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Salas O'Brien

PROPOSAL

City of Stamford

Commissioning Agent Services for New Westhill High School

State Project No. 135-0280 N / December 21, 2023 @ 4 PM

PREPARED BY

BVH Integrated Services,
a Salas O'Brien Company
206 West Newberry Road
Bloomfield, CT 06002
860.286.9171

PREPARED FOR

Erik J. Larson
Purchasing Agent
City of Stamford
elarson@stamfordct.gov

DECEMBER 21, 2023

Erik J. Larson
Purchasing Agent
City of Stamford
elarson@stamfordct.gov

Dear Erik,

BVH Integrated Services, a Salas O'Brien company (Salas O'Brien), is pleased to present our qualifications to provide Commissioning Services for the New Westhill High School in Stamford, Connecticut in response to RFP No. 2024-0194 and Addendum No.1 received on December 15th. As demonstrated in our enclosed submission, Salas O'Brien offers extensive experience in the design and commissioning of various building projects over the past 60+ years.

Professional Qualifications

Salas O'Brien has over 70 offices in the United States and we offer our clients resources that include more than 2,400 team members and 400+ registered professionals. Locally, our Commissioning (Cx) and Building Envelope Services (BECx) Departments include 15 full-time professionals. These professionals include Certified Commissioning Professionals (CCP), Building Envelope Specialists, licensed Professional Engineers, LEED Accredited Professionals, NEBB Certified Professionals, Certified EIFS Inspectors, and Level 1 Thermographers, all of whom dedicate 100% of their time and expertise to providing commissioning and building envelope services for our clients.

Project Staffing

The primary point-of-contact for this project will be Associate Vice President and Commissioning Principal-in-Charge, Michael Gannon, PE, CCP, CEM, LEED AP. Mike is a licensed professional engineer with over 30 years of experience. Our proposed team includes Commissioning Project Manager, Daniel Morin, CCP, NEBB CP, BSC, LEED AP; Commissioning Provider, Chris Bonczek; Director of Building Envelope Services, Jon Haehnel, CEI, BPI-ES & BA, CABS; and Building Envelope Specialist, and Paul D'Amore, CEI, BPI-BA. Our team understands the project goals and will be committed to the project for the life of the contract.

Our key project team members are experienced professionals who have proven themselves as leaders with an in-depth understanding of building systems, air and water balancing and temperature controls. Their experience will be of great benefit to this project.

Relevant Experience

The City of Stamford will benefit from Salas O'Brien's extensive experience with relevant K-12 projects. A large percentage of our commissioning experience is for repeat clients, a testimony to the high-quality services we consistently provide. Our portfolio also encompasses similar projects to this one such as Belmont Middle and High Schooll, HC Wilcox Technical High School, JM Wright Technical High School, and Orville H. Platt High School.

Unique Approach

The City of Stamford will also benefit from Salas O'Brien's depth of resources and a full complement of design engineers highly experienced in the design and turnover of similar buildings. A multi-disciplined engineering firm, Salas O'Brien offers civil, structural, mechanical, electrical, plumbing, fire protection, and technology engineering design services. Our integrated approach gives us an in-depth understanding of drawing detail and design, which strengthens our commissioning efforts.

Most notably, and what distinguishes us most from other firms, is how we carry out functional testing. Salas O'Brien personnel conduct all systems and equipment tests and document our review of their performance. We do not ask the contractors to test their own equipment / systems and submit paperwork on those tests for our review. We are "hands on" field technicians with years of building controls experience. We have been performing professional commissioning services since 1990 and believe our experience will be of great benefit to the City of Stamford.

Salas O'Brien has successfully performed commissioning on numerous similar facilities that have included "Full" Building Commissioning and newly renovated Commissioning projects. Our local Connecticut office is staffed with a full-time team of MEP/FP engineers in addition to our proposed commissioning team for services associated with this project.

Should you have any questions or would like additional information, please feel free to contact us. Thank you.

Sincerely,

BVH Integrated Services, a Salas O'Brien company

Michael Gannon, PE, CCP, CEM, LEED AP
Associate Vice President
860.760.7467, michael.gannon@salasobrien.com

Table of Contents

1 Statement of Minimum Qualifications

Minimum Qualifications

Section 3.1 - Specific Qualifications

The successful proposer must:

Be an independent, third-party individual or firm that is not a member of or otherwise affiliated with the designer/architect, construction manager, or otherwise affiliated with the construction team. This restriction shall not apply to the provision of owner's representative services.

BVH Integrated Services, a Salas O'Brien Company is an independent, third-party firm that is not a member of or otherwise affiliated with the designer/architect, construction manager, or otherwise affiliated with the construction team.

Possess certification as a commissioning authority by the Building Commissioning Association, the Association of Engineers, or, in the Owner's sole judgment, a comparable certifying organization.

In choosing a Commissioning Provider, certifications are a measure of technical competency, education, and experience. Members of Salas O'Brien's commissioning team hold many of the certifications in the industry, including but not limited to:

- Certified Commissioning Providers (CCP) - Building Commissioning Association
- BPI Certified Building Analyst and Envelope Specialist
- Air and Water Balancing Specialists
- LEED Accredited Professionals
- OSHA 10-hour Construction Safety
- OSHA Confined Space Training
- Certified Energy Managers
- Infrared/Thermography Certification - Level 1
- Niagara AX Certification

Salas O'Brien 's proposed Project Manager, Michael Gannon, has a Master's Degree in Construction Management and Bachelor's Degree in Mechanical Engineering. Michael has over 30 years of experience and is a licensed Professional Engineer in Connecticut. In addition, he is a Certified Commissioning Provider through the Building Commissioning Association, and is a LEED Accredited Professional.

Possess all relevant Connecticut licenses, including a Professional Engineer and/or S1 license.

Salas O'Brien's proposed Project Manager, Michael Gannon, has a Master's Degree in Technology Management and a Bachelor's Degree in Mechanical Engineering. Michael has over 30 years of experience and is a licensed Professional Engineer in Connecticut. Lindsay Huff has been in the Engineering field since 1987 and the Director of Commissioning Services since 1994. He has successfully performed commissioning duties on various projects since then and holds his Certified Commissioning Provider certification through the Building Commissioning Association.

Possess a minimum of five (5) full years field experience as a commissioning agent.

Salas O'Brien has been providing commissioning services for over 30 years in CT and has commissioned millions square feet of construction and is well versed in projects of a similar size and scope. Please refer to our k-12 experience in the Relevant Experience section.

Possess or have the ability to obtain the required insurance in Appendix D.

Salas O'Brien posses the required insurance. See attachmentsin section 6.

Minimum Qualifications

Note: the fee for insurance premiums shall be included in the proposer's lump fee and will not be separately reimbursed by the Owner. Have experience as the principal commissioning authority for at least

- **one (1) high school value exceeding $100MM in the last 7 years in the northeast region of the United States**
  - Maloney High School, Meriden, CT
    - Commissioning services for a school renovation and addition project to meet new standards, code updates and programmatic enhancements, and create new classroom wings. The new construction and renovation will be serviced by entirely new systems which include: HVAC systems along with the potential for geothermal, fuel cell and cogen systems and energy management control systems. Size: 260,000 SF renovate as new. Project Cost: $109 million. Completed 2016.
- **four (4) school new construction or renovation projects at least 200,000 gross square feet in area generally located in the northeast region of the United States**
  - Orville H. Platt High School, Meriden, CT
    - Commissioning services for a school renovation and addition project to meet new standards, code updates and programmatic enhancements, and create new classroom wings. The commissioning includes all new mechanical, electrical, plumbing, fire protection, communications, and life safety systems. Size: 247,000 SF. Project Cost: $111 million. Completed 2017.
  - J. Henry Higgins Middle School, Peabody, MA
    - Commissioning services for the new construction of a 221,518-SF middle school for 1,340 students, grades 6 through 8. With a total construction budget of approximately $75.1 million, the project is being constructed on the site of the existing school. Size: 221,500 SF. Project Cost: $75 million. Completed 2022.
  - Eli Whitney Technical High School, Hamden, CT
    - As part of the state's plan to modernize the technical high schools, Eli Whitney underwent a 35,000 s/f demolition, comprehensive renovations to 140,000 s/f of the existing facility, as well as received a 91,000 s/f addition to accommodate 800 students. Size: 231,100 SF. Project Cost: $72 million. Completed 2016.
  - Wethersfield High School, Wethersfield, CT
    - The original Wethersfield High School complex was built in 1952 with several additions over the years. Our team provided commissioning services for this full-building renovation encompassing 255,000 SF and a 26,000-SF addition. Designed to meet LEED Silver Certification, the project includes a complete infrastructure upgrade, new classrooms, a new media center, a completely renovated auditorium with increased seating at the new mezzanine, a new gymnasium, additional classrooms, a new culinary program and a new commons/cafeteria. Size: 255,000 SF renovation; 26,000 SF addition. Project Cost: $72 million. Completed 2016.
- **one (1) project utilizing phased, occupied construction at a school.**
  - HC Wilcox Technical High School, Meriden, CT
    - Performed commissioning services for this state-funded $77.9 million project which renovated the building "like new," and added some new construction to the north and south sides of the school. Parts of this building were built in the 1960s and in desperate need

Minimum Qualifications

of some updating. Updates include completely-renovated classrooms that now feature interactive Smart Boards. The project comprised a 99,000-SF renovation and 76,400-SF addition, which upgraded all building systems and brought the technical high school to current code standards. Size: 76,400 New, 99,000 Renovation. Project Cost: $77.9 million. Completion Date: 2014.

- **one (1) project achieving LEED Silver or higher certification (actual certification, not simply CTHPB requirement equivalence)**
  - M.D. Fox School, Hartford, CT
    - LEED Gold Certified in 2015, LEED 2009 Schools, 600 points
- **The lead CxA staff shall have experience with projects meeting the criteria above**
  - Michael Gannon, Associate Vice President and the proposed Commissioning Project Manager for this project, has over 30 total years of experience with a variety of building projects. In addition to the K-12, LEED- Certified, CT High Performance school projects listen on his resume, Mike also provided Cx services for J. Henry Higgins Middle School and Eli Whitney Technical High School, described above.

The project will be subject to the State of Connecticut Department of Construction Services Office of Grants Administration (CT OGA, formerly OSCG&R) requirements. Candidates shall demonstrate the ability to comply with the requirements of this state funding body. Experience with other state's funding authorities such as MSBA (Massachusetts State Building Authority) or RIDE (Rhode Island Department of Education) are acceptable forms of experience. Proposers with OGA-specific experience may be given additional credit over proposers without this experience.

Salas O'Brien has worked on numerous projects with the State of Connecticut, including new construction and renovations to Connecticut Technical High Schools throughout the state. We also have a long-standing contract with Massachusetts State Building Authority, with numerous projects completed over the past 10 years.

Selected CT Technical High Schools

- EC Goodwin Technical High School
- Eli Whitney Technical High School
- HC Wilcox Technical High School
- JM Wright Technical High School
- Orville H. Platt High School

Selected CT City/Town School Projects

- New Haven Academy, New Haven, CT
- Barack H. Obama Magnet University School, New Haven, CT
- Joseph A. DePaolo & John F. Kennedy Middle Schools, Southington, CT
- Waddell, Cheney/Bennet & Verplanck Schools, Manchester, CT
- Choate Rosemary Kohler Center (Net Zero Building Design), Wallingford, CT
- M.D. Fox School, Hartford, CT
- Francis T. Maloney High School, Meriden, CT
- Birch Grove School, Tolland, CT

Massachusetts School Building Authority

- Amesbury Elementary School, Amesbury, MA
- Belmont Middle & High School, Belmont, MA
- James F. Peebles Elementary School, Buzzards Bay, MA
- Westport Middle and High School, Westport, MA

Minimum Qualifications

Section 3.2 - General Qualifications

The Owner shall take into account, among other relevant considerations, the following qualifications:

Experience in developing Owner's Project Requirements, including but not limited to soliciting information from Owner stakeholders, managing the process, developing/revising/updating documents, and reviewing designs on behalf of the OPR criteria.

Salas O'Brien has extensive experience developing and assisting in the development of the Owner's Project Requirements (OPR) documentation. Salas O'Brien has developed a questionnaire format to assist the Owner and Design Team with identifying the key points that are identified in the OPR. In addition to the questionnaire, we are adapt are using existing project documentation to develop the framework of a project specific OPR. This existing documentation might include Statements of Need, Schematic Design Narratives, Space Programming information and previous meeting minutes. Any document that captures the end-users expectations can be used to populate the OPR. Local building and energy codes also define some of the project constraints and can be useful references in the OPR.

Experience in the operation and troubleshooting of HVAC systems and energy management control systems.

Salas O'Brien has extensive experience with the operation and troubleshooting of HVAC systems and controls. Salas O'Brien commissioning providers are hands-on field engineers with diverse backgrounds including facilities operations, temperature controls and air and water testing and balancing. We are experienced with all modern control system strategies and systems. We are familiar with construction trades and practices of the local contractors. This allows us to build a rapport with the installing contractors for a more efficient (and less adversarial) functional testing process. Our familiarity with these control systems allows us to identify key data points for trend recording and analysis. Data logging and analysis deemed necessary but outside the view of the permanently-installed equipment can often be accomplished with our own portable data logging equipment.

Knowledge of building operation and maintenance and O&M training.

Lindsay Huff, who is the Director of Commissioning for Salas O'Brien's 15-person commissioning department, has been providing commissioning services for over 30 years on hundreds of projects ranging from municipal facilities to research facilities. Prior to joining Salas O'Brien, he was the Operations and Maintenance Supervisor for several buildings for Olympia and York in Hartford, CT, and Springfield, MA. Michael Gannon, Associate Vice President and the proposed Commissioning Project Manager for this project, also has over 30 total years of experience with a variety of building projects.

Knowledge of national building & fire codes as well as water-based fire extinguishing systems, detection systems and alarms systems.

Salas O'Brien has extensive experience with the applicable life safety codes, regulations and procedures. Salas O'Brien's Commissioning Team is highly familiar with national building and fire codes, as well as water-based fire extinguishing systems, detection systems and alarm systems. Not only do we have experience commissioning fire protection systems, Salas O'Brien can draw upon the resources of our in-house MEP engineers, who design fire protection systems for all types of buildings. Salas O'Brien currently has 10 fire protection design engineers on staff. Our staff includes hands-on field engineers and commissioning staff with diverse backgrounds including licensed inspectors for the State of Connecticut, as well as experts in education facility design, facilities operations, temperature controls and testing and balancing.

Minimum Qualifications

Knowledge of testing and balancing both air and water systems.

Salas O'Brien has extensive experience in system design and combines the civil, structural, mechanical, electrical, commissioning, building envelope, and technology disciplines on over 300 projects each year. As a part of the commissioning personnel, Salas O'Brien employs four former Testing and Balancing personnel with two of them former NEBB supervisors. Together, they have over 70 years of air and water balancing experience. Salas O'Brien personnel are capable of all testing for both air and water by our staff. Salas O'Brien owns industry standard airflow hoods, differential pressure meters and an ultrasonic flow meter to assist our staff when confirming air and water flow data and troubleshooting.

Experience with energy-efficient equipment design and control strategy optimization.

LEED was designed to encourage building owners, designers, and manufacturers to put a higher priority on conserving energy and resources for future generations. According to the USGBC, there are also economic benefits. Green buildings can reduce operating costs, enhance asset value and profits, improve employee productivity and satisfaction, and optimize life-cycle economic performance.

Salas O'Brien is a national leader in green building design. With LEED Accredited Professionals on staff for each engineering discipline, our firm is knowledgeable in the design of LEED certified buildings that are environmentally responsive, resource efficient, and beneficial to the community. The following is a select sampling of the LEED projects Salas O'Brien has commissioned:

- Choate Rosemary Kohler Environmental Center/Net Zero Building Design (LEED Platinum)
- Yale University School of Medicine BML-3 (LEED Platinum)
- Bain Capital at the John Hancock Building, Boston, MA (LEED Gold)
- Barnard Environmental Studies Magnet School (LEED Gold)
- Blue Cross Blue Shield of Rhode Island (LEED Gold)
- Columbia University Northwest Science Building (LEED Gold)
- Deerfield Academy Science, Math & Technology Building (LEED Gold)
- East Hartford Fire Station (LEED Gold)
- Smith College Ford Hall (LEED Gold)
- Yale University School of Management (LEED Gold)
- Yale University Stoeckel Hall (LEED Gold)
- University of Notre Dame Purcell Pavilion (LEED Gold)
- Aetna Atrium Building (LEED Silver)
- Cheshire County House of Corrections (LEED Silver)
- Eastern Connecticut State University Fine Arts Building (LEED Silver)
- University of Massachusetts Honors College (LEED Silver)
- University of Notre Dame Innovation Park Research Building (LEED Silver)
- Yale University Health Services Center (LEED Silver)
- MaineGeneral Medical Center (LEED Silver)
- Brookhaven National Laboratory RSL II Building (LEED Core + Shell)
- Franklin Regional Transit Authority/Net Zero Building Design
- Mass Mutual, Springfield, MA (LEED EB)

Experience with total building commissioning approach including building envelope, data and communication systems and other specialty systems.

Salas O'Brien's building envelope expertise is part of our integrated services and gives our clients single source access from pre-design through post-occupancy. Building envelope services include building envelope commissioning, building envelope diagnostics, building envelope plan and specification reviews, building envelope consulting, large scale blower door testing, pressure balanced blower door testing, infrared imaging, pressurized fog testing, window airtightness testing, window water penetration testing, membrane adhesion testing, and mock up testing and inspections. Salas O'Brien has four (4) full-time employees

Minimum Qualifications

dedicated to the building envelope commissioning services, led by Mr. Jon Haehnel.

Salas O'Brien provides a full complement of technology design services to assist both end-users and planners throughout new construction, renovation, and network upgrade projects. Our team leverages current and future technologies that provide safe, secure, and efficient built environments. We bring your network up to speed for the cutting-edge communications technologies and multimedia services that facilitate cross-application compatibility, including voice, data, video and broadband applications. Technology design capabilities include network design and specifications, telecommunications cabling, technology master planning, security/access control, audio/visual systems, local area network, commissioning, closed circuit television, and system fail-over and redundancy design. Salas O'Brien has four (4) full-time employees dedicated to building technology design and troubleshooting services.

Experience in sustainable technologies. Specific emphasis placed on low EUI projects, Net-Zero buildings, EV charging, and renewable energy such as GeoExchange and solar.

Salas O'Brien is a national leader in energy planning and the planning, design, and implementation of geothermal systems, central energy plants, and district energy systems. Our extensive portfolio includes Net-Zero buildings, EV charging, and renewable energy such as GeoExchange and solar.

Making a large capital investment in a facility or system, whether new or existing, is a decision that impacts an enterprise for decades. Salas O'Brien offers the experience and expertise – and the networks and partnerships – to deliver complex projects that are reliable, resilient, versatile, and effcient, reducing operating costs and eliminating carbon.

Salas O'Brien uniquely integrates energy system and site engineering disciplines, collectively leveraging shared knowledge, information, and ideas. Our clients work directly with licensed engineers, project managers, commissioning agents, system designers, CAD/Revit technicians,field technicians, and construction administration personnel. With this unified approach, we successfully plan, design, manage and deliver the highest quality project results: one design, one team, one goal.

We have designed and commissioned numerous LEED projects, including UMass Amherst John W. Olver Design Building, a LEED Gold-certified building that showcases best practices in sustainability including cross-laminated timber; Mary Hooker Environmental Sciences Magnet School, the first LEED Platinum-certified public school in Connecticut; and Minuteman Regional Vocational Technical High School in Lexington, MA, on track for LEED Gold certification through a design that uses significant less energy than current energy codes. Moreover, our building envelope and commissioning specialists have worked on many net zero projects, including the Kohler Environmental Center at Choate Rosemary Hall, North Country School, Walter P. Breeman Performing Arts Center, Middlebury Town Offices, and AVA Gallery Sculptural Studies.

Experience in monitoring and analyzing system operation using energy management control system trending and stand-alone data logging equipment.

Salas O'Brien has performed energy monitoring and analysis for various projects, including Columbia University's Basov Lab, Will Lab, and the "XYZ" Lab within the Northwest Science Building on the Columbia University Campus. Also, we have been hired on multiple State of Connecticut projects where the scope of services requires us to collect the energy usage of the newly constructed building over a one year period and compare to the energy model

The Commissioning Agent shall also be experienced partnering with the local utility company and working with Energy programs to help maximize the Owner's available incentives. Greater consideration will be given to proposers if experience with Path 1 and Path 2 of the EnergizeCT Commercial New Construction Incentive Program is demonstrated.

Minimum Qualifications

Although not directly involved in the selection and pursuit of utility incentives, it is common for the information obtained through our functional testing process to be used to satisfy utility incentive requirements. The specific measures that will ultimately be installed are typically selected by the Design Team. This selection is finalized after budgeting and cost – benefit analyses determine the most suitable measures for the project. The measures often require specific model numbers and options from the chosen manufacturers to qualify for the utility incentives. This is one of the details focused on during the concurrent submittal review during the early construction phase. As noted earlier, the rigor of our functional testing process far exceeds the minimum documentation and testing requirements typically required to verify the installation and operation of the equipment associated with the incentives.

Verbal and writing communication skills. Organization and the ability to work with both management and trade contractors.

From commissioning specifications to commissioning plan writing, and final report documentation, nothing is more important than to be clear, understandable, well organized, and concise. Having the appropriate writing skills enables us to communicate effectively to those who manage the project, but also to the personnel who install the building components. As a leader in the commissioning industry for the past 33 years, we have not only grown, but we have learned from previous experiences, allowing us to be confident in our ability to communicate effectively not only verbally, but written as well.

Experience in writing commissioning specifications.

Salas O'Brien has written hundreds of commissioning specifications and coordinated their inclusion into these projects with Architects and Engineers-of-Record over the past 29 years. Salas O'Brien's proposed Commissioning Team will produce the specifications for the commissioning requirements of this project defining the necessary scope and participation of the design team and various subcontractors. Membership with the Building Commissioning Association.

Membership with the Building Commissioning Association.

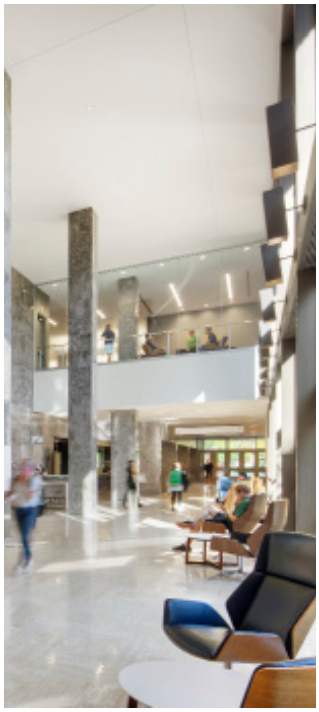
As stated in an earlier response certifications are a measure of technical competency, education, and experience. Members of Salas O'Brien's commissioning team hold many of the certifications in the industry, including but not limited to:

- Certified Commissioning Providers (CCP) - Building Commissioning Association
- BPI Certified Building Analyst and Envelope Specialist
- Air and Water Balancing Specialists
- LEED Accredited Professionals
- OSHA 10-hour Construction Safety
- OSHA Confined Space Training
- Certified Energy Managers
- Infrared/Thermography Certification - Level 1
- Niagara AX Certification

Salas O'Brien 's proposed Project Manager, Michael Gannon, has a Master's Degree in Construction Management and Bachelor's Degree in Mechanical Engineering. Michael has over 30 years of experience and is a licensed Professional Engineer in Connecticut. In addition, he is a Certified Commissioning Provider through the Building Commissioning Association, and is a LEED Accredited Professional.

2 Firm Profile, Project Experience, and Additional Information

Engineered for Impact



BVH Integrated Services, Inc., a multi-disciplined engineering firm, has been serving clients since 1958. Recognized for our leadership on successful building and commissioning projects, BVH merged with Salas O'Brien in 2021 expanding into a firm focused on advancing the human experience through the built environment. We help clients achieve critical goals, advance team members through growth and opportunity, and operate at the center of important global issues, including sustainability and decarbonization.

