of the project, on average at least seventy-five percent of the vendor's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years.

7. **Application is made for preference as a non-resident small, women- and minority-owned business, in accordance with *West Virginia Code* §5A-3-59 and *West Virginia Code of State Rules.***
☒ Bidder has been or expects to be approved prior to contract award by the Purchasing Division as a certified small, women- and minority-owned business.

8. **Application is made for reciprocal preference.**
☒ Bidder is a West Virginia resident and is requesting reciprocal preference to the extent that it applies.

Bidder understands if the Secretary of Revenue determines that a Bidder receiving preference has failed to continue to meet the requirements for such preference, the Secretary may order the Director of Purchasing to: (a) rescind the contract or purchase order; or (b) assess a penalty against such Bidder in an amount not to exceed 5% of the bid amount and that such penalty will be paid to the contracting agency or deducted from any unpaid balance on the contract or purchase order.

By submission of this certificate, Bidder agrees to disclose any reasonably requested information to the Purchasing Division and authorizes the Department of Revenue to disclose to the Director of Purchasing appropriate information verifying that Bidder has paid the required business taxes, provided that such information does not contain the amounts of taxes paid nor any other information deemed by the Tax Commissioner to be confidential.

Bidder hereby certifies that this certificate is true and accurate in all respects; and that if a contract is issued to Bidder and if anything contained within this certificate changes during the term of the contract, Bidder will notify the Purchasing Division in writing immediately.

Bidder: Mueller Associates, Inc. **Signed:** Todd J. Harris

Date: 6/24/2020 **Title:** Vice President

**Check any combination of preference consideration(s) indicated above, which you are entitled to receive.*

Mueller

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CONTACT
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