KEY CONTACTS

Authorized Representative:

Lindsay Huff, CCP, LEED AP
Senior Vice President, Director of Commissioning
lindsay.huff@salasobrien.com

Commissioning Authority:

Michael Gannon, PE, CEM, CCP, LEED AP
Associate Vice President
Commissioning Project Manager
michael.gannon@salasobrien.com

Jon Haehnel, CEI, BPI- BA, ES
Associate Vice President, Director, Building Envelope Services
jon.haehnel@salasobrien.com

Commissioning Services

Since 1990, our dedicated team of professionals has been providing commissioning services on various projects, including public and private education, research laboratories, central plants, judicial facilities, destination resorts, high-rise complexes, hospitals and medical centers, and office complexes.

With the tremendous increase in system complexity, accelerated schedules, and tighter restrictions to energy consumption, standard design and construction are no longer enough to ensure that a finished building will function optimally. Commissioning solves problems before they get in the way of a successful project.

- Functional Testing
- LEED Certification Testing
- Enhanced Cx
- Retro-Commissioning
- Facility Optimization
- Existing Building Cx
- Owner Training
- O&M Documentation
- Maintenance Training Manuals
- Air & Water Balancing Verification
- Engineering Peer Review
- Building Envelope Services
- Enhanced Contract Administration
- Continuous Commissioning Services

Building Envelope Services

Specialists in building envelope commissioning and air tightness testing, Salas O'Brien's building envelope expertise is part of our integrated services, providing clients single source access from pre-design through post-occupancy. Our cross-disciplinary knowledge delivers finely tuned buildings that meet exacting energy, material, and climate demands.

Salas O'Brien has the knowledge, experience, and equipment to make envelope commissioning a smooth process for your project. Our team is qualified and experienced in a variety of building envelope commissioning, diagnostic, and testing services.

- Building Envelope Commissioning
- Building Envelope Diagnostics
- Building Envelope Plan and Specification Review
- Building Envelope Consulting
- Large Scale Blower Door Testing
- Pressure Balanced Blower Door Testing
- Infrared Imaging
- Pressurized Fog Testing
- Window Airtightness Testing
- Window Water Penetration Testing
- Membrane Adhesion Testing
- Mock-up Testing and Inspections

Our Team

Our leaders actively model the principles of integrity, respect, fairness, and transparency, establishing a culture of trust and shared purpose.

70+
Offices across North America

400+
Registered professionals

2,400+
Passionate team members

$500+
Million in Annual revenue

Our Focus

With more than 2,000 employee owners operating from locations across North America, we provide a full range of engineering and technical consulting services for government and private sector clients.

- Mechanical & Electrical
- Plumbing/Fire Protection
- Structural
- Building Science
- Commissioning
- Energy & Utilities
- Technology Design
- Acoustics
- Fire Protection
- Industrial Process
- Civil
- Roofing & Waterproofing
- Automation & Controls
- Architecture & Interiors
- Construction Management

K-12 Experience Commissioning + Building Envelope Services

CONNECTICUT

A.I. Prince Vo-Tech High School
Amistad High School
Asian Studies at Bellizzi School
Barack H. Obama Magnet University School
Barnard Magnet School
Betsy Ross School
Birch Grove Primary School
Cheney/Bennet Academy
Clinton Avenue PreK-8 School
Dryden Elementary School
E.C. Goodwin Vo-Tech High School
East End Elementary School
East Rock Elementary School
Eli Whitney Vo-Tech I High School
Elias Brookings Elementary School
ESUMS Magnet School
Francis T. Maloney High School
Great Path Academy
Griswold Middle School
H.C. Wilcox Vo-Tech High School
Hanover High School
Henry Abbott Vo-Tech High School
Hill Regional Career High School
Howell Chaney Vo-Tech High School
Irving A. Robbins Middle School
JM Wright Vo-Tech High School
John F. Kennedy Middle School
Joseph A. DePaolo Middle School
Longfellow School
M.D. Fox School
Manchester Public Schools
New Haven Academy School
North Branford High School
North Haven Middle School
Orville H. Platt High School
Region 16 Elementary School
Regional Vocational Aquaculture School
Roberto Clemente Learning Academy
Shepaug Valley High School
Tolland High School
Verplanck Elementary School
Waddell Elementary School
Westside School
Wethersfield High School
Wilbur Cross High School
Windham Interdistrict Magnet School
Woodrow Wilson Middle School

MASSACHUSETTS

Agawam Junior High School
Alcott School
Amesbury Elementary School
Belmont Middle & High School
Dean Technical High School
Doherty Memorial High School
Dryden Elementary School
E.N. White Elementary School
Elias Brookings Elementary School
Estabrook Elementary School
Greenfield High School
Holyoke Public School
J. Henry Higgins Middle School
James F. Peebles Elementary School
Mary Dryden Elementary School
Mount Greylock Regional School
Pine Grove Elementary School
Powder Mill School
Provincetown Public School
Robert Doering School
Roberta G. Doering Middle School
Sarah Gibbons Middle School
Westport Middle/High School
Woodland Elementary School
Worcester Public Schools

MAINE

Bangor Schools

VERMONT

Burlington High School
Long Trail School
Winooski School
Burlington High School
Long Trail School

Sustainability

Net Zero Projects

- AVA Gallery Sculptural Studies Building
- Choate Rosemary Kohler Center
- Franklin Regional Transit Authority
- Middlebury Town Offices
- North Country School, Walter P. Breeman Performing Arts Center
- Vernon Community Pool Net Zero Study
- Belmont Middle-High School

Geothermal Projects - Design

- Bolton High School
- Charter Oak Academy
- Eagleview Child Care Facility
- Ellington YMCA
- Great Neck Elementary School
- Griswold Elementary School
  Oswegatchie Elementary School
- Quaker Hill School
- Quinsigamond Community College
- Quinnipiac University Crescent Extension
- St. Lawrence University, Residence Hall

Geothermal – Commissioning

- Gunnery School - Perakos Art & Community Center
- Hopkinton Public Library
- Cheshire County Correctional Facility
  Tolland Town Hall
- Tolland Intermediate School and Middle School
- Choate Rosemary School
- Belmont Middle School and High School Project
- UCONN Mansfield dormitories
- UCONN First Year Residence Hall

Photovoltaic

- Gateway Community College
- Griswold Middle School
- Engineering and Science University Magnet School
- New Britain High School
- Quinebaug Valley Middle College High School
- Quinnipiac University Crescent Extension
- Quinnipiac University York Hill Campus
- Rogers International School
- SUNY Purchase New Student Residence Hall
- TOMZ Corp
- University of Notre Dame Engineering Building
- University of Connecticut, Peter J. Werth Residence Tower

VRF Heating Systems (Heating/Cooling)

- UConn Beach Hall
- North Haven Police Department
- East Lyme Schools (3) Flanders, Hanes, Niantic
- Miller Driscoll School
- QU Pearlroth, Larson, & Troop Residence Halls
- Roslindale Library

Carbon Reduction Planning

- Dartmouth College Building Conversions
- UConn Zero-Carbon Scenario Planning
- Deerfield Academy Energy Master Plan
- Dover Community Center
- Commonwealth of Massachusetts On-Call
- Trinity College Energy Master Plan
- Amherst College Energy Master Plan
- Smith College Energy Master Plan

Additional Information

A description of “relevant” experience (project phasing, life cycle costing, testing, adjusting and balancing, building simulation, IAQ, campus projects, etc.) of the proposer’s team in the following areas. List involvement of key team members.

- projects similar to this one
- O&M experience
- energy-efficient equipment design and control strategy optimization
- system design (specify)
- troubleshooting
- low EUI / Net-Zero experience
- Commissioning systems utilizing GeoExchange
- Renewable energy systems: Photovoltaic system, roof mount, ground mount, carport etc.
- Electric vehicle charging stations.
- LEED BD+C v4 commissioning requirements
- utility new construction incentive program experience (e.g., Eversource Path 1, 2)

Many of the requirements listed above are satisfied by our project experience listed in the succeeding pages.

Salas O'Brien

Expanding a High School to include a Middle School

Massachusetts School Board Authority Belmont Middle & High School
BELMONT, MA

Commissioning and building envelope services during the occupied renovation of the existing 20,930 SF school building and new construction of 424,170 SF to accommodate more students. When completed, the building will be a 445,100-SF middle/high school for over 2,215 students between grades 7 through 12.

The schools infrastructure will include 283 geothermal wells and a roof-top photovoltaic system with over 75,000 panels. The project also includes improved ADA accessibility, and health and safety standards, as well as video production space, makerspaces, and labs.

SERVICES
Building Envelope Commissioning

COMPLETION YEAR
2023

PROJECT PARTNERS
CHA Consulting and Perkins & Will, Skanska

CONSTRUCTION COST
$295 million

SIZE
445,100 square feet

TEAM
Lindsay Huff, Jon Haehnel, Adam Gower, Paul D'Amore

CONTACT
Michael McGurl, MSBA
617-720-4466
Michael.mcgurl@massschoolbuildings.org

Results

- Occupied renovation
- Designed and constructed net-zero ready and LEED Certification
- 283 geothermal wells
- 75,000 roof-top photovoltaic panels

Salas O'Brien

LEED Platinum, Net Zero Facility

Kohler Environmental Center at Choate Rosemary Hall

WALLINGFORD, CT

The Kohler Environmental Center was designed as a LEED Platinum, net-zero energy facility by Robert A.M. Stern Architects. Completed in 2012, the Kohler Environmental Center offers the first teaching, research and residential environmental center in U.S. secondary education, with a working laboratory and an environmentally focused interdisciplinary academic program.

The Kohler Environmental Center at Choate Rosemary Hall is a new 31,000-SF state-of-the-art facility dedicated to the education of sustainable living and learning. The program will include student and staff dormitories and apartments, common areas such as cooking/dining and gathering spaces, classroom/laboratories and a greenhouse. The facility will incorporate adequate space for the development of a dynamic sustainable program and learning environment. Central to the practice of sustainable living and learning will be a high performance building that incorporates state-of-the-art technology. Of highest priority will be the ability of the building to achieve net-zero energy from the grid through monitored operation.

- All air handling units, Heat Pumps, and energy recovery units
- Earth Duct System
- Geo-Thermal Well System
- Domestic Solar Water heating system
- Variable air volume boxes
- Lighting controls
- Automatic temperature control system associated with the above
- Verification of air and water balancing for the above

SERVICES
Commissioning

COMPLETION YEAR
2012

PROJECT PARTNERS
Robert A.M. Stern Architects

SIZE
31,325 square feet

Results

- LEED Platinum
- 296 KW Solar Array
- Three Working Laboratories
- The closed-loop, ground-source heat pump (geothermal) system includes twenty-five, 450 food deep vertical wells

Salas O'Brien


Photo Credit: Robert Benson

Engineering design supports STEM opportunities for students

City of New Haven Engineering & Science University Magnet School (ESUMS) WEST HAVEN, CT, USA

In partnership with the City of New Haven, Salas O'Brien provided multidisciplinary engineering services at Engineering and Science University Magnet School (ESUMS). This college preparatory magnet school emphasizes STEM education for grades 6 through 12. This public-private partnership between the University of New Haven and the City of West Haven provides rigorous, comprehensive programs for children with a passion for science.

The new school incorporates model-making wood shops and 3-D printers into its curriculum. Designed as a learning lab, the building provides students opportunities to view exposed structures, rainwater drainage paths, and an onsite wetlands study area.

SERVICES
Mechanical, Electrical, Plumbing, Fire Protection, Civil, Technology, Commissioning

COMPLETION YEAR
2017

PROJECT PARTNERS
Svigals + Partners

CONSTRUCTION COST
$58 million

SIZE
122,000 square feet

"This is an exceptional project. Now we have a public school building on a private campus. It's an entirely new collaborative approach to public education."

Medria Blue-Ellis
ESUMS Principal

Joseph DePaolo & John F. Kennedy Middle Schools

SOUTHINGTON, CT

Designed and constructed to **Connecticut High Performance Building Standards**. Salas O'Brien provided commissioning services for "like new" renovations at both of these middle schools. The DePaolo and Kennedy Middle Schools are two almost identical schools built respectively to serve the needs of a growing middle school population in the town of Southington and its adjacent hamlet Plantsville. The schools accommodate students grades 6-8. The projects included renovations to 104,000 SF of existing space at each school and an addition of apx. 32,000 SF at each school.

SERVICES
Cx

COMPLETION YEAR
2015

Orville H. Platt High School

NEW HAVEN, CT

Salas O'Brien provided commissioning services for this 247,000-SF school renovation and addition project to meet new standards, code updates and programmatic enhancements, and create new classroom wings.

SERVICES
Cx

COMPLETION YEAR
2018

New Haven Academy

NEW HAVEN, CT

Designed and constructed to conform to the **Connecticut High Performance Building Standards**. This "renovate-as-new" project is comprised of approximately 71,900 SF. The intent of the renovation is to accommodate 360 high school students from grades 9 through 12.

SERVICES
MEP/FP & BECx

COMPLETION YEAR
2019

Barack H. Obama Magnet University School

NEW HAVEN, CT

This project involves new construction of an approximately 62,000-SF elementary school. The Barack H. Obama School is a magnet New Haven Public School for 490 students from Pre-K through 4th grade. It will be used by Southern Connecticut State University's (SCSU) School of Education as a "laboratory school" for college and graduate students.

SERVICES
Cx

COMPLETION YEAR
2020

Manchester Public Schools

MANCHESTER, CT

Renovations to three schools: Wadell Elementary, Bennet Academy, and Verplanck Elementary. Combined construction cost of $84.2 M. This included Comprehensive renovations to the 26,000-SF Cheney building and 5,000-SF Boiler building, renovations to the 66,000-SF Waddell Elementary building and a 17,000-SF addition to create 4 additional classrooms, small group, special education, art, music, band, orchestra, pupil services and an expansion to the cafeteria. And Renovations to the 51,000-SF Vernplank Elementary.

SERVICES

Cx

COMPLETION YEAR

2019

Birch Grove Elementary School

TOLLAND, CT

This project was granted emergency status in early 2019 due to the determination that the concrete foundation was deteriorating and unsafe. The new school has a gross area of approximately 85,000 square feet and a project budget of $46,000,000.Salas O'Brien provided fundamental and enhanced commissioning services to assist the project in receiving LEED certified status and to comply with the **Connecticut High Performance Building Guidelines**. Commissioning services included the HVAC system, which consists of an oil fired boiler plant, packaged rooftop air handlers with variable speed air conditioning compressors and variable refrigerant flow systems to supplement the heating and cooling of the central equipment.

SERVICES

Cx

COMPLETION YEAR

2021

Massachusetts School Building Authority, On-Call Commissioning Services

STATEWIDE, MA

Since 2012, we have been providing Commissioning Agent services to the Massachusetts School Building Authority. Our services assist the MSBA with verifying and documenting that building systems in newly constructed, renovated, or repaired school facilities perform according to specification and design intent.

SERVICES

Cx

COMPLETION YEAR

Ongoing

M.D. Fox School

HARTFORD, CT

Salas O'Brien performed commissioning services for the renovation of a four-story, 161,500-SF, reinforced concrete, steel and brick masonry school constructed in 1924. The building was designed to meet **Connecticut High Performance Building Standards** and achieved LEED Gold certification. Commissioning services included completely new mechanical, electrical, plumbing and fire protection systems for this renovate-as-new educational building.

SERVICES

Cx

COMPLETION YEAR

2013

3 Project Management Plan

Project Approach

The objective of Salas O'Brien's commissioning effort for the Westhill High School Project is to make every effort possible to ensure that the installed equipment and systems are operating according to the design intent and that the maintenance personnel are trained and familiar with the building systems prior to occupancy. We understand that the commissioning scope shall conform to the requirements of LEED v4 and Connecticut High Performance Building Guidelines.

Salas O'Brien will assist in the development of the Owner's Project Requirements (OPR) documentation. The OPR will be used to evaluate the Basis of Design and contract documents to fully understand the design intent and major mechanical, electrical and plumbing systems. This review enables us to efficiently assemble and execute functional testing protocols, which results in a seamless integration of the commissioning process into the construction schedule.

The first deliverable will be our commissioning specification, which defines the necessary scope and participation of the various subcontractors. Salas O'Brien has written hundreds of commissioning specifications and coordinated their inclusion into various projects with the respective Architects and Engineers of Record. We will review the Design Development documents and contract documents to ensure agreement with the OPR and to verify commissioning is integrated with the project documents. Additional reviews of the upcoming construction document releases will be performed as those documents are available. As the design progresses, we will work with the Owner and design team as needed to ensure all utility grant programs are explored for the maximum benefit to the project.

As a part of the project team, Salas O'Brien will develop the commissioning plan, an informational document that clarifies how the commissioning process shall proceed. This plan will outline the responsibilities of the Commissioning Provider and Owner, as well as what services will be required of the Design Team, Construction Manager, and their subcontractors. This document will also describe the processes used to carry out commissioning. It is a continual working document and will be updated throughout the project. We will develop the building envelope-related sections of the commissioning plan and an envelope commissioning schedule. We will create an envelope-related field test matrix and identify each test's roles, responsibilities, and standard test procedures.

Salas O'Brien will functionally test one hundred percent of the core mechanical, electrical and plumbing systems. A sampling approach may be implemented for repetitive terminal equipment or redundant systems. Salas O'Brien has had great success with the use of system mock-ups to help streamline the installation and functional testing process. Similar to architectural mockups, mechanical mockups can be used to establish a level of expectations early in the construction phase. This can ensure that the contactors, owner and commissioning agent are in agreement about the details of an installed component before a mistake is repeated numerous times. This is followed up with periodic site visits to review the installations as they progress. A complete review of the building management system (BMS) as it relates to the sampled components completes the process.

The requirements for this commissioning effort dictate that we perform reviews of the shop drawing submittals for the commissioned equipment. Typical review subjects shall verify that the shop drawings meet the Engineer's Basis of Design, operation and maintenance requirements, and facilitate performance testing. We will conduct an envelope coordination meeting with the Owner, Architect, General Contractor, and all subcontractors involved with the air, thermal, vapor, and moisture barrier control layers. This meeting will discuss potential challenges in specific details and in sequencing of control layer components. We will attend envelope-related construction meetings to coordinate commissioning activities and update the commissioning schedule, which will help us develop envelope-related installation checklists. Develop an envelope-related issues log and testing record and provide written progress reports with recommended actions. During construction, we will conduct site visits to observe envelope-specific components and system installations, witness envelope testing by others, and provide written reports following each visit.

Also, Salas O'Brien intends to conduct a Temperature Controls submittal review and a Pre-Balance & Controls Integration Meeting with all parties before developing the functional testing protocol. Our experience has shown that preliminary review with the engineer, Owner, facility personnel, contractors, and commissioning provider before the functional test development is beneficial to all and resolves balancing and temperature controls-related issues quickly and efficiently.

Project Approach

As the Commissioning Provider, Salas O'Brien will supervise and oversee the entire commissioning process, from construction through occupancy and the warranty period. This process is a systematic verification to determine that various systems operate as intended. Salas O'Brien will develop and utilize pre-functional checklists and functional test procedures that will verify and document the performance of the commissioned systems.

A field report will follow all site reviews. We anticipate the Building Enclosure Commissioning (BECx) site reviews to begin as soon as the exterior begins to take shape. The mechanical, electrical, and plumbing (MEP) commissioning will begin as the MEP equipment and piping is installed. On-site construction reviews will continue through the construction phase as equipment and ductwork installation progresses. The functional testing can begin as early as three months before final completion depending on the building construction progress. Salas O'Brien will supervise and oversee the functional testing process, a systematic verification performed to determine that various systems operate as intended. We anticipate that this will require the participation of several individuals to meet the project completion date.

It is strongly recommended, and a part of Salas O'Brien philosophy, that the facilities maintenance personnel take part in the commissioning process as much as practical. Facilities personnel involvement during the functional testing phase provides access to the basic workings and modes of operation of the systems that will be covered later during the contractor-provided training. Our functional testing approach starts with the hot water heating system, air handling systems, exhaust systems, and then out to the terminal equipment. As we begin the testing of the main mechanical equipment, we typically pick one system and completely finish the functional testing. We use this commissioned system as a model for the remaining building systems. We then allow the ATC and mechanical contractors to proceed to check all other components in the same manner prior to resuming our commissioning. This gives the Contractors and Design Team a comfort level with our testing procedures and helps to streamline the remaining systems, thus staying ahead of the completion date. Concurrent with the HVAC functional testing, we anticipate system testing for the plumbing and electrical equipment. This can be accomplished through coordination with the Subcontractors and the Commissioning Team.

As with most projects, off-season testing of equipment and systems will need to be performed. Our experience has shown that most system failures occur in the "swing seasons." Equipment and system deficiencies typically occur when they shift from cool night modes to warm day modes. It is our intent to witness all the necessary systems and controls through these periods. Off-season testing and the warranty period services will be accomplished on site with the installing contractors and facility staff.

We will ensure that commissioning is integrated into the construction process to minimize potential time delays. Functional testing of equipment and systems are tested by Salas O'Brien personnel with assistance from the installing contractors. The Salas O'Brien Team conducts all tests and documents our review of the equipment / system performance. Our innovative approach to any system deficiency is to identify and immediately correct it while on site and proceed to re-verify its operation. Our experience has shown that this proactive approach is well received among the various designers and contractors, and helps minimize potential delays. The rigor of our functional testing process typically exceeds the minimal verification required by energy utilities to ensure correct installation and operation of the systems related to any rebates.

Fostering teamwork and cooperation from contractors and designers are crucial to a successful project. Organization and honest, forthright, and ongoing communication are cornerstones of Salas O'Brien's work culture, and we bring an exceptional commitment and outstanding communication skills to this project. Salas O'Brien's commissioning history and our extensive portfolio of successful projects have trained our project staff to foster and encourage open communication between the Owner, designer, the commissioning team, and the trade contractors. Our commitment to excellent project management and team communication is further evidenced by the significant investment we have made in technology to support our projects. Salas O'Brien has integrated technology into every facet of our project management process.

Project Approach

As systems and equipment are tested, periodic (usually daily) commissioning updates will be posted to the Salas O'Brien Commissioning Portal for the project, indicating any specific system and equipment failures. The Commissioning Portal is an on-line tracking database used by the Commissioning Authority to track issues and assign responsibility for corrective action. All members of the Design/Construction/Commissioning Team will be given access to the Commissioning Portal as required to respond to issues or deficiencies. Open issues will be identified by the individual trades. Once a subcontractor has made any necessary corrections, they will make on-line updates to their specific issues for re-verification by Salas O'Brien's Commissioning Provider.

If assistance is needed from the Design Team, Salas O'Brien will send a formal request asking for such recommendations and / or comments. Any review comments shall be given to the Commissioning Provider in writing along with copies to the Owner. If, during the testing process, system deficiencies are identified, Salas O'Brien will facilitate discussions with the Owner, Design Team and Construction Manager. Based on these discussions, the Owner will finalize how they will proceed in improving the systems to an acceptable standard.

As with all of Salas O'Brien's commissioning projects, our primary goal for the Westhill High School project is to provide the Owner and its facility operators with a building that operates as intended. Along with a functioning building, the key to any successful project is a trained operating staff that is knowledgeable in the operation of those building systems. Salas O'Brien will verify the classroom training with the facility staff, including participation in the functional testing of equipment in order to successfully transition from construction to building operations. We will also review any video recordings performed by the contractors for format and content. A safe facility that fosters health and productivity, improved energy performance and improved system documentation are key goals with any new construction project, and this project is no exception.

During the Building Turnover / Warranty Phase, Salas O'Brien will work with the project team in gathering and reviewing all pertinent information regarding the project closeout materials, including warranties and O&M manuals. The CxA will acquire 12 months of energy usage data for documentation related to any energy incentives. This data will be documented and reported to the owner monthly during the warranty period.

As part of the end of warranty services, the CxA will review with the current building operation and address the condition of any outstanding issues related to the Owner's project requirements. The CxA will provide suggestions for improvements and track these items using the commissioning portal. The CxA will identify any problems covered under the warranty phase. The documented construction related problems will be shared with the commissioning team. The construction manager shall be responsible for organizing the respective subcontractors to perform any corrective actions required to resolve these problems identified. As a result, this process aids in increasing energy efficiencies and savings, reducing system and equipment failures, and increased occupant comfort complaints due to declining indoor environmental conditions. All necessary commissioning-related documentation for Connecticut High Performance Building Guidelines verification and utility energy rebate verification will be provided by Salas O'Brien.

4 Staff Resumes

Michael Gannon PE, CCP, CEM, LEED AP

Associate Vice President & Commissioning Project Manager

Mike has more than 30 years of experience and serves as a Commissioning Project Manager. He reviews design criteria and construction documents, develops procedures for functional testing, observes and comments on the MEP installations, develops commissioning schedules, interacts with all trade contractors, performs the functional testing procedures, and publishes system field reports as commissioning is completed on the individual systems.

OFFICE LOCATION

Northeast Division - CT

YEARS OF EXPERIENCE

30 Years

PROJECT ROLE

Commissioning Project Manager

EDUCATION

Masters In Science, Construction Management, Central Connecticut State University

Bachelor in Science, Mechanical Engineering, University of Hartford

Associates in Science, Mechanical Engineering, Hartford State Technical College

REGISTRATIONS

PE: CT

Certified Commissioning Professional (BCxA)

LEED Accredited Professional

PROFESSIONAL AFFILIATIONS

Building Commissioning Association (BCxA)

ASHRAE

RELEVANT EXPERIENCE

Engineering and Science University Magnet School (ESUMS)

WEST HAVEN, CT

This New Haven inter-district magnet school has a college preparatory theme that emphasizes STEM principles for grades 6 through 12. With a construction cost of $58 million, the project created a 112,000-SF, 616-student school. Includes an innovation lab to support the robotics program, as well as computer labs and flexible classrooms. Provided civil, structural, MEP/FP, and technology design, and commissioning services.

Birch Grove School

TOLLAND, CT

Provided fundamental and enhanced commissioning services including building envelope, for this new, 85,000SF school to receive LEED certified status and comply with the CT High Performance Building Guidelines. Commissioning services included the HVAC system, which consists of an oil fired boiler plant, packaged rooftop air handlers with variable speed air conditioning compressors and variable refrigerant flow systems to supplement the heating and cooling of the central equipment. Also provided commissioning of the emergency generator, all equipment on standby power, emergency lighting and the fire alarm system, fire protection and the domestic hot water system.

Great Path Academy at Manchester Community College

MANCHESTER, CT

The new school has a gross area of apx. 85,000 SF and a project budget of $46,000,000. Provided fundamental and enhanced commissioning services to assist the project in receiving LEED certified status and to comply with the CT High Performance Building Guidelines.

Wethersfield HIgh School

WETHERSFIELD, CT

Commissioning services for this full-building renovation encompassing 255,000 SF and a 26,000-SF addition. Designed to meet LEED Silver Certification, the project includes a complete infrastructure upgrade, new classrooms, a new media center, a completely renovated auditorium with increased seating at the new mezzanine, a new gymnasium, additional classrooms, a new culinary program and a new commons/cafeteria.

Daniel Morin CCP, NEBB CP, BSC, LEED AP

Associate Vice President & Commissioning Project Manager

Daniel Morin has 39 years of experience in the commissioning and air and water balancing fields. He will review design criteria and construction documents to understand the design intent, visit the site and observe and comment on the MEP installations, interact with all Trade Contractors, assist in the functional testing procedures, assist in the seasonal and warranty review periods, and publish system field reports as commissioning is completed on the individual systems.

OFFICE LOCATION

Northeast Division - CT

YEARS OF EXPERIENCE

39 Years

PROJECT ROLE

Commissioning Project Manager

REGISTRATIONS

Certified Commissioning Provider, BCxA

NEBB Certified Building Systems Commissioner (BSC)

LEED Accredited Professional

Certified Level 1 Thermographer

OSHA 30-Hour Construction Safety

Testing and Balancing Certified Professional (NEBB CP)

PROFESSIONAL AFFILIATIONS

Building Commissioning Association (BCxA)

RELEVANT EXPERIENCE

Roberto Clemente Learning Academy

NEW HAVEN, CT

Commissioning Services for a new 75,600-SF K-8 school with a separate 5,000-SF central utilities plant. The school is centered around a courtyard and contains a library/media center, computer labs, science labs, and art and music rooms. Commissioning work included HVAC systems, energy management, control systems, fire protection systems, ice storage energy systems and fuel cells.

New Haven Academy

NEW HAVEN, CT

Commissioning services for this “renovate as new” project. The facility is 67,000 SF and the commissioning scope includes fire protection, plumbing, HVAC, electrical, technology and building envelope systems. This project was designed and constructed to conform to the High Performance Building Standards.

Region 16 Elementary School

PROSPECT, CT

Commissioning services for the mechanical, electrical, plumbing, and life safety systems. The school is a newly constructed, 86,000 SF, pre-K through 5th grade school building located in Prospect, Connecticut. The project facility consisted of approximately 86,000 SF distributed across both single and two story wings.

Henry Abbott Technical High School

DANBURY, CT

Commissioning services for 116,000-SF of shop wing building additions and 85,000-SF of teaching space and gym building renovations. A new 4,500-SF bus garage was also included in the project.

Barack H. Obama Magnet University School

NEW HAVEN, CT

Commissioning services for this school formerly known as Strong School. This project consists of the new construction of an approximately 62,000-SF school. The school accommodates 490 students from Pre-K through 4th grade. Located on a college campus, it’s a “laboratory school” for SCSU college and graduate students preparing to be future elementary school teachers.

Christopher Bonczek

Commissioning Provider

Chris has 16 years of professional experience whic includes experience as a TABB Supervisor and Technician, and as a Fire Life Safety Level 1 Technician. He has also served as a TABB Instructor and a Fire Life Safety Level 1 Instructor. Chris' responsibilities include reviewing construction documents, performing functional testing, overseeing MEP installations, developing commissioning schedules, and producing system field reports as throughout the commissioning process.

OFFICE LOCATION

Northeast Division - CT

YEARS OF EXPERIENCE

16 Years

PROJECT ROLE

Commissioning Provider

EDUCATION

United States Navy 1994-2005

CAD-1

REGISTRATIONS

TABB Technician

TABB Supervisor

Sheet Metal Journey Person: CT

Fire Safety Technician, Level 1

OSHA 30-hr

Fume Hood Performance Testing Technician

RELEVANT EXPERIENCE

Wethersfield HIgh School

WETHERSFIELD, CT

Commissioning services for this full-building renovation encompassing 255,000 SF and a 26,000-SF addition. Designed to meet LEED Silver Certification, the project includes a complete infrastructure upgrade, new classrooms, a new media center, a completely renovated auditorium with increased seating at the new mezzanine, a new gymnasium, additional classrooms, a new culinary program and a new commons/cafeteria.

New Haven Academy

NEW HAVEN, CT

New Haven Academy is a four-year, 9-12 grade high school. The facility is 67,000 SF and the commissioning scope includes fire protection, plumbing, HVAC, electrical, technology and building envelope systems. This $44 million project was designed and constructed to conform to the CT High Performance Building Standards.

Shepaug Valley High School

WASHINGTON, CT

Commissioning and Building Envelop services for renovations to the science labs and new AgSTEM program spaces totalling 63,057 SF. This project was designed and constructed to conform to CT High Performance Building Standards.

Berman Middle School (formerly Woodrow Wilson)

MIDDLETOWN, CT

Commissioning and Building Envelope services for the new 150,000-SF school which has the capacity for 650 students, grades 6 through 8. The building meets CT High Performance Building Standards. In addition to classrooms, the school also has an innovation lab, auditorium, and gym.

Barack H. Obama Magnet University School

NEW HAVEN, CT

Commissioning services for this school formerly known as Strong School. This project consists of the new construction of an approximately 62,000-SF school. The school accommodates 490 students from Pre-K through 4th grade. It is by Southern Connecticut State University's (SCSU) School of Education as a "laboratory school" for college and graduate students preparing to be future elementary school teachers.

Jon Haehnel CEI, BPI-BA & ES

Associate Vice President, Director of Building Envelope Services

Jon has been testing and inspecting all building types for over 20 years. His commissioning and building envelope forensics experience includes various types of educational buildings, laboratories, municipal and government buildings, manufacturing, military bases, and hospitals. Jon has presented on building envelope commissioning at the Better Buildings by Design Conference numerous times.

OFFICE LOCATION

Northeast Division - VT

YEARS OF EXPERIENCE

21 Years

PROJECT ROLE

Director of Building Envelope Services

EDUCATION

Bachelor of Science, Biology, Utah State University

REGISTRATIONS

BPI Certified Building Envelope Analyst & Specialist

Certified EIFS Inspector

ABAA Certified Air Barrier Specialist (CABS)

RELEVANT EXPERIENCE

Birch Grove School

TOLLAND, CT

Provided fundamental and enhanced commissioning services including building envelope, for this new, 85,000SF school to receive LEED certified status and comply with the CT High Performance Building Guidelines. Commissioning services included the HVAC system, which consists of an oil fired boiler plant, packaged rooftop air handlers with variable speed air conditioning compressors and variable refrigerant flow systems to supplement the heating and cooling of the central equipment.

Manchester Public Schools

MANCHESTER, CT

Cheney/Bennet - Comprehensive renovations to the 26,000-SF Cheney building and 5,000-SF Boiler building. A classroom and pedestrian bridge link both buildings to Bennet Academy. Minor classroom renovations, a cafeteria addition, and retro-commissioning of MEP and fire alarm systems were also included.

Waddell Elementary School - Renovations to the 66,000-SF school building and a 17,000-SF addition to create additional classrooms, special education, art, music, band, orchestra, and an expansion to the cafeteria. Renovations include demolition, exterior envelope improvements, all new MEP/FP systems.

Verplanck Elementary School - Renovations to a 51,000-SF school building and a 19,000-SF addition to create 4 additional classrooms, small group, special education, art, music, band, orchestra, pupil services and an expansion to the cafeteria. Renovations include demolition, exterior envelope improvements, all new MEP/FP systems.

Barack H. Obama Magnet University School

NEW HAVEN, CT

Commissioning and Building Envelope services for The new construction of an approximately 62,000-SF school. The Barack H. Obama Magnet School (formerly 21st Century Strong School) is a New Haven Public School for 490 students from Pre-K through 4th grade. It will be used by Southern Connecticut State University's School of Education as a "laboratory school" preparing students to become elementary school teachers.

Paul D'Amore BPI-BA, CEI

Building Envelope Specialist

Paul has over 8 years of experience and has provided envelope commissioning and consulting services on a wide variety of buildings including academic, medical, childcare, government and corporate buildings. Paul is experienced with completing envelope design reviews, construction phase quality assurance inspections, and field quality control testing, and is managing nearly a dozen projects through various stages of design and construction.

OFFICE LOCATION

Northeast Division - VT

YEARS OF EXPERIENCE

4 Years

PROJECT ROLE

Building Envelope Commissioning Provider

EDUCATION

Bachelor of Science,
Building & Construction Technology,
University of Massachusetts, Amherst

Associates in Arts, General Studies,
Massachusetts Bay Community College

REGISTRATIONS

BPI Certified Building Envelope Analyst

Certified EIFS Inspector

RELEVANT EXPERIENCE

Berman Middle School (formerly Woodrow Wilson)

MIDDLETOWN, CT

Commissioning and Building Envelope services for the new 150,000-SF school which has the capacity for 650 students, grades 6 through 8. The building meets CT High Performance Building Standards. In addition to classrooms, the school also has an innovation lab, auditorium, and gym.

Birch Grove School

TOLLAND, CT

Provided fundamental and enhanced commissioning services including building envelope, for this new, 85,000SF school to receive LEED certified status and comply with the CT High Performance Building Guidelines. Commissioning services included the HVAC system, which consists of an oil fired boiler plant, packaged rooftop air handlers with variable speed air conditioning compressors and variable refrigerant flow systems to supplement the heating and cooling of the central equipment. Also provided commissioning of the emergency generator, all equipment on standby power, emergency lighting and the fire alarm system, fire protection and the domestic hot water system.

Barack H. Obama Magnet University School

NEW HAVEN, CT

Commissioning and Building Envelope services for The new construction of an approximately 62,000-SF school. The Barack H. Obama Magnet School (formerly 21st Century Strong School) is a New Haven Public School for 490 students from Pre-K through 4th grade. It will be used by Southern Connecticut State University's School of Education as a "laboratory school" preparing students to become elementary school teachers.

Belmont Middle School

BELMONT, MA

Commissioning and building envelope services for the renovation of the existing 20,930 SF building and new construction of 424,170 SF. When completed, the building will be a 445,100-SF middle/high school for over 2,215 students between grades 7 through 12.

Ilona Prosol PE, LEED AP BD+C

Senior Vice President

Ilona, a Senior Vice President, has over 32 years of design and management experience and approaches each project with a focus on sustainability. She has been part of the design team for many award-winning projects throughout the New England and her portfolio includes K-12 Schools, academic buildings, higher education buildings, museums and hospitality projects.

OFFICE LOCATION

Northeast Division - CT

YEARS OF EXPERIENCE

32 Years

PROJECT ROLE

Peer Review - Electrical

EDUCATION

Masters of Science in Construction Engineering, Cracow Institute of Technology

REGISTRATIONS

PE: CT, MA, MT, NY, RI

LEED Accredited Professional

PROFESSIONAL AFFILIATIONS

Connecticut Architecture Foundation, Board Member

Connecticut Green Building Council, Board Member

Connecticut Codes and Standards Committee Member

RELEVANT EXPERIENCE

Rogers IB Interdistrict Magnet School

STAMFORD, CT

New 106,000-SF interdistrict magnet school with a focus on environmental studies, which will serve 660 children in grades pre-K through 8. The project achieved LEED Silver certification for its energy saving features, and was the subject of a study for the Connecticut Green Building Council.

Strawberry Hill School Extension

STAMFORD, CT

This project includes the design of a school facility with a projected maximum enrollment of 720 students. The school includes core classrooms with special education classrooms, science and computer labs, art and music rooms, gymnasium, library/media center, cafeteria, and support space. The project also includes the renovation of an existing historic barn on the site to be use as an auditorium.

John F. Kennedy Middle School

ENFIELD, CT

This “renovate-as-new” project serves 1,200 students in grades six through eight. The building, occupied during construction, received a comprehensive phased renovation including all new MEP/FP systems. Included in the project is an 18,600-SF auditorium addition which increased the building size to 198,000 SF.

Engineering and Science University Magnet School (ESUMS)

WEST HAVEN, CT

This new state-of-the-art, 27,500-SF science, math, and technology building achieving LEED for Schools Gold certification. The program includes laboratories, classrooms, and departmental workspace for both the science and math departments.

The Morgan High School

CLINTON, CT

New 135,000-SF public high school featuring a gathering place located near the school’s 210-seat open food-court style cafeteria. Floor-to-ceiling windows in classrooms on the second and third story allow natural light to flow through the building. The new high school also features a 700-seat auditorium with a 180-seat balcony and an oversized gymnasium.

Sandy Hook School

NEWTON, CT

New 80,000-SF school inspired by the sense of community and natural beauty of Newtown, integrating healing elements of nature as they serve to foster an environment of learning, environmental stewardship, and community involvement. Achieving LEED Gold certification, the school also benefits from new security standards developed by the State of Connecticut and the U.S. Department of Homeland Security.

Michael Tartaglia CPD

Senior Plumbing / Fire Protection Designer

Mike has over 34 years of experience and is responsible for the inspection, review and documentation of the plumbing and fire protection building systems, including utility service entrances, domestic and non-potable water systems, drainage systems, and natural and lab gas systems. He provides plumbing and fire protection design and peer review services for higher educational facilities, engineering science labs, medical research labs, and office buildings.

OFFICE LOCATION
Northeast Division - CT

YEARS OF EXPERIENCE
34 Years

PROJECT ROLE
Peer Review - Plumbing / Fire Protection

EDUCATION
Porter & Chester Institute, Drafting and Mechanical Design

REGISTRATIONS
Certified Plumbing Designer, CT

PROFESSIONAL AFFILIATIONS
American Society of Plumbing Engineers

National Fire Protection Association

RELEVANT EXPERIENCE

New Canaan High School
NEW CANAAN, CT

$48 million "renovate as new" project including 16 new science classroom/laboratory facilities, six general-purpose classrooms, a new 150-seat multipurpose space, and a new kitchen, servery and cafeteria. The project including incorporating modern technology throughout the building, including access control, intrusion detection, and CCTV system.

Daniel Hand High School
MADISON, CT

This new 205,000-SF high school accommodates 1,250 students. The academic building contains classrooms, laboratory space, administrative areas and a library/media center. The core building includes a full gymnasium as well as music, band, art and technical education classrooms. The cafeteria functions as a multi-purpose "great hall" with a stage to accommodate performances.

E.C. Goodwin Vocational Technical School
NEW BRITAIN, CT

Engineering design for a 225,000 comprehensive renovation at this regional vocational-technical school. E.C. Goodwin's trades and specialty spaces include automotive technology, carpentry, HVAC design, plumbing and heating, culinary arts, drafting technology, electrical, electromechanical technology, electronics, fashion technology, graphic technology, manufacturing technology, and hairdressing and barbering.

Christopher Columbus Family Academy
NEW HAVEN, CT

New 80,000 square foot elementary school includes a library media center, gymnasium, cafetorium, classrooms, guidance and support services, and is situated in an urban neighborhood between a residential area and a retail area.

Loomis Chaffee Clark Center for Science and Mathematics
WINDSOR, CT

$13-million, 36,000-SF full building renovation includes redesigned classrooms, new labs, new offices, and a redesigned lecture hall. Outdated building systems were completely replaced with new systems.

Brad Huff PE

Associate Vice President

Brad is an Associate Vice President and Project Manager. A mechanical engineer by trade, he has 15 years of experience and is responsible for the design of the mechanical systems from design development through project closeout. Brad has worked on various types of projects including corporate and industrial buildings, athletic and recreation facilities, academic buildings, laboratory and research buildings, as well as healthcare facilities.

OFFICE LOCATION

Northeast Division - CT

YEARS OF EXPERIENCE

15 Years

PROJECT ROLE

Peer Review - Mechanical

EDUCATION

Bachelor of Science, Mechanical Engineering, University of Connecticut

REGISTRATIONS

PE: CT, ME

PROFESSIONAL AFFILIATIONS

American Society of Heating, Refrigerating and Air-Conditioning Engineers

RELEVANT EXPERIENCE

UConn Center for Comparative Medicine

FARMINGTON, CT

This 7-story renovation aligns the building with current and federal regulations on housing research+ animals. Engineering design included replacing and upgrading HVAC systems, lighting, and lab casework.

University of Vermont, Hills Science Building

BURLINGTON, CT

Engineering design services for renovations & additions to 55,000-SF existing; originally built in 1950; upgraded classrooms, offices, science laboratories; new entry vestibules; connector between Hills and adjacent auditorium

University of Notre Dame, Campus Crossroads

SOUTH BEND, IN

Massive series of additions around the perimeter of the football stadium. Combined, there is more than 836,000 SF of teaching, research, performance, student life, and recreation facilities. LEED Gold certified

Quinnipiac University New Residence Hall

HAMDEN, CT

Design of an 80,000-SF residence hall with common and support space for students.

Quinnipiac University Perlroth, Larson and Troup Residence Halls

HAMDEN, CT

Renovations to Perlroth, Larson, and Troup Residence Halls, including complete air conditioning and new electrical service.

Westfield State University Student Housing

WESTFIELD, MA

Engineering design for University Hall featuring 400+ beds in 1, 4 and 6 bedroom suites, including singles and doubles, each with a shared suite bath, living room and kitchenette. This 140,000-SF mixed-use project includes 60,000 SF of retail, restaurants and office space and a 40,000-SF public parking garage.

Current Workload of Proposed Cx Team

Bradley Airport Vertical Circulation Cx – September 2024
Melissa Vaillancurt, FM Architecture, (617) 830-7093
Currently in construction, no dollar value available.

UMass Amherst Computer Science Lab Cx – July 2025
Jeff Gotta, Colliers, (860) 575-3731
Currently in design, no dollar value available.

Brookhaven National Lab SUSC Cx – May 2024
Andrea Clemente, Brookhaven National Lab, (631) 344-6129
No dollar value available.

Bridgeport Hospital Cardiac Cath Lab Cx – January 2024
Steve Giameta, CBRE, (203) 501-0357
currently in construction, no dollar value available.

Work Products

As an attachment, provide the following work products that members of the proposer's team developed. List the team member who actually wrote the document and the projects on which they were used. Work from the designated CxA is preferred.

- Commissioning plan that was executed (the process part of the plan).
- An actual functional test procedure form that was executed with attendant prefunctional lists (both building envelope and HVAC systems, as applicable).
- Sample design review comments

5 References

References

Barack H. Obama Magnet University School
Webster Grouten
Gilbane Building Co.
203-946-2812

Joseph DePaol & John F. Kennedy Middle School
Randy Daigle
JFK Building Committee Chairperson
Enfield, CT
(860) 713-5696

Manchester Public Schools
Town of Manchester
Christopher Till, P.E.
Facilities Manager
(860) 647-3145

Massachusetts School Building Authority
Greg Brunell
Boston, Massachusetts
Director of Construction Administration
(617) 720-4466

New Haven Academy
Webster Grouten
Gilbane Building Co.
203-946-2812

Orville H. Platt High School
Michael Grove
Asst. Superintendent
203-630-1473

5 Attachments

Attachments

The following documents should be returned with your RFQ/RFP:

1. Contractor's Statement
2. Non-Collusion Affidavit
3. City of Stamford State of Connecticut Contractor Verification (in accordance with Public Act 16-67) Compliance Affidavit (For all school projects)
4. A Certificate of Corporate Resolution signed by the Secretary of your firm, authorizing you to execute a contract.
5. Proposer's Information and Acknowledgement Form
6. Department of the Treasury Internal Revenue Service Form W-9
7. Commission on Human Rights and Opportunities Contract Compliance Regulations Notification to Bidders Form
8. Insurance
9. Sample Documents

    - Commissioning plan that was executed (the process part of the plan).
    - An actual functional test procedure form that was executed with attendant prefunctional lists (both building envelope and HVAC systems, as applicable).
    - Sample design review comments

Contractor's Statement

Pursuant to Section 103.1 of the Stamford Code of Ordinances, I hereby provide the following:

If a joint venture, trustee, partnership, limited liability company or partnership, the names and addresses of all joint ventures, beneficiaries, partners or members:

N/A

If a corporation, the names and addresses of all officers, and the names and addresses of all parties owning over 10% of its common stock or over 10% of its preferred stocks. If any of said stockholders is a holding corporation, the names and addresses of all persons owning a beneficial interest in over 10% if the common or preferred stock of said holding company.

Owner: Lorad Asset Management, LLC (ultimate owner Darin Anderson, SO Chairman & CEO)

Ownership %: 11.5%

Address: 8825 Research Drive, Irvine, CA 92618

The names and positions of all persons listed hereinabove who are elected or appointed officers or employees of the City of Stamford.

N/A

Name of Bidder/Proposer: Thomas St. Denis

Signature of Bidder/Proposer: Thomas St. Denis

Title: Managing Principal

Company Name: BVH Integrated Services, Inc.

Address: 206 West Newberry Road, Bloomfield, CT

Indicate if company submitting this proposal is: _____MBE _____WBE _____DBE

Non-Collusion Affidavit

The undersigned, having been duly sworn, affirms and says that to the best of his/her knowledge and belief:

1. The prices in this Proposal have been arrived at independently without collusion, consultation, communication, or agreement with any other Proposer or with any competitor for the purpose of restricting competition.

2. Unless otherwise required by law, the prices, which have been quoted in this Proposal, have not been knowingly disclosed by the Proposer and will not knowingly be disclosed by the Proposer prior to opening, directly or indirectly, to any other Proposer or to any competitor.

3. No attempt has been made or will be made by the Proposer to induce any other person, partnership or corporation to submit or not to submit a Proposal for the purpose of restricting competition.

Name of Proposer: BVH Integrated Services, a Salas O'Brien company

By: Thomas St. Denis

Print Name: Thomas St. Denis

Title: Managing Principal

ACKNOWLEDGMENT

STATE OF Connecticut

COUNTY OF Hartford ss. Bloomfield

Date: 12-12-2023

Personally appeared Thomas St. Denis, as Managing Principal of the above named firm, and attested that the foregoing statements are true and accurate to the best of his/her knowledge and belief.

Maria A. Fox

Signature of Notary Public

My Commission Expires: Jan. 31, 2028

EFFECTIVE: 2/24/09

City of Stamford

State of Connecticut Contractor Verification (in accordance with Public Act 16-67)

Compliance Affidavit

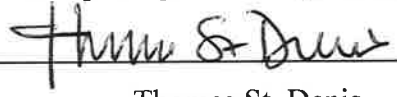
I, the undersigned, personally and on behalf of BVH Integrated Services, a Salas O'Brien company (Contractor), having been duly sworn, affirm and say that I have read, understand and am in compliance with Public Act 16-67 Concerning the Disclosure of Certain Education Personnel Records, Criminal Penalties for Threatening in Educational Settings and the Exclusion of a Minor's Name from Summary Process Complaints, and that neither I nor said Contractor, to the best or my knowledge, is in possession of any information indicating a finding of abuse or neglect or sexual misconduct, or otherwise have knowledge of such a condition(s) for any employees working on the project identified in RFQ/RFP or Bid S-2024.0194 (RFQ/RFP or Bid Number). Further, if I or said Contractor become aware of any information indicating such a finding, or otherwise gain knowledge of such a condition, I and/or said Contractor will immediately forward such information to the City of Stamford.

Contractor Name: BVH Integrated Services, a Salas O'Brien company

Street Address: 206 West Newberry Road

City, State, Zip: Bloomfield, CT 06002

Title of person completing this form: Managing Principal

Signature: 

Printed Name: Thomas St. Denis

Date: 12-12-2023

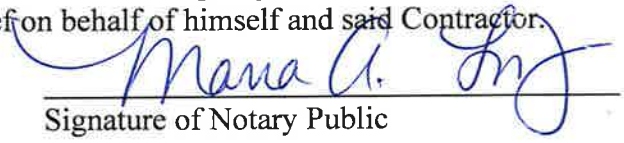
ACKNOWLEDGMENT

STATE OF Connecticut

COUNTY OF Hartford ss. Bloomfield

Date: 12-12-2023

Personally appeared Thomas St. Denis, as Managing Principal of the above named Contractor, and attested that the foregoing statements are true and accurate to the best of his/her knowledge and belief on behalf of himself and said Contractor.



Signature of Notary Public

My Commission Expires: January 31, 2028

CERTIFICATE OF CORPORATE RESOLUTION
RFQ/RFP

I, Thomas St. Denis, SECRETARY OF BVH Integrated Services, Inc.

A CORPORATION EXISTING UNDER THE LAWS OF THE STATE OF Connecticut, DO HEREBY CERTIFY THAT THE FOLLOWING IS A TRUE COPY OF CERTAIN RESOLUTIONS ADOPTED BY THE BOARD OF DIRECTORS OF SAID COMPANY, AT A MEETING THEREOF DULY CALLED AND HELD ON THE 22 DAY OF December, 20 22.

"RESOLVED, THAT THE Jeffrey Cichonski

OF THE CORPORATION BE AND IS HEREBY AUTHORIZED TO SIGN

A CONTRACT WITH THE CITY OF STAMFORD, CONNECTICUT FOR

Commissioning Agent Services, RFP/RFQ No. 2024.0194 ".

I, FURTHER CERTIFY THAT, Jeffrey Cichonski IS THE DULY ELECTED Principal OF BVH Integrated Services, Inc.

AND THE FOREGOING RESOLUTION HAS NOT BEEN MODIFIED OR REPEALED AND IS IN FULL FORCE AND EFFECT.

IN WITNESS WHEREOF, I HAVE, HEREUNTO, SUBSCRIBED BY NAME AND AFFIXED THE SEAL OF SAID CORPORATION THE 12 DAY OF December, 20 23.

Thomas St. Denis

SECRETARY

PROPOSER'S INFORMATION AND ACKNOWLEDGEMENT FORM

RFP No: State Project #135-0280 N

Date: December 21, 2023 @ 4:00 P.M.

Proposer's Name: BVH Integrated Services, a Salas O'Brien Company

Street Address: 206 W Newberry Rd

Bloomfield	Connecticut	06002
City	State	Zip

Business Telephone: (860) 286-9171

Email: tom.stdenis@salasobrien.com

Unique Entity ID: _____ Tax Id. No.: 060841230

Indicate (Yes/No) if company submitting this proposal is:

_____MBE _____WBE _____DBE
(If yes, attach relevant certification)

Signature: Thomas St. Denis Date: 12/19/2023

Printed Name: Thomas St. Denis

Title: Managing Principal

Addenda Acknowledgement – check and note date of addendum

☑ Addenda No. 1 12/15/23	☐ Addenda No. 2
☐ Addenda No. 3	☐ Addenda No. 4
☐ Addenda No. 5	☐ Addenda No. 6
☐ Addenda No. 7	☐ Addenda No. 8
☐ Addenda No. 9	☐ Addenda No. 10
☐ Addenda No. 11	☐ Addenda No. 12

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

▶ **Go to *www.irs.gov/FormW9* for instructions and the latest information.**

Give Form to the requester. Do not send to the IRS.

Print or type. See **Specific Instructions** on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

BVH Integrated Services, Inc.

2 Business name/disregarded entity name, if different from above

BVH Integrated Services, Inc., a Salas O'Brien Company

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only **one** of the following seven boxes.

☐ Individual/sole proprietor or single-member LLC ☑ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.

206 West Newberry Rd.

Requester's name and address (optional)

6 City, state, and ZIP code

Bloomfield, CT 06002

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN,* later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number

			–			–				

or

Employer identification number

0	6	–	0	8	4	1	2	3	0

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here **Signature of U.S. person ▶** Diane Mampadra **Date ▶** 03/31/2023

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9.*

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, *later.*

COMMISSION ON HUMAN RIGHTS AND OPPORTUNITIES
CONTRACT COMPLIANCE REGULATIONS
NOTIFICATION TO BIDDERS
(Revised 09/3/15)

The contract to be awarded is subject to contract compliance requirements mandated by Sections 4a-60 and 4a-60a of the Connecticut General Statutes; and, when the awarding agency is the State, Sections 46a-71(d) and 46a-81i(d) of the Connecticut General Statutes. There are Contract Compliance Regulations codified at Section 46a-68j-21 through 43 of the Regulations of Connecticut State Agencies, which establish a procedure for awarding all contracts covered by Sections 4a-60 and 46a-71(d) of the Connecticut General Statutes.

According to Section 46a-68j-30(9) of the Contract Compliance Regulations, every agency awarding a contract subject to the contract compliance requirements has an obligation to "aggressively solicit the participation of legitimate minority business enterprises as bidders, contractors, subcontractors and suppliers of materials." "Minority business enterprise" is defined in Section 4a-60 of the Connecticut General Statutes as a business wherein fifty-one percent or more of the capital stock, or assets belong to a person or persons: "(1) Who are active in daily affairs of the enterprise; (2) who have the power to direct the management and policies of the enterprise; and (3) who are members of a minority, as such term is defined in subsection (a) of Section 32-9n." "Minority" groups are defined in Section 32-9n of the Connecticut General Statutes as "(1) Black Americans . . . (2) Hispanic Americans . . . (3) persons who have origins in the Iberian Peninsula . . . (4)Women . . . (5) Asian Pacific Americans and Pacific Islanders; (6) American Indians . . ." An individual with a disability is also a minority business enterprise as provided by Section 4a-60g of the Connecticut General Statutes. The above definitions apply to the contract compliance requirements by virtue of Section 46a-68j-21(11) of the Contract Compliance Regulations.

The awarding agency will consider the following factors when reviewing the bidder's qualifications under the contract compliance requirements:

(a) the bidder's success in implementing an affirmative action plan;
(b) the bidder's success in developing an apprenticeship program complying with Sections 46a-68-1 to 46a-68-17 of the Administrative Regulations of Connecticut State Agencies, inclusive;
(c) the bidder's promise to develop and implement a successful affirmative action plan;
(d) the bidder's submission of employment statistics contained in the "Employment Information Form", indicating that the composition of its workforce is at or near parity when compared to the racial and sexual composition of the workforce in the relevant labor market area; and
(e) the bidder's promise to set aside a portion of the contract for legitimate minority business enterprises. See Section 46a-68j-30(10)(E) of the Contract Compliance Regulations.

INSTRUCTIONS AND OTHER INFORMATION

The following BIDDER CONTRACT COMPLIANCE MONITORING REPORT must be completed in full, signed, and submitted with the bid for this contract. The contract awarding agency and the Commission on Human Rights and Opportunities will use the information contained thereon to determine the bidders compliance to Sections 4a-60 and 4a-60a CONN. GEN. STAT., and Sections 46a-68j-23 of the Regulations of Connecticut State Agencies regarding equal employment opportunity, and the bidder's good faith efforts to include minority business enterprises as subcontractors and suppliers for the work of the contract.

1) Definition of Small Contractor

Section 4a-60g CONN. GEN. STAT. defines a small contractor as a company that has been doing business under the same management and control and has maintained its principal place of business in Connecticut for a one year period immediately prior to its application for certification under this section, had gross revenues not exceeding fifteen million dollars in the most recently completed fiscal year, and at least fifty-one percent of the ownership of which is held by a person or persons who are active in the daily affairs of the company, and have the power to direct the management and policies of the company, except that a nonprofit corporation shall be construed to be a small contractor if such nonprofit corporation meets the requirements of subparagraphs (A) and (B) of subdivision 4a-60g CONN. GEN. STAT.

MANAGEMENT: Managers plan, organize, direct, and control the major functions of an organization through subordinates who are at the managerial or supervisory level. They make policy decisions and set objectives for the company or departments. They are not usually directly involved in production or providing services. Examples include top executives, public relations managers, managers of operations specialties (such as financial, human resources, or purchasing managers), and construction and engineering managers.

BUSINESS AND FINANCIAL OPERATIONS: These occupations include managers and professionals who work with the financial aspects of the business. These occupations include accountants and auditors, purchasing agents, management analysts, labor relations specialists, and budget, credit, and financial analysts.

MARKETING AND SALES: Occupations related to the act or process of buying and selling products and/or services such as sales engineer, retail sales workers and sales representatives including wholesale.

LEGAL OCCUPATIONS: In-House Counsel who is charged with providing legal advice and services in regards to legal issues that may arise during the course of standard business practices. This category also includes assistive legal occupations such as paralegals, legal assistants.

COMPUTER SPECIALISTS: Professionals responsible for the computer operations within a company are grouped in this category. Examples of job titles in this category include computer programmers, software engineers, database administrators, computer scientists, systems analysts, and computer support specialists

ARCHITECTURE AND ENGINEERING: Occupations related to architecture, surveying, engineering, and drafting are included in this category. Some of the job titles in this category include electrical and electronic engineers, surveyors, architects, drafters, mechanical engineers, materials engineers, mapping technicians, and civil engineers.

OFFICE AND ADMINISTRATIVE SUPPORT: All clerical-type work is included in this category. These jobs involve the preparing, transcribing, and preserving o f written communications and records; collecting accounts; gathering and distributing information; operating office machines and electronic data processing equipment; and distributing mail. Job titles listed in this category include telephone operators, bill and account collectors, customer service representatives, dispatchers, secretaries and administrative assistants, computer operators and clerks (such as payroll, shipping, stock, mail and file).

BUILDING AND GROUNDS CLEANING AND MAINTENANCE: This category includes occupations involving landscaping, housekeeping, and janitorial services. Job titles found in this category include supervisors of landscaping or housekeeping, janitors, maids, grounds maintenance workers, and pest control workers.

CONSTRUCTION AND EXTRACTION: This category includes construction trades and related occupations. Job titles found in this category include boilermakers, masons (all types), carpenters, construction laborers, electricians, plumbers (and related trades), roofers, sheet metal workers, elevator installers, hazardous materials removal workers, paperhangers, and painters. Paving, surfacing, and tamping equipment operators; drywall and ceiling tile installers; and carpet, floor and tile installers and finishers are also included in this category. First line supervisors, foremen, and helpers in these trades are also grouped in this category.

INSTALLATION, MAINTENANCE AND REPAIR: Occupations involving the installation, maintenance, and repair of equipment are included in this group. Examples of job titles found here are heating, ac, and refrigeration mechanics and installers; telecommunication line installers and repairers; heavy vehicle and mobile equipment service technicians and mechanics; small engine mechanics; security and fire alarm systems installers; electric/electronic repair, industrial, utility and transportation equipment; millwrights; riggers; and manufactured building and mobile home installers. First line supervisors, foremen, and helpers for these jobs are also included in the category.

MATERIAL MOVING WORKERS: The job titles included in this group are Crane and tower operators; dredge, excavating, and lading machine operators; hoist and winch operators; industrial truck and tractor operators; cleaners of vehicles and equipment; laborers and freight, stock, and material movers, hand; machine feeders and offbearers; packers and packagers, hand; pumping station operators; refuse and recyclable material collectors; and miscellaneous material moving workers.

PRODUCTION WORKERS: The job titles included in this category are chemical production machine setters, operators and tenders; crushing/grinding workers; cutting workers; inspectors, testers sorters, samplers, weighers; precious stone/metal workers; painting workers; cementing/gluing machine operators and tenders; etchers/engravers; molders, shapers and casters except for metal and plastic; and production workers.

White (not of Hispanic Origin)-All persons having origins in any of the original peoples of Europe, North Africa, or the Middle East. Black (not of Hispanic Origin)-All persons having origins in any of the Black racial groups of Africa. Hispanic- All persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.	Asian or Pacific Islander- All persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands. This area includes China, India, Japan, Korea, the Philippine Islands, and Samoa. American Indian or Alaskan Native- All persons having origins in any of the original peoples of North America, and who maintain cultural identification through tribal affiliation or community recognition.

BIDDER CONTRACT COMPLIANCE MONITORING REPORT

PART 1 – Bidder Information

Company Name: BVH Integrated Services, a Salas O'Brien Company Street Address: 206 West Newberry Road City & State: Bloomfield, CT Chief Executive: Thomas St. Denis	Bidder Federal Employer Identification Number: 060841230 Or Social Security Number:
Major Business Activity: (brief description) With more than 2,400 employee-owners operating from locations across North America, we provide a full range of engineering and technical consulting services for government and private sector clients. Services include MEP/ FP, Structural, Civil/ Site Utilities, Commissioning, Technology, Industrial Process, Building Science, Roofing & Waterproofing, Automation & Controls, Energy & Utilities, Acoustics, Construction Management, and Architecture & Interiors.	Bidder Identification (response optional/definitions on page 1) -Bidder is a small contractor? Yes ☐ No ☑ -Bidder is a minority business enterprise? Yes ☐ No ☑ (If yes, check ownership category) Black ☐ Hispanic ☐ Asian American ☐ American Indian/Alaskan Native ☐ Iberian Peninsula ☐ Individual(s) with a Physical Disability ☐ Female ☐ -Bidder is certified as above by State of CT? Yes ☐ No ☐
Bidder Parent Company: (If any) Salas O'Brien	
Other Locations in CT: (If any)	

PART II - Bidder Nondiscrimination Policies and Procedures

1. Does your company have a written Affirmative Action/Equal Employment Opportunity statement posted on company bulletin boards? Yes ☑ No ☐	7. Do all of your company contracts and purchase orders contain non-discrimination statements as required by Sections 4a-60 & 4a-60a Conn. Gen. Stat.? Yes ☑ No ☐
2. Does your company have the state-mandated sexual harassment prevention in the workplace policy posted on company bulletin boards? Yes ☑ No ☐	8. Do you, upon request, provide reasonable accommodation to employees, or applicants for employment, who have physical or mental disability? Yes ☑ No ☐
3. Do you notify all recruitment sources in writing of your company's Affirmative Action/Equal Employment Opportunity employment policy? Yes ☑ No ☐	9. Does your company have a mandatory retirement age for all employees? Yes ☐ No ☑
4. Do your company advertisements contain a written statement that you are an Affirmative Action/Equal Opportunity Employer? Yes ☑ No ☐	10. If your company has 50 or more employees, have you provided at least two (2) hours of sexual harassment training to all of your supervisors? Yes ☑ No ☐ N/A ☐
5. Do you notify the Ct. State Employment Service of all employment openings with your company? Yes ☐ No ☑	11. If your company has apprenticeship programs, do they meet the Affirmative Action/Equal Employment Opportunity requirements of the apprenticeship standards of the Ct. Dept. of Labor? Yes ☐ No ☐ N/A ☑
6. Does your company have a collective bargaining agreement with workers? Yes ☐ No ☑ 6a. If yes, do the collective bargaining agreements contain non-discrimination clauses covering all workers? Yes ☐ No ☐ 6b. Have you notified each union in writing of your commitments under the nondiscrimination requirements of contracts with the state of CT? Yes ☐ No ☐	12. Does your company have a written affirmative action Plan? Yes ☑ No ☐ If no, please explain. 13. Is there a person in your company who is responsible for equal employment opportunity? Yes ☑ No ☐ If yes, give name and phone number: Karl F. Frey (860) 286-9171

1. Will the work of this contract include subcontractors or suppliers? Yes ☐ No ☑

1a. If yes, please list all subcontractors and suppliers and report if they are a small contractor and/or a minority business enterprise. (defined on page 1 / use additional sheet if necessary)

1b. Will the work of this contract require additional subcontractors or suppliers other than those identified in 1a. above? Yes ☐ No ☑

PART IV - Bidder Employment Information Date:

JOB CATEGORY *	OVERALL TOTALS	WHITE (not of Hispanic origin)		BLACK (not of Hispanic origin)		HISPANIC		ASIAN or PACIFIC ISLANDER		AMERICAN INDIAN or ALASKAN NATIVE	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Management	29	24	4			1					
Business & Financial Ops	15	13	2								
Marketing & Sales	1		1								
Legal Occupations											
Computer Specialists	2		1			1					
Architecture/Engineering	82	59	6	5	1	4		5	2		
Office & Admin Support	5	3	2								
Bldg/ Grounds Cleaning/Maintenance											
Construction & Extraction											
Installation , Maintenance & Repair											
Material Moving Workers											
Production Occupations											
TOTALS ABOVE	134	99	16	5	1	6		5	2		
Total One Year Ago	122	96	15	3		3		4	1		
FORMAL ON THE JOB TRAINEES (ENTER FIGURES FOR THE SAME CATEGORIES AS ARE SHOWN ABOVE)											
Apprentices											
Trainees											

*NOTE: JOB CATEGORIES CAN BE CHANGED OR ADDED TO (EX. SALES CAN BE ADDED OR REPLACE A CATEGORY NOT USED IN YOUR COMPANY)

1. Which of the following recruitment sources are used by you? (Check yes or no, and report percent used)				2. Check (X) any of the below listed requirements that you use as a hiring qualification		3. Describe below any other practices or actions that you take which show that you hire, train, and promote employees without discrimination
SOURCE	YES	NO	% of applicants provided by source	(X)		
State Employment Service	☐	☑		X	Work Experience	Equal Opportunity Employment Statement Salas O'Brien provides equal employment opportunities to all employees and applicants for employment and prohibits discrimination and harassment of any type without regard to race, color, religion, age, sex, national origin, disability status, genetics, protected veteran status, sexual orientation, gender identity or expression, or any other characteristic protected by federal, state/provincial, or local laws. Salas O'Brien will accommodate the disability-related needs of applicants as required by law.
Private Employment Agencies	☑	☐	10%	X	Ability to Speak or Write English	
Schools and Colleges	☑	☐	10%		Written Tests	
Newspaper Advertisement	☐	☑		X	High School Diploma	
Walk Ins	☐	☑		X	College Degree	
Present Employees	☑	☐	5%		Union Membership	
Labor Organizations	☐	☐		X	Personal Recommendation	
Minority/Community Organizations	☐	☐			Height or Weight	
Others (please identify)	☑	☐	website 75%		Car Ownership	
	☐	☐			Arrest Record	
	☐	☐			Wage Garnishments	

Certification (Read this form and check your statements on it CAREFULLY before signing). I certify that the statements made by me on this BIDDER CONTRACT COMPLIANCE MONITORING REPORT are complete and true to the best of my knowledge and belief, and are made in good faith. I understand that if I knowingly make any misstatements of facts, I am subject to be declared in non-compliance with Section 4a-60, 4a-60a, and related sections of the CONN. GEN. STAT.

(Signature)	(Title)	(Date Signed)	(Telephone)
Melody L. Lee	HR Manager	12/12/2023	651-252-4982

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

3/1/2024

DATE (MM/DD/YYYY) 8/11/2023

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Lockton Companies 444 W. 47th Street, Suite 900 Kansas City MO 64112-1906 (816) 960-9000 kcasu@lockton.com	**CONTACT NAME:** **PHONE (A/C, No, Ext):** **FAX (A/C, No):** **E-MAIL ADDRESS:**
INSURED 1470563 BVH INTEGRATED SERVICES, INC A SALAS O'BRIEN COMPANY 206 WEST NEWBERRY RD. BLOOMFIELD CT 06002	**INSURER(S) AFFORDING COVERAGE** — **NAIC #** **INSURER A :** Continental Casualty Company — 20443 **INSURER B :** Zurich American Insurance Company — 16535 **INSURER C :** Travelers Property Casualty Company of America — 25674 **INSURER D :** **INSURER E :** **INSURER F :**

COVERAGES **CERTIFICATE NUMBER:** 17638079 **REVISION NUMBER:** XXXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
B	[X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [X] PRO-JECT [ ] LOC OTHER:	Y	N	GLO 3537984	8/15/2023	3/1/2024	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 1,000,000 $ 10,000 $ 1,000,000 $ 2,000,000 $ 2,000,000
B	AUTOMOBILE LIABILITY [X] ANY AUTO [ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS [ ] HIRED AUTOS ONLY [ ] NON-OWNED AUTOS ONLY	N	N	BAP 3537985	8/15/2023	3/1/2024	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ XXXXXXX $ XXXXXXX $ XXXXXXX
C	[X] UMBRELLA LIAB [X] OCCUR EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [X] RETENTION $ 10,000	N	N	CUP-6S366916	8/15/2023	3/1/2024	EACH OCCURRENCE AGGREGATE	$ 10,000,000 $ 10,000,000 $ XXXXXXX
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? [N] (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	N	WC 3537983	8/15/2023	3/1/2024	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 1,000,000 $ 1,000,000 $ 1,000,000
A B	PROF. LIAB POLL. LIAB VALUEABLE PAPERS	N	N	AEH591877402 CPP565778	8/15/2023 8/15/2023	8/15/2024 8/15/2024	EACH CLAIM: $5,000,000 AGGREGATE: $5,000,000 PER SCHEDULE ON FILE	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

EVIDENCE OF INSURANCE.

CERTIFICATE HOLDER

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Joseph M Agnello

Building Envelope Peer Review Comment Sheet

206 West Newberry Road
Bloomfield, CT 06002
Tel: (860) 286-9171
Fax: (860) 242-0236

The drawing review notes found below are for the above referenced project. General comments represent repeat issues that are not drawing or area specific. Specific comments listed below are referenced on the appropriate drawing with the reference number noted. The architect is asked to respond to the issues in the Architect's Comment column to allow for the tracking of these items during future reviews. Please do not treat these comments as directives, just questions or suggestions.

Project Name: Brookhaven National Lab - SUSC
BVH Project Number: 21-20-016
Drawing Set: Final Issued for Construction Set
Drawing Date: 6/11/2021

Review Date: 6/14/2021
Reviewer: Mike LaCrosse

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
50% CD Comments - 100% CD Back-Check - IFC Back-check					
General	3/17/2020		Based on wall section and detail call outs provided, it appears that the major envelope transition details are being anticipated. Good. However, most sections and details currently available do not appear developed enough yet for meaningful envelope review. Therefore we plan to review all details in full during the next CD submission. That said, there may still be some detail specific comments offered in this review.	All details are considered to be at an approximately 50% DD level of consideration/completion.	**BVH 3/23/21 - Comment was for BVH reference. Can be closed. See new comments at the end of this back-check.**

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
General	3/17/2020		The north and south elevations are almost entirely glass. Have the following items regarding energy and occupant comfort been considered?: - Summer time overheating/high cooling demands (does the low 0.23 SHGC specified address this?) - Winter time occupant discomfort (too warm on the south side, too cold on the north) - Excess winter night time heat loss on both elevations - 2018 IECC maximum vertical fenestration requirements We realize these drawings are in CD stage, but if there is any opportunity to reduce glazing, or at least, insulate some glazing, we would encourage it. It could mean reduced size of HVAC equipment and better occupant comfort.	Occupant comfort and mechanical requirements were paramount to the design of the entire form. This is why the north side has taller glazing than the south and most primary workplace program is located on the north half of the floor. This will afford naturally lit, glare-free workspace all day long, while limiting south-facade activity to more targeted and social functions where glare and solar gain are less of a concern. Glazing selections are among the highest-performing available today and mechanical systems are being designed in accordance.	**BVH 3/23/21 - Based on Gensler response, it appears this has been highly studied/discussed prior to our involvement. If team feels confident that the original considerations are addressed, then we will note this as a closed subject.**
General	3/18/2020		Some mock-up testing specified, such as that under 072726, 1.0, H implies that there could be a stand-alone mockup, which we think would be valuable. However there is no mock-up specification available. What is the intent regarding mock-ups? Will there be a stand-alone mock-up for testing purposes?	We will always advocate for and recommend the use of both visual and performance mockup units. That said, the decision to heed that recommendation ultimately lies with the client and contractor teams.	BVH 5/7/20 - Based on our 5/7/20 design review meeting, our understanding is that BNL anticipates requiring a mockup, but that details still need to be sorted. **BVH 3/23/20 - We note that a standalone mockup is shown on A700 and referenced by some technical specifications. Any specific performance-related inquiries will be raised as individual items in the new comments below**.

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
A-500	3/18/2020	1	A500 - Suggest a plan detail for wall panel joints, particularly at abutting exterior insulated panels, be provided. We've typically seen interior and exterior backer rod and caulk with a center emseal gasket. Suggest notes which require the joint width to be maintained for full height of joint.	Agreed. Detail under development.	**BVH 3/23/21 - BVH notes this detail has been included as 03/A500. We note that joint width dimension is explicit.**
A-500	3/18/2020	2	7/A500 - The insulation and air barrier should wrap around this wall feature to maintain continuity with the curtain wall and the sill and head soffits above and below. We assume this is the intent, just graphical incompleteness.	Agreed. Detail under development.	BVH 3/23/21 - BVH notes this is now 6/A520. Insulation and air barrier have designed to allow continuity in plane with the CW, a smart design move. Suggest a detail call out at the CW jamb to illustrate the air and weather barrier interface at the RO. Gensler 5/5/21 - Will add Detail. **BVH 6/14/21 - No change.**
A-500	3/18/2020	3	7/A500 & 1/A501 - The outer most plane of insulation and air barrier is further out in plane than the insulation and air barrier shown at the sill/soffit in detail 3/A512. What this will mean is that the underside of this wall feature, at the level 2 elevation line, will need to be wrapped in air barrier and insulation as well to connect back to the 3/A512 soffit detail. Suggest creating section and plan details, where drawn as lines/circles, to help illustrate this.	Agreed. Detail under development.	BVH 3/23/21 - The soffit detail (now 1/A521) appears to illustate alignment of air and thermal barrieres with what is now 6/A520. See new comments below, if any, regarding detail-specific recommendations.
A-510	3/18/2020	1	A510 - As foundation details develop, we would like to see the intent of the waterproofing graphically illustrated. Will wall panels be shimmed or structurally held off from the foundation/slab edge? If not, continuous waterproofing will be more critical (water table aside) to prevent capillary action into the precast panels.	Agreed. Detail under development.	**BVH 3/23/21 - Precast wall base details have been developed on A511 and a high-level view indicates a capillary break via a shim stack has been included. Any detail specific comments will be included below.**

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
A-510	3/18/2020	2	6/A510 - As this detail develops, please be mindful that the roof AVB will need to integrate continuously with the curtain wall head. Air barrier detailing at the jambs of this CW will have to integrate with this wall to roof transition at head corners as well.	Agreed. Detail under development.	BVH 3/23/21 - Detail now appears to be 8/A511. A physical seal of the roof membrane to the CW frame is not graphically or textually clear. Also, the connection to the jamb backer rod and caulk will be minimal. Gensler 5/5/21 - Roof base sheet should lap over top of parapet, counterflashing should tie into curtain wall and then over the roofing base sheet. **BVH 6/14/21 - OK. Suggest this be illustrated and defined on drawings. The approach is not clear there.**
A-510	3/18/2020	3	1/A510 - Will precast wall panel actually overhang the foundation like this? It could make air sealing it to the foundation/slab edge more challenging.	We are still working through this detail with potential precast suppliers. Our intent was to obtain a continuous line of insulation from panel to foundation. If we can't reach consensus about this approach, we can revert to a more traditional bearing strategy and live with the thermal bridge.	BVH 5/7/20 - Per our 5/7/20 design review meeting, updated detailing indicates that air sealing of this transition is easiest from the slab edge to the structural wythe. **BVH 3/23/21 - We see that an overhang is present in detail 1/A511, creating the aforementioned thermal alignment. Since this is an approach-based question we will close. Please see performance specific comments, if any, further below.**
A-512	3/18/2020	1	2,3,5/A512 & sim. Consider drip edge with a kicker on it at circled locations on these details, to prevent drainage back onto cladding either by slope or surface tension. If installed against painted or moisture vulnerable material, the length of the kicker must result in a drip edge that is at least 1/2" from the finish material surface.	Agreed. Detail under development.	BVH 3/23/21 - These details now appear on A521. We do not see any indication of a drip edge with a kicker at the exterior edge of the coping. This will help reduce the amount of drain back on the underside of the coping and into the wall system. Also applies to new details like 4/A512 and similar. Gensler 5/5/21 - The space between soffit panels should act as a drip edge. **BVH 6/14/21 - Understood and agree at soffit, but at the TO parapet line, water will run down underside of coping and behind ACM panel, and not necessarily drip out at 1/2" gap.**

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
A-512	3/18/2020	2	2,5/A512 & sim. - As air barrier detailing develops, note that carrying the air barrier around the outer tube steel and framing, leaves condensation risk on these steel components, due to low exterior R-value surrounding them.	Understood. Final approaches to overall AVB and insulating strategies are still being determined.	BVH 3/23/21 - Detail 3/A521 appears to address this with exterior R-value surrounding. The parapet cap still acts as a potential weak point, with low R-value. Gensler 5/5/21 - Sheathing will continue across horizontal surface over insulation. **BVH 6/14/21 - We note the added insulation, great.**
A-512	3/18/2020	3	2/A512 & sim. - As air barrier detailing develops, be mindful of the structural penetrations through sheathing which will need to be air sealed. In this detail, it looks like the intent could for the air barrier to extend direct to the roof deck in plane with the wall. However, the steel penetrations through the sheathing will be difficult to seal from outside, with the perpendicular plate in place.	Understood. Final approaches to overall AVB and insulating strategies are still being determined.	BVH 3/23/21 - These details now appear as 6,7/A521. There still appears to be at least 2 significant steel structure penetrations through the sheathing in these details. Structurals indicate these occur every 6.5 feet. Suggest calling out these penetrations be air sealed at the sheathing air barrier layer and at the building wrap layer (drainage continuity). Gensler 5/5/21 - Will call out air seal around all penetrations. **BVH 6/14/21 - We note the added call out.**
A-512	3/18/2020	4	1,3/A512 - A002 indicates these wide sills will be sloped to drain. Here they look level. Will this slope be illustrated in future drawings?	Yes.	**BVH 3/23/21 - The geometry of this sill area appears to have changed, making this comment irrelevant at this stage.**
A-513	3/18/2020	1	1/A513 - There is no R-value or air barrier indicated horizontally across this soffit. The same is true of the related wall and building sections.	Agreed. Detail under development.	**BVH 3/23/21 - R-value is now present in what is now detail 1/A521. Item can be closed.**
General	3/18/2020	Specs	For all envelope field testing specified, it should be made clear which party is to engage the testing agency - typically owner or contractor.	Agreed. Many items in the specifications need to be coordinated with ownership and contracting team(s).	Gensler 5/5/21 - Specs are being modified to GC engangement of all testing/inspections except for those required by code. **BVH 6/14/21 - Understood. We have noted that most testing no longer indicates "Owner-engaged", leading default assumption to be by contractor.**

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
034500	3/18/2020	2.0,A	Should R-value requirements be for insulated panels be identified under this article or is this being considered covered under 2.0, J, 1?	Specifics of insulation requirements are covered in 2.0, J, 1 as you note, but we think it's a good idea to add a note about overall system R-Value to 2.0, A.	BVH 3/23/21 - Insulation and R-value does not appear to be defined anywhere in part 2 and wall type PC01 is included in this spec. Aforementioned article J no longer exists. Gensler 5/5/21 - R-value requirements for roofs and walls will be added to the drawings. **BVH 6/14/21 - We note the added R-value requirements in the drawings, but consider identifying the insulation material and its required properties in specs under part 2, article B or reference the 072100 spec if the insulation is found there. We close this here because it is a repeat comment found further below that is left open.**
034500	3/18/2020	2.0,H	See recommendations for precast panel joints under line 18. Should these sealant types be defined, or at least referenced, in this article or spec?	We will continue to refine/revise specifications as we gather more information and make more decisions regarding the insulated precast panels.	BVH 3/23/21 - Drawings reference the sealant joints to 079200. However there are 2 types of vertical sealants specified. It isn't clear which the precast panel joints should use. Gensler 5/5/21 - Material tag SE01 has been added to the drawings and specifications for Tnemec Dymeric 240 FC. **BVH 6/14/21 - We note the added information.**
034501	3/18/2020	1.0,B,2	The 014000 specification doesn't exist.	BNL is providing Division 01. We will need to coordinate this section with them, or strike the aforementioned reference. From BNL: Remove the aforementioned reference and replace with any specific requirement for field testing as needed.	**BVH 3/23/21 - Both specs have been removed.**
071413	3/18/2020	1.0,B,2,A	The referenced 075556 specification doesn't appear to exist. Can you confirm that the 071413 and the pending 075556 specifications pertain to the lower level paver roofs?	We are still finalizing which specification sections will and won't ultimately be included at the end of documentation. If we end up utilizing any fluid-applied PMR roofing projects, this section will be included; if not, we will strike the reference.	**BVH 3/23/21 - We note both specification sections have been removed, defining all roofs as SBS modified under 075216.**

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
071413	3/18/2020		See above comment. If confirmed, then presumably this waterproofing system will also serve as the air barrier? Suggest language indicating its need to remain continuous from an air barrier standpoint at penetrations and perimeter conditions.	Yes, the above sections reference the lower roofs only. We will take suggestion regarding additional language under advisement.	**BVH 3/23/21 - We note both specification sections have been removed, defining all roofs as SBS modified under 075216.**
071413	3/18/2020		This specification section doesn't discuss a roof membrane over the insulation and beneath the pavers. Assume this will be covered by the 075556 spec that is referenced but not yet included?	We are not anticipating including any membrane over top of the insulation. The pavers will serve as ballast and protection.	BVH 5/1/20 - Does this mean pavers are water-tight? If not, what about concerns for bulk water freezing between insulation board layers an joints? I'd be a bit concerned about upheaving or breakage of some boards. This thinking could be a product of not yet fully understanding the roof design in its early stages. BVH 5/7/20 - In our DR meeting, elimination of the pavers was discussed which may change roofing strategy. **BVH 3/23/21 - This is no longer relevant as all roof systems now contain a finish SBS modified membrane.**
071413	3/18/2020	3.0,I,2	Flood testing duration will need to be clarified. 24 hrs is typical. The type of EFVM testing (high voltage or low voltage) will need to be specified. Confirm that the intent is to include both types of testing. Note that EFVM testing will require a conductive material installed beneath the membrane to be tested. Compatibility with manufacturer's system will need to be verified.	Understood. Language and requirements will be clarified.	**BVH 3/23/21 - This specification no longer exists. All roofs appear to be SBS modified per specs.**
071413	3/18/2020	3.0,1	Protocol for repair should be included should a breach be detected in testing.	Understood. Language and requirements will be clarified.	**BVH 3/23/21 - This specification no longer exists, however the recommendation applies to the EFVM testing outlined in 075216 which discusses retesting following repairs.**
071416	3/18/2020	3.0,G	Will flood testing be possible for vertical foundation wall surfaces? EFVM testing would require high voltage testing to perform on walls and would need a conductive material behind, as described on line 35 above.	We will review requirements and recommendations for testing at vertical surfaces and amend language as necessary.	**BVH 3/23/21 - This specification no longer exisits. Damproofing appears to be product of choice at slab edges.**

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
072100	3/18/2020		Specification still appears largely under development.	All specifications are still largely under development. The drawings and manual represent an approximately 50% DD level of consideration/completion. It is uncommon, in our experience, to have fully developed specifications at the half-way point of the Design Development phase of a project.	**BVH 5/1/20 - Agreed. It is a note more for our reference, so we know to check again in the next cycle**
072616	3/18/2020	3.0,B,G	Suggest specifying preference for liquid mastic (if available through manufacturer) at penetrations before resorting to tape product.	Will review suggestion internally and amend as necessary.	BVH 3/23/21 - No change to article 3.0, B. Liquid flashing is especially beneficial at conduit clusters. Gensler 5/5/21 - Noted. **BVH 6/14/21 - Spec appears to have been eliminated. Assume 031550 is utilized instead. No mention of liquid flashing. We assume the decision has been made to not specify.**
072726	3/18/2020		Specification still appears largely under development. As a fluid-applied product is selected, bear in mind that the build (low, medium, high) selected should equate to a product designed for that level of build. Otherwise, for example, a low-build product used as a high-build will create vapor permeance characteristics that do not match the advertised permeance of the product. Fortunately, the specs already seem to segregate the differnet	Understood. Language and requirements will be clarified.	**BVH 3/23/21 - This spec section has been removed as it appears the fluid-applied has been replaced with sheathing air barrier. This makes this original comment irrelevant, therefore we will close it.**
072726	3/18/2020	1.0,H,2,B	Suggest eliminating this test requirement for mockups. Testing the air barrier accurately in the field isn't feasible. The qualitative E1186 testing at mock-up stage is more valuable as it identifies where the leaks are actually occurring. This applies to 3.0, E, 4, B as well.	Will review suggestion internally and amend as necessary.	**BVH 3/23/21 - This spec section has been removed as it appears the fluid-applied has been replaced with sheathing air barrier. This makes this original comment irrelevant, therefore we will close it.**
072726	3/18/2020	3.0,E,4,C	Suggest pull testing at a much lesser frequency. Once every 600SF is a large quantity of tests that isn't usually cost-effective. For this project, we might suggest three for each cardinal direction.	Will review suggestion internally and amend as necessary.	**BVH 3/23/21 - This spec section has been removed as it appears the fluid-applied has been replaced with sheathing air barrier. This makes this original comment irrelevant, therefore we will close it.**
072726	3/18/2020	3.0,E,4,A	Suggest outlining specifically which air barrier details are to be tested. Typical details would include wall to roof transitions for framed and precast walls, CW or storefronts, CW or storefront openings, overhangs, inside/outside corners, precast panel joints, MEP penetrations, etc.	Will review suggestion internally and amend as necessary.	**BVH 3/23/21 - This spec section has been removed as it appears the fluid-applied has been replaced with sheathing air barrier. This makes this original comment irrelevant, therefore we will close it.**

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
074213.23	3/18/2020	2.0, A	Are the performance requirements for air and water infiltration essential when they aren't serving as the air barrier or drainage plane?	Interesting question! Will rview with senior technical staff and amend as necessary.	BVH 5/7/20 - In our 5/7/20 DR meeting Geoffrey Diamond agreed about eliminating spec language in order to avoid bidder confusion. BVH 3/23/21 - No changes. Gensler 5/5/21 - Performance requirements will be removed from 074213.23 2.0,A. **BVH 6/14/21 - No change.**
074213.23	3/18/2020	3.0,E	In addition to the above comment, this AAMA 501.2 testing doesn't seem necessary either since metal cladding isn't our bulk water barrier, it is just a rain screen.	Agreed. Will revise language as necessary.	BVH 3/23/21 - No change. Gensler 5/5/21 - AAMA 501.2 testing requirements will be removed from 074213.23 3.0,E. **BVH 6/14/21 - No change.**
075216	3/18/2020	2.0	It doesn't appear that any kind of roof air barrier is specified. We strongly suggest a dedicated, self-adhered, roof air barrier membrane for installation between the substrate board and insulation. Detailing would need to integrate this layer continuously with surrounding air barriers.	Will review suggestion internally and amend as necessary.	BVH 5/1/20 - Would like to discuss further the implications of treating roof membrane as an air barrier rather than having a dedicated AVB. BVH 5/11/20 - BVH sent email that describes preference for seeing dedicated roof AVB as well as supporting documentation by Joe L. BVH 3/23/21 - BVH notes that there is no roof AVB specified or identified in the typical roof types on page A530. BVH still recommends a dedicated air barrier for greater simplicity of air barrier continuity and wind uplift resistance, particularly important in a coastal environment. Please confirm that no separate air/vapor barrier product will be utilized. If so, suggest a self-adhered base sheet for the SBS roof serve as the air barrier. Gensler 5/5/21 - Please show us the detail you would like to see and we will review. **BVH 6/14/21 - BVH notes that the specifications identify the SBS base sheet as the air barrier layer. This is the layer we will commission as the air barrier and will look for air continuity to perimeter walls and at penetrations.**

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
075216	3/18/2020	3.0,K,1	Given the sloped roof, EFVM testing will likely need to be specified as high voltage testing. As mentioned above, this will require a conductive material, compatible with the manufacturer's system to be installed beneath the roof membrane. This doesn't appear to be accounted for in the specs.	Will review suggestion internally and with manufacturers and amend as necessary.	BVH 3/23/21 - No change. BVH believes high voltage testing still likely required, vs low-voltage. Has Gensler reviewed/included provisions needed to accommodate EFVM testing? Usually a dedicated ground just beneath the membrane or a ground lead is necessary. These requirements should be outlined in the spec so the roofing contractors include in their SOW. Gensler 5/5/21 - We will continue to review this. **BVH 6/14/21 - No change. If EFVM testing is to be reliable and accurate, it is critical that a conductive grounding medium be included as part of the design directly beneath roof membrane. Otherwise the roofer may not carry costs to purchase and install, or the test agent may not be able to perform the test without one.**
079200	3/18/2020	1.0,G,2	Suggest indicated how/where preconstruction sealants will be created. Will it be on the building, on a dedicated standalone mockup?	Agreed. Will revise language as necessary.	BVH 3/23/21 - BVH notes that mock-ups of sealants and joint types is required. However it still isn't clear if these mock-ups should be on the building, on the stand-alone mockup, or as its own mockup. It would be more cost-effective to test all joint types in one mockup location. Gensler 5/5/21 - The stand-alone building mock-up assembly has been VE'd out of the project. **BVH 6/14/21 - Understood. This preconstruction testing is still specified though. Suggest it be removed if it is not intended. It has been removed from our updating testing matrix based on the above feedback and responses to our matrix.**
079200	3/18/2020	2.0	Suggest including a schedule which indicates the general locations each type of sealant is intended to be used.	Will review suggestion internally and amend as necessary.	**BVH 3/23/21 - BVH notes sealant uses have been identified.**
079200	3/18/2020	3.0,D,1,A	Suggest clarifying which sealant types are to be tested.	Agreed. Will revise language as necessary.	**BVH 3/23/21 - BVH notes this has been clarified.**

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
084113	3/18/2020	3.0,G,2	Suggest specifying what size area should be tested. We think testing 2 or 3 areas at 4 bays wide, would offer good representation. Has water penetration testing with induced pressure (chamber testing - AAMA 503) been considered?	This would need to be discussed with ownership and contracting teams. It's likely that whatever system we end up with will have already undergone significant testing and will have reports available upon request. From BNL: The BECx recommendation for quantity of the test is reasonable. The AAMA 501.2 testing is adequate; AAMA 503 testing is not needed.	BVH 5/7/20 - In 5/7/20 review meeting, BVH discussed the pros/cons of the two test types for owner/architect clarity in decision making. Based on the meeting, and prior comments, BNL is leaning in the direction of AAMA 501.2 testing. We will review for test requirements in the specifications on our next review. BVH 3/23/21 - BVH notes that there is no field quality control testing specified. Is this deliberate? Please confirm. Gensler 5/5/21 - We will review this in conjuction with BNL's comments included. **BVH 6/14/21 - We note that section 084413 references the testing requirements for storefronts under part 3. Consider this spec reference 084413 for Field Quality Control, similar to how it does so for Installation. Otherwise, this is considered resolved.**
084413	3/18/2020	1.0,E,3,B	Suggest eliminating requirement for quantitative air leakage testing. As suggested by AAMA 503, accurately quantifying a curtain wall is difficult due to challenges in sealing a chamber to the performance components from both sides. Suggest qualitative fog testing per ASTM E1186 instead.	Will review suggestion internally and with manufacturers and amend as necessary.	BVH 5/7/20 - BVH provided further clarity on reason for recommendation in the 5/7/20 DR meeting. The team was to review this further. BVH 3/23/21 - BVH notes that ASTM E783 testing does not appear to be specified. Still suggest ASTM E1186 fog tests on CW assemblies Gensler 5/5/21 - We will continue to review. **BVH 6/14/21 - No change. The fog testing was accepted in the BVH field testing matrix, so consider this spec referencing that matrix, or directly specifiying here.**
084413	3/18/2020	1.0,E,3,B	Suggest specifying a quantity of AAMA 501.2 testing to be performed. We think 3 areas at 4 bays wide would offer good representation. Has water penetration testing with induced pressure (AAMA 503) been considered?	This would need to be discussed with ownership and contracting teams. It's likely that whatever system we end up with will have already undergone significant testing and will have reports available upon request. From BNL: The BECx recommendation for quantity of the test is reasonable. The AAMA 501.2 testing is adequate; AAMA 503 testing is not needed.	BVH 3/23/21 - Now article E,3,A. We see "Hose Stream Testing' is specified. Suggest explicitly referencing the AAMA 501.2 standard. Also the quantity of tests and size of each test area needs to be defined for bidding purposes and scope clarity. Gensler 5/5/21 - We will review this in conjuction with BNL's comments included. **BVH 6/14/21 - The above is considered resolved. Since there is no mock-up now, suggest removal of the mock-up location mentioned. Similar for steel-framed entrances just below.**

Page	Markup Date	#	BVH Comments	Architect's Comments	BVH Back Check Comments
084413	3/18/2020	General	Suggest including curtain wall testing as part of any stand-alone mock-up assembly.	We will always advocate for and recommend the use of both visual and performance mockup units. That said, the decision to heed that recommendation ultimately lies with the client and contractor teams. From BNL: This test should be included as suggested by the BECx.	BVH 5/1/20 - Would like to discuss test options that would be practical for a mockup CW. BVH 3/23/21 - See above latest response. Suggest clarifying field mock-up as one of the test locations. Gensler 5/5/21 - The stand-alone building mock-up assembly has been VE'd out of the project. **BVH 6/14/21 - Understood.**
100% CD Review Comments - IFC Back-check					
General	3/23/2021		We note that the VE process has removed the fluid-applied air barrier/ drainage plane. Updated wall types should identify which materials serve as the air barrier and which serve as the drainage plane. Per my email conversations with BNL during this review, my understanding is that the standard exterior gypsum (AB01) is the primary air barrier on all framed wall types, and that the specified building wrap is the weather barrier/drainage plane. There is also a secondary sheathing w/integrated weather barrier identified (AB02), but we have not been made aware of where it is incorporated in this project.	AB02 is not used in the project.	**BVH 6/14/21 - We note that wall types now reference air barrier vs weather barrier. The AB02 shown in the spec should be removed if not intended for the project.**
General	3/23/2021		Specification 061600 does not include sheathing air barrier accessory materials, which are critical for creating an air tight assembly at sheathing joints and to adjacent air barrier materials. These accessory materials need to be manufacturer-approved and it should be verified the manufacturer will provide an air barrier system warranty.	Refer to WEATHER BARRIERS 072500.	**BVH 6/14/21 - Air barrier and weather barrier are not the same thing. If weather barrier flashing materials specified in 072500 are to also be used for the gypsum sheathing air barrier, then suggest the 061600 spec reference 072500 for those materials and contain installation instructions for the air barrier. Otherwise, this could be overlooked.**
General	3/23/2021		Given that a standard exterior grade gypsum sheathing is to serve as the primary air barrier, we don't necessarily expect an air barrier graphic across the field of sheathing. However, we do think changes in sheathing plane and transitions to other materials should identify intent for continuity, textually and graphically.	Refer to SHEATHING Section for air barrier sheathing and transition materials. Happy to discuss together if needed.	**BVH 6/14/21 - Since we are told AB02 is not used in this project, transition materials are not identified in SHEATHING section, as mentioned in above response.**
General	3/23/2021		We note that a dedicated roof air/vapor barrier over substrate board or concrete deck has not been incorporated. Given the coastal climate, and for simplicity of details, BVH still advocates for a dedicated self-adhered barrier. Please confirm that no dedicated air barrier over the roof deck/substrate board will be provided.	A dedicated air barrier is shown over metal deck, but not included where there is a concrete slab on top of metal deck.	**BVH 6/14/21 - We do not see an air barrier over metal deck. Specifications identify the SBS base sheet as the air barrier. Comments below for 8/A511 also confirm this AVB is not supposed to be here. Considering this comment closed.**

Mechanical and Plumbing Peer Review Comment Sheet

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BVH integrated services

The drawing review notes found below are for the above referenced project. General comments represent repeat issues that are not drawing or area specific. Specific comments listed below are referenced on the appropriate drawing with the reference number noted. The design engineer is asked to respond to the issues in the Engineer's Comment column to allow for the tracking of these items during future reviews. Please do not treat these comments as directives, just questions or suggestions.

Project Name:	BNL SUSC	**Review Date: 3/30/21 & 4/6-8/21**	
BVH Project Number:	2120016	**Reviewer: MJG, JBA**	
Drawing Set:	100% DD		
Drawing Date:	5-Mar-21		

Specification Section	-	BVH Comments	Engineer's Comments	BVH Back Check Comments
50% CD Comments - 100% CD Back-Check				
017700, G		O&M Manuals should be provided in electronic and (if wanted) hard copy formats. Specific formatting for electronic O&Ms should be identified so they have the same features as the hard copies. Final O&M should be available before training is scheuled.	Concur.	3/30/21: No Change in 3/5/21 set
017700, H		Training requirements should include a syllabus and advanced scheduling to allow BNL to organize staff to attend the training. Reference to 019113 for additional training requirements should also be made.	Concur.	3/30/21: No Change in 3/5/21 set
Div 22 Specs		No reference to powered natural gas valve located in the plumbng specs.	Natural gas will be under the mechanical scope of work. Motorized gas valves are specified in 23 11 23 2.E	3/30/21: OK
220640		This spec section is listed in the TOC but not povided with this package.	This specification does not exist and will be reomved form the TOC.	3/30/21: Section removed in 3/5/21 set
221119, 2.0, T		Verify spcified water meters can provide cmmunications to BMS as specifed.	Will evalute.	3/30/21: Acknowledged in 3/5/21 set
230593		Consider adding scope for TAB contractor to balance DHW recirculation loop.	Concur. Added DWH to 230593.	3/30/21: Acknowledged in 3/5/21 set
230713		We recommend requiring insulation over reheat coil sections at shutoff VAVs. This unlined section of duct is ofter left uninsulated and can sweat during cooling operation.	Concur. We have added a note to detail C3 on M-503 and added to specification 23 07 16.	3/30/21: could not locate reference in spec in 3/5/21 set, but is noted on detail.
230993, 3.0, C, 2, B		Systems to be connected should include all metering specified to be monitored by BMS, packaged controls for booster pump and DHW HX, etc.)	Concur. We have added these systems to the specifications.	3/30/21: It appears the spec # changed to 239200? Could not locate any monitoring of domestic water in this section
233600, 2.0, 9		We recommend having ALC provide all controls. VAV controllers can be shipped th VAV manufacturer for assembly.	Concur. ALC to provide controllers for VAV manufacturers to install. Specification has been updated.	3/30/21: this has been acknowledged; however, there are several references to the previous control spec number 230923. these should be updated to reference section 239200 if this to be the new spec number.
235216, 2.0		The condensing boiler spec includes a DHW heat excjanger. Is this in addition to the HWs scheduled on P-601?	They are the ame heat exchangers. The DWHX will be provided by the boiler manufacturers.	3/30/21: OK
236426		A refrigerant detection is included with the chiller spec, but not identified on the drawings or sequence of ops.	Refrigerant monitoring is not required based on the volume of refrigerant present based on ASHRAE 15 and 34.	3/30/21: OK

236426			Chiller spec includes a portable refrigerant recovery unit and an automated tube cleaning system. Verify with Owner if this equipment is required.	These items are not required and have been removed.	3/30/21: OK
Page	**Markup Date**	**#**	**BVH Comments**	**Engineer's Comments**	**BVH Back Check Comments**
50% CD Comments - 100% CD Back-Check					
M-101	3/26/20	1	Mechanical floor plans do not appear what we would consider to be 50% DD with nothing more than duct and pipe mains shown to the general area (with the exception of the mechanical room).	Concur. Duct and pipe routing is currently being designed.	3/30/21: Acknowledged in 3/5/21 set
M-101	3/26/20	2	Without ductwork shown, cannot review zoning or determine if it appears appropriate, typical all duct plans.	Concur. Duct and pipe routing is currently being designed.	3/30/21: Acknowledged in 3/5/21 set
M-101	3/26/20	3	Is cooling or ventilation required for elevator control room?	Yes. It is being served by a ductless minisplit DSS-103/CU-103	3/30/21: symbol for unit is shown but not numbered. DSS-103 is on schedule on M-602 and # shown on M-201. Recommend adding unit # on this drawing as well
M-101	3/26/20	4	No fire or smoke dampers yet indicated.	Fire or smoke dampers are not required as we only have 1 hr rated walls.	3/30/21: What about at floor penetrations?
M-101	3/26/20	5	Are there any special security bars or other protection required at louvered openings into federal building?	ATFP is not required for this building.	3/30/21: OK
M-102	3/26/20	1	No fire or smoke dampers yet indicated.	Fire or smoke dampers are not required as we only have 1 hr rated walls.	3/30/21: What about at floor penetrations?
M-102	3/26/20	2	Is cooling/ventilation required for electrical room?	The electrical rooms on level 01 will be ventilated by EF-101 and 102 to maintain a 10 deg differential from ambient temperature. Level 02 and Level 03 electrical rooms will be conditioned by VAV boxes due to impracticality of ducting ventilation and exhaust air to that space.	3/30/21: OK
M-102	3/26/20	3	Is unit heater required for this electrical room with no exterior exposure?	No. We have removed unit heaters.	3/30/21: OK
M-102	3/26/20	4	It appears that chase/shaft for duct riser is missing.	Concur. Shaft has been added.	3/30/21: Acknowledged in 3/5/21 set
M-103	3/26/20	1	Is unit heater required for this electrical room with no exterior exposure?	No. We have removed unit heaters.	3/30/21: OK
M-103	3/26/20	2	Is cooling/ventilation required for electrical room?	See above M-102 Note #2.	3/30/21: OK
M-103	3/26/20	3	No fire or smoke dampers yet indicated.	Fire or smoke dampers are not required as we only have 1 hr rated walls.	3/30/21: OK
M-103	3/26/20	4	It appears that chase/shaft for duct riser is missing.	Concur. Shaft has been added.	3/30/21: Acknowledged in 3/5/21 set
M-200	3/26/20	1	Please clarify whether these pipes are at grade, buried, or elevated on supports? Does pedestrian or vehicular traffic need to pass through this area?	The refrigernat piping is elevated on supports approx 1 foot above grade. We have added key notes to M-402. Detail of pipe support shown on M-505.	3/30/21: OK
M-200	3/26/20	2	Pipe tags and sizes not yet indicated.	Pipe on this sheet will be taged but will not show sizes. . All pipe tags and sizes will be shown on M-201 to 204.	3/30/21: OK
M-200	3/26/20	3	Consider piping HW loop at this floor in reverse return configuration if practical.	Will evaluate.	3/30/21: OK
M-201	3/26/20	1	Windows appear to be down to the floor; is this pedestal or recessed radiation, typical?	The heaters are trench radiant heaters that will be recessed into the floor.	3/30/21: OK
M-201	3/26/20	2	Are cabinet unit heaters required in this vestibule (or possibly fan coil units for summer cooling as well)?	Trench heaters will be provided in the vesibule. Cooling will not be provided.	3/30/21: OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-201	3/26/20	3	Coordinate piping with ductwork as there may be little or no room here, especially if adding ceiling CUHs.	Piping has been coordinated to avoid ductwork.	3/30/21: OK
M-201	3/26/20	4	Consider finned-tube radiation under counter at reception, and there is often a cool breeze through open doors.	Will evaluate.	3/30/21: OK
M-201	3/26/20	5	Is cabinet unit heater required near this door?	Will evaluate.	3/30/21: OK
M-201	3/26/20	6	Radiation appears to conflict with door.	Trench heaters will be recessed.	3/30/21: OK
M-202	3/26/20	1	Recommend finned-tube radiation at full height glazing. If glass to floor, then need pedestal or recessed type.	We have trench heaters on both the north and south walls of level 02 and 03. It is not showing up on the piping plans for some reason. We will fix.	3/30/21: OK
M-202	3/26/20	2	Recommend that bull-head tees be avoided.	Concur. We will avoid if possible.	3/30/21: OK
M-202	3/26/20	3	Piping seems large for the area only at this half of the east end.	Concur. Pipe sizes will be updated to match load.	3/30/21: Acknowledged in 3/5/21 set
M-203	3/26/20	1	Recommend finned-tube radiation at full height glazing. If glass to floor, then need pedestal or recessed type.	We have trench heaters on both the north and south walls of level 02 and 03. It is not showing up on the piping plans for some reason. We will fix.	3/30/21: OK
M-203	3/26/20	2	Recommend that bull-head tees be avoided.	Concur. We will avoid if possible.	3/30/21: OK
M-203	3/26/20	3	Piping seems large for the area only at this half of the east end.	Concur. Pipe sizes will be updated to match load.	3/30/21: Acknowledged in 3/5/21 set
M-301	3/26/20	1	In order to maintain acceptable velocities through louvers, they need to be much larger than the ducts connecting to them, with oversize plenums construction behind the louvers (connecting ducts to the plenums).	That is what we have designed. Louvers are sized for approximatly 550 fpm with oversized plenum. AHU's connect to plenum.	3/30/21: OK
M-305	3/26/20	1	Fire, smoke and combination dampers not yet indicated.	Fire or smoke dampers are not required as we only have 1 hr rated walls.	3/30/21: What about at floor penetrations?
M-306	3/26/20	1	No piping shown yet.	Concur. Pipe routing and sizing is currently being designed.	3/30/21: Acknowledged in 3/5/21 set
M-306	3/26/20	2	Please verify that there is adequate clearance for airflow around chillers and condensing units without short-circuiting warm discharge air back into condenser inlets.	Minimum clearances based on manufacturers recommendations have been maintained.	3/30/21: OK
M-401	3/25/20	1	We recommend showing refrigerant vent piping on this view also.	Concur. We will show refrigerant releif piping on plans.	3/30/21: Could not locate vent piping on this drawing on 3/5/21 set
M-401	3/26/20	2	Provide oversize plenums and louvers to assure appropriate velocities across free areas.	Louvers are sized for approximatly 550 fpm with oversized plenum. AHU's connect to plenum.	3/30/21: OK
M-401	3/26/20	3	Consider interconnecting duct mains for AHU-201/202 and AHU-301/302 to provide redundancy at relatively small additional cost.	We will evaluate.	3/30/21: OK
M-401	3/26/20	4	Boiler venting and combustion air not yet shown.	Concur. Vent and combustion routing is currently being designed.	3/30/21: Acknowledged in 3/5/21 set
M-401	3/26/20	5	To where does this duct go down? Could not follow on sections.	This serves the mech room. The elbow will be deleted and the duct will be capped with a birdscreen.	3/30/21: changes to mechanical space ductwork. EF-105 not shown on this drawing on 3/5/31 set.
M-401	3/26/20	6	Much piping not yet shown.	Concur. Pipe routing is currently being designed.	3/30/21: OK
M-401	3/26/20	7	There does not appear to be make-up for mechanical room ventilation.	This is the 72 x 60 OA in note #9.	3/30/21: OK
M-401	3/26/20	8	Consider combining AHU-102 & 104 (and possibly 103) into a single unit for significant cost savings.	This was a requirement by the owner to have the three multi-urpose rooms have separte systems.	3/30/21: OK
M-401	3/26/20	9	Please clarify intent for this 72x60 duct.	This is the make up air for mechanical room ventilation in note #7.	3/30/21: OK
M-402	3/26/20	1	No refrigerant piping shown yet.	Concur. Pipe routing is currently being designed.	3/30/21: Acknowledged in 3/5/21 set
M-402	3/26/20	2	Please verify that there is adequate clearance for airflow around chillers and condensing units without short-circuiting warm discharge air back into condenser inlets.	Minimum clearances based on manufacturers recommendations have been maintained.	3/30/21: OK
M-503	3/26/20	1	Is this detail applicable anywhere?	This detail is not used and has been removed.	3/30/21: Acknowledged in 3/5/21 set
M-503	3/26/20	2	Detail should be deleted if there are no fan-powered VAV terminal units.	This is still under evaluation and will be removed if not required.	3/30/21: Acknowledged in 3/5/21 set

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-504	3/23/20	1	Specs required a blowdown valve on Y-strainers that are 2" and larger. We recommend adding these to smaller strainers in addition to a hose-end and cap.	We will add blowdown valve on all Y-strainers.	3/30/21: 3/5/21 set shows ball valves on strainers.
M-504	3/26/20	2	Recommend that no 3-way valves be used, and these details deleted.	3-way valves are used at the end of each piping run to aid in balancing.	3/30/21: OK
M-504	3/26/20	3	Recommend that pressure independent control valves (PICV) be used at air handler coils. This would also allow deletion of manual balancing valve (unless there are multiple stacked coils on a single control valve).	Concur. WE will use PICV for the AHU's.	3/30/21: Acknowledged in 3/5/21 set
M-505	3/23/20	1	If constant speed pumps are not on VFDs, a balancing device will be required to set / measure required water flow.	Concur. We show balancing valves on the airflow diagrams and have added them to the details.	3/30/21: Acknowledged in 3/5/21 set
M-505	3/26/20	2	Size of channel should vary depending on pipe sizes/weights; 6" can be rather large for small bore pipes on common trapeze.	Concur. We heave updated detail to reflect channel based on pipe diameter.	3/30/21: Acknowledged in 3/5/21 set
M-505	3/26/20	3	Does nylon foot need to be anchored to pad/slab? If so, with what?	We will evaluate.	3/30/21: OK. Anchoring of foot not mentioned in 3/5/21 set.
M-506	3/26/20	1	Provide detail for water and refrigerant piping at split chillers.	Concur. We will provide a detail.	3/30/21: Could not locate this detail on 3/5/21 set.
M-601	3/23/20	1	Please review supply airflow quantity noted for AHU-104.	Concur. This was a typo and have corrected it to read 1665 cfm.	3/30/21: Acknowledged in 3/5/21 set
M-601	3/23/20	2	he HW schematic on M-704 shows a glycol makeup system. Please review.	Concur. Glycol maekup system has been removed.	3/30/21: Acknowledged in 3/5/21 set
M-601	3/26/20	3	OA percentage seems low for unit serving conference space.	We have reviewed and this seems to be correct. Will evalute again.	3/30/21: OK
M-601	3/26/20	4	Have load calculations verified this is adequate capacity for areas with entire walls of south-facing glass?	Yes the load calclulations take into account full walls of south facing glass.	3/30/21: OK
M-601	3/26/20	5	Clarify quantity of fans in each unit, and CFM each fan.	Concur. We have updated scheudle to show these values.	3/30/21: Acknowledged in 3/5/21 set
M-601	3/26/20	6	Why use such high speed fans, which are typically louder than lower speed units?	Based on cabinet size and airflow and ESP required these are the only fan selections that work. We will work with vendors to come up with a better fan selection.	3/30/21: OK
M-601	3/26/20	7	Is there a reason that leaving air temperature is so low for these units, requiring very deep coils with high APD?	The multipurpose rooms have a very high people density and a very low sensible heat reation (0.62). In order to keep the humidity in an acceptable range the LAT needs to be that low.	3/30/21: OK
M-601	3/26/20	8	5.9 ft WPD seems unusually low for a 13 row coil.	We confirmed with the vendor that these values are correct.	3/30/21: OK
M-601	3/26/20	9	Consider lower face velocities for all units, for reduced APD and lower fan horsepower.	A higher full load face velocity is preferred to allow more turndown and keep footprints as small as possible in crowded mech room. Units wont run and full airflow very often.	3/30/21: OK
M-601	3/26/20	10	The EAT must vary between units, with different min OA percentages.	Concur. We will updated the EAT and LAT for each individual coil.	3/30/21: EATs are all 35 for heating coil
M-601	3/26/20	11	Recommend sizing heating coils for minimum 65F LAT.	We have sized for the same discharge as the cooling so the box always see the same temp. The VAV box reheat coil will temper from there.	3/30/21: OK
M-601	3/26/20	12	Coils should be sized for lower EWT of 130-140 to maximize hours of boiler operation in condensing mode.	We will evaluate.	3/30/21: OK
M-601	3/26/20	13	Is stainless steel applicable to all coils, or only cooling coil?	All coils.	3/30/21: OK
M-601	3/26/20	14	Consider at least 4" deep MERV 13 filters for greater holding capacity and less frequent replacements.	Concur. WE have updated schedule to reflect 4" filters	3/30/21: Acknowledged in 3/5/21 set

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-601	3/26/20	15	Many of these FLA seem low for the motor HP indicated).	We confirmed with the vendor that these values are correct.	3/30/21: OK
M-601	3/26/20	16	Are airflow measuring minimum OA dampers required?	Yes. We have added a schedule note.	3/30/21: Acknowledged in 3/5/21 set
M-601	3/26/20	17	Should fans be specified with integral airflow stations (piezo rings and transducers)?	Not at this time. We will evaluate.	3/30/21: OK
M-601	3/26/20	18	What deflection springs are required?	Since this went from the roof to the ground we will switch to neoprene isolators.	3/30/21: OK
M-601	3/26/20	19	What is purpose of low ambient operation when all AHUs have full economizers?	Concur. We have removed this requirement.	3/30/21: Acknowledged in 3/5/21 set
M-601	3/26/20	20	Verify efficiency; variable speed screw chillers are typically much higher than this for IPLV.	These are the minimum IEEC/ASHRAE 90.1 values. Since we are at the low range of a screw compressor offering we are in that range. Although some vendors are muhc better a majority are in that range.	3/30/21: OK
M-601	3/26/20	21	Verify whether variable speed air-cooled screw chillers are available in a split evaporator configuration; we suspect they are not due to oil return concerns.	We confirmed with three manufacturers that remote evap is available.	3/30/21: OK
M-601	3/26/20	22	Recommend that max sound power by octave band be specified.	Concur. We have included the A-weighted sound power to the schedule.	3/30/21: Acknowledged in 3/5/21 set
M-601	3/26/20	23	Should any specific low sound features be specified?	Concur. WE have added a schedule note to include a compressor sound blanket and low sound condenser fans.	3/30/21: Acknowledged in 3/5/21 set
M-601	3/26/20	24	Recommend that variable speed (ECM) condenser fans be specified.	Concur. We have included a schedule note to include.	3/30/21: Acknowledged in 3/5/21 set
M-601	3/26/20	25	Clarify that EV-101 and EV-102 (not scheduled, but indicated on plans) are these remote evaporators.	EV-101 and 102 are the remote evaporators and will be provided by the chiller manufacturers.	3/30/21: OK
M-601	3/26/20	26	We recommend scheduling the boilers to operate at a max of 130-140F in order to maximize hours operating in condensing mode. Note that this requires domestic water heaters to be separate, gas-fired, condensing units, so that 160F water is not required for domestic water heating.	We will evaluate.	3/30/21: OK
M-601	3/26/20	27	Specify that a separate boiler master control panel, be provided, if not integral to the on-board controllers.	Concr. We have inlcuded a schedule note to inculde a master control panel.	3/30/21: Acknowledged in 3/5/21 set
M-601	3/26/20	28	Also specify boiler minimum flow rate.	Concur. WE have added minimum flow to boiler schedule.	3/30/21: Acknowledged in 3/5/21 set
M-601	3/26/20	29	Clarify if these are water tube or fire tube boilers.	The boiler specification requires a fire tube boiler.	3/30/21: OK
M-602	3/27/20	1	Should this be Mech Rm? There is no penthouse.	Concur. We have updated to MECHANICAL ROOM	3/30/21: Acknowledged in 3/5/21 set
M-602	3/27/20	2	Unit is indoors; why need for outdoor construction or heat tracing?	Concur. We have removed this schedule note.	3/30/21: Acknowledged in 3/5/21 set
M-602	3/27/20	3	Should these be 217 and 530 GPM to match equipment flows?	Secondary flow is 445 gpm. Primary flow is a pump dedicated to each chiller that is sized for 60% of the load.	3/30/21: OK
M-602	3/27/20	4	Verify capacities - are they all 6 MBH?	Concur. We will update the capcities for each room they serve.	3/30/21: Acknowledged in 3/5/21 set
M-602	3/27/20	5	Recommend select at max of 130-140F to maximize hours of boilers operating in condensing mode.	We will evaluate.	3/30/21: OK
M-602	3/27/20	7	Clarify that this is Exhaust/Return Fans.	Concur. We have fixed schedule.	3/30/21: Acknowledged in 3/5/21 set
M-602	3/27/20	8	Recommend that primary CHW and HW pumps be eliminated and system operate with variable-primary pumps. See additional comments on flow schematics.	We will stick with primary secondary. This is the preferred system of the owner.	3/30/21: OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-602	3/27/20	9	Should these CHW pumps be 530 GPM each?	Secondary flow is 445 gpm. Primary flow is a pump dedicated to each chiller that is sized for 60% of the load.	3/30/21: OK
M-602	3/27/20	10	Recommend that primary pumps be variable speed if primary-secondary system is retained.	Primary pumps will be constant speed with a decoupler line. Balancing valves will be provided on primary loop.	3/30/21: OK
M-602	3/27/20	11	Does a condensate pump need to be provided?	No condensate pumps are necessary. Condensate will gravity drain to the sanitary sewer.	3/30/21: OK
M-602	3/27/20	12	Clarify if this is total or BTUH/LF.	The BTUH listed is per 4 foot heater. WE will update schedule for clarity.	3/30/21: Acknowledged in 3/5/21 set
M-602	3/27/20	13	Clarify location; there is no penthouse.	This will be in the mechanical room.	3/30/21: OK
M-602	3/27/20	14	Should these motors over 2 HP all be 460V, 3-phase?	All motors above 2 HP shall be 460/3. 2 HP and bleow shall be 115/1,	3/30/21: OK
M-603	3/23/20	1	VAV heating airflow max is below min airflow setpoint. Please review.	Concur. We will update schedules.	3/30/21: Acknowledged in 3/5/21 set
M-603	3/27/20	2	The majority of these numbers do not properly compute; the indicated heating CFM, MBH, GPM and Delta-T do not match.	Concur. We will update schedules.	3/30/21: Acknowledged in 3/5/21 set
M-603	3/27/20	3	The specified MBH for many of these boxes results in a low temperature rise, and may not be sufficient to heat the space.	Concur. We will update schedules.	3/30/21: Acknowledged in 3/5/21 set
M-603	3/27/20	4	Consider 2-row coils. The incremental cost is small, and it provides a safety factor to help resolve any unexpected field conditions.	Concur. We will update schedules.	3/30/21: Acknowledged in 3/5/21 set
M-603	3/27/20	5	Recommend selections based on maximum 130-140F EWT, to maximize hours of boiler operation in condensing mode.	We will evaluate.	3/30/21: OK
M-603	3/27/20	6	Why no heat in this perimeter room?	Conure. We will add heat to this space.	3/30/21: OK
M-603	3/27/20	7	A 120-24VAC transformer at each box requires 120V power wiring to every box; consider specifying all boxes at 24VAC, and make ATC contractor responsible for low voltage power.	All boxes will be 24 v control.	3/30/21: OK
M-603	3/27/20	8	Currently there are no fan-powered boxes scheduled; Consider using fan-powered units at any perimeter areas that do not have finned-tube radiation, so that AHU does not have to operate to maintain unoccupied setback temperatures.	Concur.	3/30/21: Fan powered VAVs appear to be removed on this set
M-701	3/27/20	1	Clarify demarcations between building ethernet, BACNET-IP and BACNET-MSTP.	Concur. We have updated the system architecture.	3/30/21: Acknowledged in 3/5/21 set
M-701	3/27/20	2	Clarify if these are contractor-provided owner meters, or utility company meters. If utility meters, verify that they have suitable output signals for BAS to monitor.	Concur. The meters are purchased by the contracor/owner. Natural gas meter is insatlled by National Grid. Water meter and electrical meter installed by the contractor	3/30/21: Acknowledged in 3/5/21 set
M-702	3/23/20	1	Please review chiller staging parameters. Between specified delays and reducing the lead chiller to 50% FLA during transition, the system may have a tough time catching up to the load.	We will evaluate.	3/30/21: no change to sequence on this set.
M-702	3/23/20	2	We recommend starting a lag chiller immediately upon failure of the lead machine.	We will evaluate.	3/30/21: no change to sequence on this set.
M-702	3/23/20	3	We recommend specifying a remote location for the DP sensors. This is typical for CHW and HW.	Concur. We will show the DP on our flow diagrams	3/30/21: location not noted on this set
M-702	3/27/20	4	Recommend variable-primary configuration, rather than primary-secondary piping. This saves cost by eliminating primary pumps (and associated power & controls), and typically improves overall system delta-T and efficiency, especially at part load. This requires flow meters and motorized bypass valves to assure that minimum flow is maintained through operating chillers.	We will stick with primary secondary. This is the preferred system of the owner.	3/30/21: OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-702	3/27/20	5	Need a flow meter here if system is revised to variable primary.	We will stick with primary secondary. This is the preferred system of the owner.	3/30/21: OK
M-702	3/27/20	6	Suggest that chillers be shown with split evaporators for clarity.	Concur. WE have shown split evaporators.	3/30/21: Acknowledged in 3/5/21 set
M-702	3/27/20	7	This motorized isolation valve can be eliminated for primary-secondary pumping system, but must be retained if revised to recommended variable-primary system, typical both chillers.	Concur. WE have removed	3/30/21: Acknowledged in 3/5/21 set
M-702	3/27/20	8	Need a controlled bypass valve between CHWS & CHWR for a variable-primary system.	We will stick with primary secondary with a decoupler line.	3/30/21: OK
M-702	3/27/20	9	Are chillers going to have BACNET interface to monitor and display parameters at operator workstation? Need to specify what points are to be mapped over to BAS.	Chillers will have Bacnet interface. Points are shown on M-703. We will evaluate and indicate additional points as needed.	3/30/21: OK
M-703	3/23/20	1	Is this intended to be CHW pump DP? No DP switch or sensor shown at chillers. Please review.	Concur. We have removed these points from schedule.	3/30/21: Acknowledged in 3/5/21 set
M-703	3/23/20	2	Primary CHW pumps are constant flow and shown with starters. Please review	This is correct.	3/30/21: OK
M-703	3/27/20	3	Are chillers going to have BACNET interface to monitor and display parameters at operator workstation? Need to specify what points are to be mapped over to BAS.	Chillers will have Bacnet interface. Points are shown on M-703. We will evaluate and indicate additional points as needed.	3/30/21: OK
M-704	3/23/20	1	Motorized isolation valves are not required if each boiler has a dedicated pump. Please review.	Concur. We have removed the motorized valve and will have manual isolation valve for maintenance.	3/30/21: Acknowledged in 3/5/21 set
M-704	3/23/20	2	Packaged boiler controllers typically require a dedicated OA temperature sensor (in addition to BMS system sensor). Please review if the installation of both should be shown.	Our standard design is a single building OA temp sensor.	3/30/21: OK
M-704	3/23/20	3	we would recommend the installation of the OA temperature sensors on a north facing wall or some other area not exposed to direct sunlight.	Concur.	3/30/21: OK
M-704	3/23/20	4	Multiple EPO switches may be required for this MER.	Concur. We have placed at both doors.	3/30/21: OK
M-704	3/23/20	5	At least one primary HW pump will be required to operate whenever the HW plant is enabled, not just when it's boiler is enabled.	We will evaluate.	3/30/21: OK
M-704	3/27/20	6	If these are fire-tube boilers with low minimum flow requirements, recommend variable-primary configuration, rather than primary-secondary piping. This saves cost by eliminating primary pumps (and associated power & controls), and typically reduces return water temperatures, increasing the number of hours in condensing mode, especially at part load. This requires flow meters and motorized bypass valves to assure that minimum flow is maintained through operating boilers. If boilers are water tube, then still may need primary pumps to maintain min flows through boilers.	We will evaluate.	3/30/21: OK
M-704	3/27/20	7	Are boilers going to have BACNET interface to monitor and display parameters at operator workstation? Need to specify what points are to be mapped over to BAS.	Boilers will have Bacnet interface. Points are shown on M-705. We will evaluate and indicate additional points as needed.	3/30/21: OK
M-704	3/27/20	8	Schematic should show interface to domestic water heaters, however, we recommend that DWHs be changed to gas-fired condensing units, so that heating HWS&R temperatures can be reduced for increased hours in condensing mode for boilers. Separate DWHs also means that the boilers can potentially be turned off in the summer if reheat HW is not required.	We will evaluate.	3/30/21: OK
M-704	3/27/20	9	Need a flow meter here if system is revised to variable primary.	Concur. We will add if we switch pump strategy.	3/30/21: OK
M-704	3/27/20	10	Need a controlled bypass valve between HWS & HWR for a variable-primary system.	Concur. We will add if we switch pump strategy.	3/30/21: OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-704	3/27/20	11	This motorized isolation valve can be eliminated for primary-secondary pumping system, but must be retained if revised to recommended variable-primary system, typical all boilers.	Concur. We have removed the motorized valve and will have manual isolation valve for maintenance.	3/30/21: Acknowledged in 3/5/21 set
M-704	3/27/20	12	Recommend that temperatures be reduced to maximize hours in condensing mode.	We will evaluate.	3/30/21: OK
M-705	3/23/20	1	Will pumps require proof of status by DP and current transformer?	Pumps will require proof from DP. There are no current switches.	3/30/21: OK
M-705	3/23/20	2	Primary HW pumps are typically controlled by packaged boiler controls.	We will evaluate.	3/30/21: OK
M-705	3/23/20	3	Only one BO will be needed if packaged boiler controller manages staging and firing rates of boilers.		3/30/21: not acknowledged. No change on this set.
M-705	3/27/20	4	We recommend also adding HWS and HWR temperatures for each boiler (via communication protocol with boiler controller).	Concur. We have added these points.	3/30/21: Appears to be Typo. HWS listed twice and no HWR.
M-705	3/23/20	5	Common HW supply and return temperature should be available on the BMS.	Concur.	3/30/21: Common HWS not shown.
M-705	3/27/20	6	Are boilers going to have BACNET interface to monitor and display parameters at operator workstation? Need to specify what points are to be mapped over to BAS.		3/30/21: not acknowledged. No change on this set.
M-706	3/23/20	1	Units serving assembly areas may be good candidates for demand controlled ventilation. Please review.	Concur. These spaces will be controlled by DCV. We will add to the AHU and VAV box controls sheets	3/30/21: OK
M-706	3/23/20	2	We recommend adding mixed air low limit control during economizer mode to avoid possible freeze-stat trips.	We will evaluate.	3/30/21: OK
M-706	3/23/20	3	Many devices shown do not agree with the printed SOO. We will review the controls schematic during next drawing release.	We will further develop control sheets as design progresses.	3/30/21: OK
M-706	3/27/20	4	What is value/purpose of airflow station at relief air, as outdoor airflow is already being measured?	We will control the return fan, return damper and exhaust dampers based on the relief air measurement. Sequence will be updated and space pressurization control will likely not be used for relief system.	3/30/21: OK
M-706	3/27/20	5	Are there airflow stations at the fan inlet?	No.	3/30/21: OK
M-706	3/27/20	6	Recommend that PICV valves be used at AHU coils.	Concur. We will use PICV for the AHU's.	3/30/21: OK
M-706	3/27/20	7	During unoccupied hours, OA dampers should remain closed when unit is running. When override occupancy buttons are activated at zone controls, may need to introduce outdoor air if enough overrides are activated.	Concur. We have updated the sequence.	3/30/21: Acknowledged in 3/5/21 set
M-706	3/27/20	8	Recommend that SAT reset be limited to a max SAT (62F?), and/or limited based on a max return air 60% RH.	Concur. We have updated to be 62 deg.	3/30/21: Acknowledged in 3/5/21 set
M-708	3/23/20	1	VAV dampers typically go full open with the loss of airflow during unoccupied modes. This also reduces the chance of a high-static trip at unit startup.	We will evaluate.	3/30/21: OK
M-708	3/23/20	2	Will the activation of the unoccupied zone override start the AHU that serves the VAV being overridden? Please review.	We will evaluate.	3/30/21: OK
M-708	3/23/20	3	The max heating supply airflow is scheduled, not the max heating temperature. Please review.	Concur. The EAT, LAT have been added to the VAV box schedule/.	3/30/21: Acknowledged in 3/5/21 set
M-708	3/27/20	4	This sequence should be omitted if there are no fan-powered VAV boxes.	Concur. We will remove once we make the determination whether any fan powered boxes will be used.	3/30/21: Acknowledged in 3/5/21 set
M-708	3/27/20	5	Does high CO2 only create an alarm, or should it increase the zone airflow, subject to reheat being available and not overcooling the zone?	Concur. Some spaces like multipurpose and large conference rooms will be controlled by DCV. We will add to the AHU and VAV box controls sheets	3/30/21: Acknowledged in 3/5/21 set

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-709	3/23/20	1	VAV fan run status may also be a useful point for monitoring.	Concur. We will add if we keep the fan powered VAV boxes.	3/30/21: Fan powered VAVs appear to be removed on this set
M-709	3/27/20	2	Omit if there are no fan-powered VAV boxes.	Concur.	3/30/21: Fan powered VAVs appear to be removed on this set
M-710	3/23/20	1	Ductless splits usually don't communicate well with BMS'. A stand-alone BMS temperature sensor may be the best bet here. Please review.	Concur. We have added a secondary DDC stat for monitoring.	3/30/21: now on drawing M-709 Acknowledged in 3/5/21 set
M-710	3/27/20	2	Although unit control is independent, recommend adding DDC zone temperature sensor/alarm.	Concur. We have added a secondary DDC stat for monitoring.	3/30/21: now on drawing M-709 Acknowledged in 3/5/21 set.
M-712	3/27/20	1	Recommend using VFD, rather than 2-speed motors; preferably ECM with integral VFD.	We will evaluate.	3/30/21: this sequence appears to be removed from the 3/5/21 set.
M-713	3/27/20	1	Baseboard heating control should be interlocked and controlled by the same T-stat as the associated VAV box for the zone.	Concur. We will make necessary changes.	3/30/21: Acknowledged in 3/5/21 set
M-901	3/27/20	1	Make tags consistent with other drawings - EV-102 & EV-102.	Concur. WE have updated tags to EV-101 and 102.	3/30/21: Acknowledged in 3/5/21 set
M-901	3/27/20	2	See comments on dwg M-702/	Concur.	3/30/21: OK
M-902	3/24/20	1	With HW boilers at their minimum reset temperature (110 degrees F), DHW will be less than temperatures recommended to control Legionnella growth. Please review.	Concur. We will evaluate and correct.	3/30/21: OK
M-902	3/27/20	2	See additional comments on dwg M-704.	Concur.	3/30/21: OK
M-902	3/27/20	3	Recommend use gas-fired condensing water heaters, rather than heat exchangers depending on 160F hot water.	Concur. We will evaluate.	3/30/21: OK
M-903	3/27/20	1	Recommending combining AHU-102 and AHU-104 (and possibly AHU-103) into a single unit.	Will consider. This was a requirement of the owner for the multipurpose rooms to be served by separate AHU's.	3/30/21: OK
M-904	3/27/20	1	Recommend tying supply and return duct mains together for both systems serving one floor, for increased redundancy.	Concur. We will evaluate.	3/30/21: OK
P-011	3/24/20	1	How will drainage of OA and EA wells be handled? Please review.	Concur. There are roof drains in the pit that gravity drains to the storm system.	3/30/21: OK
P-011	4/1/20	2	Do all of the floor drains have trap primers, with CW to them?	All floor drains will have trap primers.	3/30/21: OK
P-101	4/1/20	1	Coordinate with food service equipment; it seems likely that more drainage would be required.	The space has refrigerators, sink and freezer. The sink is the only item that requires a drain. We have added a floor drain under the refrigerator and freezers.	3/30/21: OK
P-103	4/1/20	1	It seems unlikely that overflow drainage would be required for a substantially pitched roof; please verify.	Although it might not be required becuase of roof colapse we feel it still has a benefit. The roof slopes to the front of the building to a large pit that runs along the south roof line. If the primary drain gets clogged the overflow will dump down the front of the building to where the entrance and patio will be.	3/30/21: OK
P-201	4/1/20	1	Coordinate with food service equipment; it seems likely that there would be more H&C water requirements.	The space has refrigerators, sink and freezer. We have included domestic water connections to refreigerators and sinks.	3/30/21: OK
P-201	4/1/20	2	Cold water to trap primers not yet indicated.	Concur. We will show trap primers on plans.	3/30/21: Acknowledged in 3/5/21 set
P-201	4/1/20	3	Domestic make-up water feeds to boiler and chiller systems not yet indicated.	Concur. We will show makeup water connections.	3/30/21: Acknowledged in 3/5/21 set
P-201	4/1/20	4	Is there any kitchen equipment that requires 140F hot water?	No.	3/30/21: OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
P-204	4/1/20	1	It seems unlikely that overflow drainage would be required for a substantially pitched roof; please verify.	Although it might not be required becuase of roof colapse we feel it still has a benefit. The roof slopes to the front of the building to a large pit that runs along the south roof line. If the primary drain gets clogged the overflow will dump down the front of the building to where the entrance and patio will be.	3/30/21: OK
P-204	4/1/20	2	Roof drains in this low flat roof area are missing.	Concur. We have fixed.	3/30/21: Acknowledged in 3/5/21 set
P-204	4/1/20	3	Are special deck drains required in this area, with drainage at top and also at roof membrane below pavers?	No drains required. The whole thing is open-joint and just drops down to the roof below.	3/30/21: OK
P-301	4/1/20	1	Code requires overflow roof drainage to discharge to daylight.	Concur. Overflow drains will discharge to daylight at 1' AFF via a lambs tongue	3/30/21: OK
P-301	4/1/20	2	Should this be indicated as a T-wye with a cleanout, rather than a 90 degree elbow, typical?	We will evaluate.	3/30/21: OK
P-301	4/1/20	3	What does gas piping serve? Water heaters are currently water-to-water heat exchangers.	Concur. These pipes need to be shifted back to the boilers. We have fixed.	3/30/21: Acknowledged in 3/5/21 set
P-401	4/1/20	1	Is the site water pressure so low as to require a booster pump for this 3-story building? There should only be about 40 feet (17 psi) of static head from grade to the highest fixtures.	Based on 65 psi available from the main we calculate the avialable pressure of 35 psi after water meter, backflow preventor etc. Per IPC we are required to provide 35 psi at the furthest fixture. We calculate that we need 75 psi to meet this requirement with only 35 psi availble.	3/30/21: OK
P-401	4/1/20	2	Consider gas-fired condensing water heaters, rather than heat exchangers using boiler hot water. This would allow boilers to operate at lower temperatures and greatly increase the number of hours in condensing mode, saving energy. If the water heaters were storage type, it may also allow elimination of ST-101.	We will evaluate.	3/30/21: OK
P-501	3/24/20	1	Consider adding (or review with BNL) monitoring of HW supply temperature and recirc pump status by BMS.	We will discuss in review meeting.	3/30/21: OK
P-501	3/24/20	2	If this heat exchanger assembly includes packaged controls, consider adding monitoring of alarm by BMS if applicable.	Concur. The heat exchanger/pump skid has the ability to be connected to BAS and have included in the boiler specification and in the schedule.	3/30/21: OK
P-501	3/24/20	3	BMS interface for both water meters should be specified.	Concur. This is shown on M-701 and is included in the specifications.	3/30/21: Acknowledged in 3/5/21 set
P-501	4/1/20	4	Clarify how 2 units are to be piped, and also show how storage tank is piped.	We will update this deatil to show storage tank and sendo DWHX.	3/30/21: Detail shows two DWHs
P-501	4/1/20	5	This detail should be retained if water heaters are changed to gas-fired, but is currently not applicable with water-to-water heat exchangers.	Concur. This is not applicable and has been removed.	3/30/21: Acknowledged in 3/5/21 set
P-501	4/1/20	6	Intent not clear, can this be eliminated, since dimensions are shown on detail?	Concur. We have added dimensions to detail and remove matrix.	3/30/21: Acknowledged in 3/5/21 set
P-501	4/1/20	7	Should this be tagged as Booster Pump?	This has been updated to read Domestic Water Heat Exchanger.	3/30/21: Booster Pump detail now not shown.
P-501	4/1/20	8	Should indicate required acid neutralizing tank.	There shouldn't be a need for a neutralization kit since this is heating water and domestic water. We do show a condensate neutralization kit for the boiler drain on sheet M-902.	3/30/21: water heater is fuel fired and requires a condensate neutralizer?
P-502	4/1/20	1	Should there also be a detail for a 2-level deck drain?	Concur. We have fixed this to read in "FLOOR" instead of ground floor as it is typical for all levels.	3/30/21: Acknowledged in 3/5/21 set
P-503	3/24/20	1	Consider monitoring booster pump skid for alarm by BMS.	Concur. We have added this as a reuirement.	3/30/21: BMS monitoring not noted on this drawing. Noted somewhere else?

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
P-503	4/1/20	2	Is this detail applicable? We did not see any heat tracing scheduled or indicated on plans.	This is required. Ther is a chase on an exterior wall on the east side where domestic water pipes are not exposed to interior conditions.	3/30/21: OK
P-601	4/1/20	1	Is the site water pressure so low as to require a booster pump for this 3-story building? There should only be about 40 feet (17 psi) of static head from grade to the highest fixtures.	Based on 65 psi available from the main we calculate the avialable pressure of 35 psi after water meter, backflow preventor etc. Per IPC we are required to provide 35 psi at the furthest fixture. We calculate that we need 75 psi to meet this requirement with only 35 psi availble.	3/30/21: OK
P-601	4/1/20	2	Does a dual-level deck drain also need to be scheduled?		3/30/21: not acknowledged.
P-601	4/1/20	3	Nothing scheduled yet in this submission.	Concur. We will update schedules.	3/30/21: Acknowledged in 3/5/21 set
P-601	4/1/20	4	Consider gas-fired condensing water heaters, rather than heat exchangers using boiler hot water. This would allow boilers to operate at lower temperatures and greatly increase the number of hours in condensing mode, saving energy. If the water heaters were storage type, it may also allow elimination of ST-101.	We will evaluate.	3/30/21: Gas fired now scheduled.
P-601	4/1/20	5	Clarify type of heat exchanger.	Concur. We will update schedules.	3/30/21: HXs no longer used
P-601	4/1/20	6	Recirculation pump performance needs to be scheduled.	Concur. We will update schedules.	3/30/21: Recirc pump now scheduled.
P-601	4/1/20	7	Is there a reason why ADA urinal is not also automatic flush?	Concur. This has been updated to an autmatic flochometer.	3/30/21: Acknowledged in 3/5/21 set
P-904	3/24/20	1	Monitoring of natural gas meter by BMS should be specified.	Concur.	3/30/21: Acknowledged in 3/5/21 set
P-904	4/1/20	2	If water heaters are changed to gas-fired, then will need to add gas piping to them in flow diagram.	Concur.	3/30/21: Could not locate gas piping
100% CD Review Comments - IFC Set Back Check					
Page	**Markup Date**	**#**	**BVH Comments**	**Engineer's Comments**	**BVH Back Check Comments**
M-001	4/2/2021	1	Please clarify that this is exposed ductwork IN FINISHED SPACES. Is it applicable to supply and return ducts? Also make sure it is clear on the drawings where it is exposed (refer to architectural reflected ceiling plans?).	Double wall duct work and all references will be removed. All ductwork will be externally insulated.	Acknowledged
M-001	4/2/2021	2	Please fix wording - CO2 SENSORS SHALL BE PROVIDED BY DIVISION 23. WIRE CO2 SENSOR BACK TO EMCS PANEL FOR ALARM.	Concur. Fixed.	Acknowledged
M-101	4/2/2021	1	Assure that ductwork does not violate dedicated space requirements above electrical gear.	We have evaluated and have required clearances	OK
M-101	4/2/2021	2	Assure that ductwork is not in conflict with IT equipment or pathways.	We have coordinated duct and IT pathways.	OK
M-101	4/2/2021	3	Please clarify what this represents?	This is transfer air into the restroom. NA indicates it doesn't connect to a duct.	OK
M-101	4/2/2021	4	Does copy/print room require exhaust for compliance with IAQ LEED credit? Basis of design narrative indicates exhaust.	Typical office copy print is not required to be exhausted per ASHRAE IC-62.1-2007-25. This is not being used for a LEED credit. We will update the basis of design.	OK
M-101	4/2/2021	5	Does elevator control room require exhaust?	No exhaust required since we are conditioning it with independent split DX system.	OK
M-101	4/2/2021	6	Please clarify this duct size and intent?	If an enlarged plan is present all annotation is shown on the enlarged plans and not on the overall plans. Typical of all comments. This is shown on the enlarged plan detail 2 on M-403.	OK
M-101	4/2/2021	7	Size missing.	This is shown on the enlarged plan detail 2 on M-403.	OK
M-101	4/2/2021	8	Clarify duct sizes and intent.	This is shown on the enlarged plan detail 1 on M-403.	OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-101	4/2/2021	9	Provide exhaust duct sizes.	This is shown on the enlarged plan detail 1 on M-403.	OK
M-101	4/2/2021	10	This is an ugly fitting; can it be improved to lessen turbulence and air pressure drop?	With space available this seems to be the best solution.	OK
M-101	4/2/2021	11	VAV not tagged, and duct sizes missing.	This is shown on the enlarged plan detail 1 on M-403.	OK
M-101	4/2/2021	12	Coordinate and verify with architect all full height partitions, and assure that openings and transfer ducts are provided as necessary to assure return airflow back to AHU.	Concur. We have evaluated.	OK
M-101	4/2/2021	13	Supply diffusers size, types and airflows not clear.	This is shown on the enlarged plan detail 1 on M-403.	OK
M-101	4/2/2021	14	Many duct sizes and grille/diffuser tags are missing.	This is shown on the enlarged plan detail 1 on M-403.	OK
M-101	4/2/2021	15	Duct sizes and diffuser tags missing.	This is shown on the enlarged plan detail 1 on M-403.	OK
M-101	4/2/2021	16	Coordinate with architectural reflected ceiling plans to be sure that VAV boxes are located above accessible ceilings.	Concur. We have coordinated VAV access.	OK
M-101	4/2/2021	17	Recommend specify remotely adjustable manual volume dampers for inaccessible ceiling spaces.	We have dampers on the diffusers in hard ceilings.	OK
M-101	4/2/2021	18	Note #10 either misplaced or mislabled.	Concur. Should be keynote 9.	Acknowledged
M-101	4/2/2021	19	Should this corridor have any supply air?	It has SA coming from VAV -101-11. See detail 1 on M-403.	OK
M-101	4/2/2021	20	Clarify size and type of opening for plenum return.	This is shown on the enlarged plan detail 1 on M-403.	OK
M-101	4/2/2021	21	Should warming kitchen be exhausted, rather than return, to prevent food odors from migrating throughout the AHU-101 space? Basis of design narrative indicates exhaust will be provided.	A kitchen that is not used to cook is not required to be exhausted per ASHRAE IC-62.1-2016-1. There are no cooking appliances and owner did not intend to use this space as a cooking kitchen. We will update the basis of design.	OK
M-101	4/3/2021	22	Elec room has 112.5 and 75 kVA transformers; should it have ductless split, rather than VAV, to provide 24/7 cooling when AHU is not running (unoccupied mode)?	Concur, We will add a ductless split system.	this room is served by EF-103. did not see a split system in this room. Please advise
M-102	4/2/2021	1	Does copy/print room require exhaust for compliance with IAQ LEED credit? Basis of design narrative indicates exhaust.	Typical office copy print is not required to be exhausted per ASHRAE IC-62.1-2007-25. This is not being used for a LEED credit. We will update the basis of design.	OK
M-102	4/2/2021	2	Does copy/print room require exhaust for compliance with IAQ LEED credit? Basis of design narrative indicates exhaust.	Typical office copy print is not required to be exhausted per ASHRAE IC-62.1-2007-25. This is not being used for a LEED credit. We will update the basis of design.	OK
M-102	4/2/2021	3	Exhaust duct size and configuration for janitor closet is not clear.	Concur. We have cleaned up.	Acknowledged
M-102	4/2/2021	4	Exhaust ducts not sized.	Concur. We have added duct sizes.	Acknowledged
M-102	4/2/2021	5	Should fire dampers be specified at floor penetrations?	Fire dampers are not required.	OK
M-102	4/2/2021	6	Should RA be eliminated from shower room?	We will evaluate.	OK
M-102	4/2/2021	7	Coordinate and verify with architect all full height partitions, and assure that openings and transfer ducts are provided as necessary to assure return airflow back to AHU.	Concur. We have evaluated.	OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-102	4/2/2021	8	Many duct sizes and grille/diffuser tags are missing.	We will review. Some of the grilles that are being served from the same VAV and have identical airflows are tagged as typical with the (#) representing the quantity.	OK
M-102	4/2/2021	9	Coordinate with architectural reflected ceiling plans to be sure that VAV boxes are located above accessible ceilings.	Concur. We have coordinated VAV access.	OK
M-102	4/2/2021	10	Recommend specify remotely adjustable manual volume dampers for inaccessible ceiling spaces.	We have dampers on the diffusers in hard ceilings.	OK
M-102	4/2/2021	11	Are fire dampers required at floor penetrations?	Fire dampers are not required.	OK
M-102	4/2/2021	12	Please verify with code interpretation that this does not require a rated shaft with combination fire/smoke dampers where duct penetrate 2 floors. It may be a matter of verifying whether the mezzanine counts as a third floor, or whether the ducts are technically only penetrating one "floor."	Mezzanine is not considered a third floor.	OK
M-102	4/2/2021	13	Please clarify size and configuration of return air opening.	See keynote 7.	OK
M-102	4/2/2021	14	Elec room has 112.5 kVA transformer; should it have ductless split, rather than VAV, to provide 24/7 cooling when AHU is not running (unoccupied mode)?	Concur, We will add a ductless split system.	this room is served by EF-201 did not see a split system in this room. Please advise
M-103	4/2/2021	1	Is fire damper required at floor penetration?	We are reviewing the code and will apply fire dampers if they are required.	OK - no fire dampers installed on this drawing
M-103	4/2/2021	2	Coordinate and verify with architect all full height partitions, and assure that openings and transfer ducts are provided as necessary to assure return airflow back to AHU.	Concur. We have evaluated.	OK
M-103	4/2/2021	3	Many duct sizes and grille/diffuser tags are missing.	We will review. Some of the grilles that are being served from the same VAV and have identical airflows are tagged as typical with the (#) representing the quantity.	OK
M-103	4/2/2021	4	Coordinate with architectural reflected ceiling plans to be sure that VAV boxes are located above accessible ceilings.	Concur. We have coordinated VAV access.	OK
M-103	4/2/2021	5	Recommend specify remotely adjustable manual volume dampers for inaccessible ceiling spaces.	We have dampers on the diffusers in hard ceilings.	OK
M-103	4/2/2021	6	Are fire dampers required at floor penetrations?	Fire dampers are not required.	OK
M-103	4/2/2021	7	Please verify with code interpretation that this does not require a rated shaft with combination fire/smoke dampers where duct penetrate 2 floors. It may be a matter of verifying whether the mezzanine counts as a third floor, or whether the ducts are technically only penetrating one "floor."	Mezzanine is not considered a third floor.	OK
M-103	4/2/2021	8	Connection to secondary duct missing.	Concur. Have fixed.	Acknowledged
M-103	4/2/2021	9	What does this T-stat do?	Concur. Have removed.	Acknowledged
M-103	4/2/2021	10	Elec room has 112.5 kVA transformer; should it have ductless split, rather than VAV, to provide 24/7 cooling when AHU is not running (unoccupied mode)?	Concur, We will add a ductless split system.	this room is served by EF-301 did not see a split system in this room. Please advise.
M-103	4/2/2021	11	Is there a partition here that conflict with ductwork shown?	No. What is shown is a railing.	OK
M-201	4/2/2021	1	Does perimeter restroom need heat (ERH-A), since there is no warm supply air into space?	We added ERH-A to this space.	Acknowledged
M-201	4/2/2021	2	Recommend some heat (baseboard or cabinet heater) under counter at reception; staff always gets cold when doors are opened frequently.	We will not provide at this point due to budget constraints.	OK
M-201	4/2/2021	3	Piping to where?	Missing pipe. Have fixed. Comment in Room 112 goes to Trench heaters.	there is still RS/RL lines not connected to anything in corridor 1007
M-201	4/2/2021	4	Recommend revise configuration to avoid bullhead tee.	Concur. Have fixed.	Acknowledged

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-201	4/2/2021	5	Coordinate location to assure it does not violate dedicated space requirement above electrical gear.	There is a hard ceiling and we have coordinated overhead clearance.	ok
M-201	4/2/2021	6	Recommend reroute around IDF room.	Concur. Have fixed.	Acknowledged
M-201	4/2/2021	7	Size/label refrigerant piping.	Concur. Have fixed.	Acknowledged
M-201	4/3/2021	8	Should CUH be provided for this corridor with exterior door?	We will evaluate	OK. CUH has not been added in IFC set.
M-202	4/2/2021	1	Show HWS&R piping up and down feeding mezzanine baseboard.	Concur. Have fixed.	Acknowledged
M-202	4/2/2021	2	Recommend change configuration to avoid bullhead tee.	We have these fittings calculated into our head calcs and will leave them as they are.	OK
M-202	4/2/2021	3	Pipe sizes missing.	Concur. Have fixed.	Acknowledged
M-203	4/2/2021	1	Recommend change configuration to avoid bullhead tee.	We have these fittings calculated into our head calcs and will leave them as they are.	OK
M-203	4/2/2021	2	Pipe sizes and branch to VAV-301-16 missing.	No heat in this VAV box. Likely be replaced by split system.	No change to this set. VAV without reheat piping connection still shown.
M-203	4/2/2021	3	Pipe sizes missing.	Concur. Have fixed.	no change. Pipe sizes to VAV-301-10 & 12 not shown.
M-203	4/2/2021	4	Is piping down through level 2 exposed?	Yes.	ok
M-301	4/2/2021	1	Should this be AS-101 (CHW)?	Concur. Have fixed.	Acknowledged
M-301	4/2/2021	2	Where is MD for EF-101?	Concur. Have fixed.	Acknowledged
M-301	4/2/2021	3	It would be helpful if each of these louvers were labeled as to what they served.	We will leave as is. The system is indicated on the tag.	OK
M-302	4/2/2021	1	Recommend use elbow silencer on supply to improve this transition.	Concur, We will use elbow silencers where appropriate.	Acknowledged
M-302	4/2/2021	2	Show MD on mech rm outdoor air intake.	Concur. Have fixed.	Acknowledged
M-303	4/2/2021	1	Are fire dampers required at floor penetrations?	Fire dampers are not required.	ok
M-303	4/2/2021	2	Please verify with code interpretation that this does not require a rated shaft with combination fire/smoke dampers where duct penetrate 2 floors. It may be a matter of verifying whether the mezzanine counts as a third floor, or whether the ducts are technically only penetrating one "floor."	Mezzanine is not considered a third floor.	ok
M-303	4/2/2021	3	Should this duct follow roof line, similar to section on M-306?	We will keep this duct level.	ok
M-304	4/2/2021	1	This section appears to be looking south.	Concur. Have fixed.	Appears to still shows looking north?
M-304	4/2/2021	2	These pipes appear to go through CH-101; reroute around the chiller.	Concur. Have fixed.	Acknowledged
M-401	3/31/2021	1	Is another boiler/water heater emergency shut-off switch required at this door?	We have added boiler emergency shut-off switch at both doors.	ok
M-401	3/31/2021	2	Does this also shut down domestic water heaters? Please clarify.	ASME CSD-1 is what requires the shut-off switch and doesn't list hot water heaters and only references boilers.	Shouldn't it shut off all gas fired applicances in the room?
M-401	4/2/2021	3	Does AHU-301 get a supply air silencer?	Yes. It is shown on detail 2 on M-403.	Acknowledged
M-401	4/2/2021	4	Please clarify bridge connection (in vertical?) at this point.	Concur. We have added a keynote to detail 3on sheet M-402.	Acknowledged
M-401	4/5/2021	5	Are there safety reliefs on the remote evaporators? Relief vent piping should be shown on the drawings, with appropriate vent to atmosphere.	Remote evaporators do have relief valves and we will show vent piping on drawings.	Acknowledged
M-401	4/5/2021	6	Need to show combustion air and exhaust venting from domestic water heaters.	This is shown on on P-401.	Acknowledged
M-402	4/2/2021	1	Is discharge above sidewalk allowed by code?	NFPA-54 requires the vent to terminate a minimum of 7 feet above grade when located adjacent to public walkways.	ok
M-402	4/2/2021	2	Gas line sizes?	Concur. Have fixed.	Acknowledged
M-402	4/2/2021	3	Recommend a stair platform be constructed over refrigerant lines to prevent someone from stepping on them across walkway.	Due to cost considerations we will not have stair platform.	ok

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-402	4/2/2021	4	Will refrigeration piping close to ground allow appropriate service access to the chiller?	We believe there is adequate access. The evaporators are indoors which give more room to operate.	ok
M-502	4/2/2021	1	Recommend face dampers be omitted, as they tend to be noise-makers, and are less effective than the specified manual volume dampers at the branch take-off.	We will leave face damper detail as we have some applications where we don't have a branch take-off.	ok
M-502	4/2/2021	2	Recommend specify remotely-operated manual volume damper where there are not accessible ceilings, typical of manual damper details.	Added Note to detail 6 "CONTROL VALVES AND ISOLATION VALES SHALL BE WITHIN TRENCH.	This appears to be for next comment. No comment for volume dampers
M-503	4/3/2021	1	Clarify where the isolation and control valves are to be installed (within trench heater, at ceiling, or in verticals behind columns).	Added Note to detail 6 "CONTROL VALVES AND ISOLATION VALES SHALL BE WITHIN TRENCH.	Acknowledged
M-504	4/2/2021	1	Recommend a third test port at outlet of strainer.	Concur. Added	Acknowledged
M-504	4/2/2021	2	Recommend a third test port at inlet of strainer, after isolation valve.	Concur, Added.	Acknowledged
M-504	4/2/2021	3	Are drawings clear where 3-way valve detail is applicable (end of run)?	Correct, End of run. Can be seen on CV schedule and flow diagrams.	ok
M-505	4/2/2021	1	Specify how rigid nylon foot is anchored to ground/structure.	Concur. Updated detail.	Acknowledged
M-506	4/5/2021	1	Recommend provide a detail for water and refrigerant piping at split chillers.	We have notes to pipe per manufacturers instructions as each vendor has a different setup.	ok
M-507	4/2/2021	1	Recommend specify to follow firestopping manufacturer's installation instructions, per UL listing of product.	Detail updated.	Acknowledged
M-507	4/2/2021	2	Modify detail as appropriate for specified sidewall intake and exhaust.	Detail updated.	Acknowledged
M-508	4/2/2021	1	Clarify if separate min and max dampers are required.	See Note 3 on M-508.	ok
M-601	4/1/2021	1	Recommend 0.5 HP single phase motors be specified as ECM.	Concur. Fixed.	Acknowledged
M-601	4/2/2021	2	Recommend multiple plenum fan arrays for redundancy (particularly on larger units).	We evaluated fan arrays and we could not get the turndown required. We are also facing budget constraints.	ok
M-601	4/2/2021	3	Why is this fan not a direct drive fan like the others?	It was the best selection to give required turndown. We will allow either DD or BD fan.	ok
M-601	4/2/2021	4	With different min OA percentage, the EATs should not all be the same for every unit.	The VAV box has two minimums. If ambient is above 20 deg the min airflow is listed under MIN DESIGN AIRFLOW. If ambient conditions are 20 or below the VAV HEATING AIRFLOW MINIMUM setpoint is used to ensure mixed air temps reach 35 deg for freeze protection.	ok
M-601	4/2/2021	5	Should there also be a sound power level at return fan intake specified for AHU-102?	We will leave schedule as it is.	ok
M-601	4/2/2021	6	Coordinate with electrical, which do not show these branch circuit feeds.	We have coordinated.	ok
M-601	4/2/2021	7	Except for AHU-102, relief outlets are field ducted and not integral to the AHU.	Keynote 11 only appears on AHU-102.	ok
M-601	4/2/2021	8	Total pressure drop and associated fan selections should be based on mid-life dirty filter allowance.	Added dirty filter to keynote.	Acknowledged
M-601	4/2/2021	9	Plans indicate same side connection.	Updated note.	Acknowledged
M-601	4/2/2021	10	Don't think this capacity is available in direct drive; please verify.	We have a selection for a Cook SQN-D direct drive at scheduled airflows and ESP.	ok
M-601	4/2/2021	11	Should specify model size for each fan selection.	I want vendor to provide an optimized selection.	ok
M-601	4/2/2021	12	Should specify model size for each pump selection.	I want vendor to provide an optimized selection.	ok
M-602	4/1/2021	1	Recommend specify ECM motors, if available.	We will stick with standard motor UH's due to budget constraints.	ok
M-602	4/3/2021	2	Recommend omitting OBD, as they just increase noise, and are not as effective for balancing as the specified manual volume dampers at branch take-offs.	These are drum louvers directly in the duct and do not have a branch take off.	ok

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-602	4/3/2021	3	Recommend elbow silencers at locations that are immediately adjacent to an elbow.	We will consider elbow silencers.	ok
M-602	4/3/2021	4	Why are amps all the same, even for units 104 and 106 that are 30% higher capacity?	That's what the cutsheets indicate.	ok
M-602	4/3/2021	5	Why are efficiencies different for 22 MBH units which appear to be otherwise identical?	We have updated the efficiencies for all 22 MBH units to be 21.5 SEER.	Acknowledged
M-602	4/3/2021	6	Shouldn't airflow for units 104 & 106 be higher for units with 30% higher capacity?	We have updated the airflows.	Acknowledged
M-602	4/3/2021	7	Do these units need integral (or separate) condensate pumps?	These will use gravity drains to floor drains within the space.	ok
M-602	4/3/2021	8	Suggest delete data from all heating coil cells, since there is no coil.	We will likely change these to dx split systems and will remove from schedule.	ok
M-602	4/3/2021	9	Notes 7 & 8 not yet complete.	The XX are intentional to denote the format because they apply to several different tag numbers.	ok
M-603	4/2/2021	1	Please clarify if this is finned element length or cover length.	We have updated the schedule to indicate element length.	Acknowledged
M-603	4/2/2021	2	Length missing.	Concur. Fixed.	Acknowledged
M-603	4/3/2021	3	In order to prevent pump dead-head, only select end-of-line valves need to be 3-way. For CHW, this should only be AHU-101. For HW, it should not include any AHUs, and include only the most remote terminal units at each floor. Too many 3-ways valves will result in decreased system efficiency by lowering the overall delta-T. Chillers are most efficient with the warmest possible return water, and condensing boilers are most efficient with the coolest possible return water.	On the chilled water system, CV-008 was changed to a three-way valve, and CV-007 and CV-012 were changed to two-way valves. This modification ensures minimizes the number of three-way valves while allowing the secondary pumps to continue to operate in a stable region of the pump curve at reduced flow by maintaining approximately 25% of the design flow. As you noted in your comment, the inclusion of three-way valves also prevents dead-heading the pump. The heating water system implemented a similar approach to the chilled water system. Increasing the volume of water flowing through the secondary system helps to prevent short-cycling of the boilers. The three-way valves in the mechanical room and several on the first floor have been removed from the heating water system to incorporate your comment. However, a number of three way valves have been retained, primarily near the ends of piping branches, to allow roughly 20% of the design flow through the system for the reasons listed above.	OK
M-603	4/3/2021	4	Recommend that chilled water valves at AHUs fail closed, rather than open.	We will evaluate and update.	OK
M-603	4/3/2021	5	Clarify electrical requirements for TH-A through D. Elect dwgs currently have 277V power feed to every trench heater.	We have coordinated with electrical power to the trench heater hubs.	OK
M-603	4/3/2021	6	Clarify how trench heaters are wired for power, and coordinate with electrical. Does only TH-A get line voltage power, and then each downstream unit B, C or D gets only 24V power?	See detail 6 on M-503.	OK
M-603	4/3/2021	7	Note is not applicable as all chilled water is indoors.	Concur, Removed note.	Acknowledged
M-603	4/3/2021	8	Please indicate if this is factory and field insulated tank.	Concur. Added factory installed 1/2" Armaflex insulation.	Acknowledged

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-701	4/5/2021	1	None of these monitoring points for domestic water system, elect and gas utility meters, or combustible gas detection are detailed within the following control drawings. Also recommend include alarm monitoring of domestic water booster pump system.	There is a detail on M-701. Booster pump will be removed from the project.	ok
M-702	4/3/2021	1	Is any control or communication wiring required between the chiller and remote evaporator?	All control wiring between the chiller and remote evap will be a part of the chiller install and startup.	ok
M-702	4/3/2021	2	Recommend add alarm fault from VFD.	We have added a note to the point schedule.	Acknowledged
M-702	4/3/2021	3	40% minimum speed seems high; consider 20%	We will adjust to 25% on cooling pumps and 20% on heating pumps.	Acknowledged
M-702	4/3/2021	4	Pump is indicated as variable speed; include same points and P-3 & 4.	Concur, Have fixed.	Acknowledged
M-702	4/3/2021	5	Primary chilled water pumps are variable speed (which is a good thing to maximize delta-T and chiller efficiency); how is their speed controlled? also need to include a low limit to maintain required minimum flow through chiller.	The intent is to run the primary pumps as constant speed using the VFD for balancing, soft start and flexibility.	OK
M-702	4/3/2021	6	Suggest also monitor alarm status from chiller.	We have added a note to the point schedule.	Acknowledged
M-703	4/3/2021	1	Recommend adding alarm status for chillers.	We have added a note to the point schedule.	Acknowledged
M-704	4/3/2021	1	Recommend add alarm fault from VFD.	We have added a note to the point schedule.	Acknowledged
M-704	4/5/2021	2	Suggest also monitor alarm status from boiler.	Concur, We added alarm status to point schedule notes.	Acknowledged
M-704	4/5/2021	3	Suggest also monitor domestic hot water supply temperature and alarm status for each water heater.	Added point list for domestic water system on M-709.	Acknowledged
M-704	4/5/2021	4	Pump is indicated as variable speed; include same points and P-5 & 6.	Concur. Fixed.	Acknowledged
M-704	4/5/2021	5	Please clarify if these also shut down domestic water heaters (and snowmelt boiler in alternate).	Added snow melt boiler.	Acknowledged
M-704	4/5/2021	6	Clarify typical of how many.	Concur. Fixed.	Acknowledged
M-704	4/5/2021	7	There are no motorized isolation valves to control.	Concur. Removed.	Acknowledged
M-704	4/5/2021	8	30% minimum speed seems high, and only a single small boiler firing is only 22%, which would result in recirculation of return water in the secondary supply. Consider 20% minimum speed.	Concur. We have updated to 20%.	Acknowledged
M-704	4/5/2021	9	These are already variable speed pumps. Consider a sequence to modulate these pump speeds based on primary and secondary return water temperatures. This will result in the lowest return water temperature to each boiler, and maximize system operating efficiency.	The intent is to run the primary pumps as constant speed using the VFD for balancing, soft start and flexibility.	OK
M-704	4/5/2021	10	Since boiler #4 is larger than the other 3, should the sequence use outdoor air temperature to revise which boiler should be lead?	We will consider. We are considering dropping one boiler and the remaining three will be the same size.	OK
M-705	4/5/2021	1	Should these be boiler return temperatures?	Concur. Fixed.	Acknowledged
M-705	4/5/2021	2	Clarify if there are multiple DP sensors.	Only 1 DP sensor.	OK
M-705	4/5/2021	3	Consider adding speed command for primary boiler pumps (unless this speed command is by boiler control panel).	The intent is to run the primary pumps as constant speed using the VFD for balancing, soft start and flexibility.	OK
M-705	4/5/2021	4	Are boilers going to have BACNET interface to monitor and display parameters at operator workstation? Need to specify what points are to be mapped over to BAS.	We have added a note to the point schedule.	Acknowledged
M-706	4/5/2021	1	Recommend add alarm fault from VFD.	We have added a note to the point schedule.	Acknowledged
M-706	4/5/2021	2	Where do these OA airflow stations get installed? On most units, there is a very short piece of duct between OA plenum and damper.	They are integral to the damper.	OK
M-706	4/5/2021	3	Recommend clarify which AFMA are field installed, versus factory furnished with AHU. Field installed units should all be shown on plan/section drawings.	Field installed dampers are shown and scheduled to have airflow measurement.	Ok
M-706	4/5/2021	4	Did not see bipolar ionization units shown on the plans.	Has been removed from project	Still shown on IFC set

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-706	4/5/2021	5	Please clarify if there are multiple SP sensors.	There is one static pressure sensor per AHU.	OK
M-706	4/5/2021	6	Recommend that hot water valve be modulated to maintain AHU cabinet temperature to minimum 50 degF. Also note position of heating coil IFB damper.	We have a freeze protection paragraphs elsewhere. Added note for IFB to be in full bypass.	OK
M-706	4/5/2021	7	Why open OA damper for unoccupied setback temperature control? It is typical to keep OA closed in this mode.	Concur. We have corrected.	Acknowledged
M-706	4/5/2021	8	Why using only temperature, rather that comparative enthalpy control of economizer?	We will use differential enthalpy to enable the economizer.	OK
M-706	4/5/2021	9	Please clarify control of both damper and valve. Recommend that below 35 degF OA temperature, the valve be fully open and the IFB damper be modulated for control of discharge. Above 35 degF OA temp, the IFB damper be open to full flow acrosss coil, and the HW valve be modulated to maintain setpoint.	Concur. Have added this sequence.	Acknowledged
M-706	4/5/2021	10	Please clarify that there is one of these for each AHU, and it is not a single global sensor.	There should be a static pressure sensor for each AHU in the space that it serves. Added note.	Acknowledged
M-706	4/5/2021	11	On detection of high CO2 levels in a space, the local VAV box should be modulated open first to meet CO2 setpoint, before increase outdoor airflow to the entire unit.	We have added this to the sequence.	Acknowledged
M-706	4/5/2021	12	Recommend that AHU fans (including duct static presssure reset) and VAV boxes should not be set to "occupied mode," but rather operate as normal to maintain setback/setup temperatures.	We have modified the operation to maintain the unoccupied setpoints.	OK
M-706	4/5/2021	13	Control of unit UV lights and bipolar ionization needs to be specified.	Bipolar ionization is not a part of the project. UV lights shall be on all the time expect when AHU door switch is active by opening the access door.	OK
M-707	4/5/2021	1	Bipolar ionization control missing.	Bipolar ionization is not a part of the project.	OK
M-708	4/5/2021	1	High space CO2 level should first open the VAV box to satisfy setpoint (subject to low limit on space temperature), before sending command to AHU to increase OA flow.	Added to sequence.	Did not see this added to the IFC set
M-708	4/5/2021	2	Also include control of ERH for select rooms.	Shown on M-711.	OK
M-708	4/5/2021	3	Recommend that VAV box HW valve and perimeter heating (TH or BB) valve be modulated together, rather than making perimeter the first stage. Our experience has been the operating the perimeter first can completely satisfy the space temperature, while the VAV box is still discharging cool air, which can be perceived as drafty from occupants.	We have updated sequence.	Acknowledged
M-708	4/5/2021	4	Please include point list table for VAV box.	Concur, Have fixed.	Acknowledged
M-708	4/5/2021	5	Isn't all the fan control all integral controls from the trench heater hub controller? This implies it is part of the DDC controls.	The hub has quick connects via molinex connectors that controls the heaters. The hub receives a signal from the thermostat or the DDC and the hub takes it from there.	OK
M-710	4/5/2021	1	Per the schedule, this fan is on VFD. Recommend the sequence modulate the fan speed to maintain setpoint when OA temperature is below 45 degF. This will help to prevent the fan from continuous cylcing on/off when very cold outside, and only run or cycle with a much smaller amount of outdoor air.	We have updated sequence.	OK
M-710	4/5/2021	2	Need to also include control of motorized damper at make-up air to the room.	Concur. Added OA damper.	Acknowledged
M-710	4/5/2021	3	Include speed control of fan.	We have updated sequence.	Acknowledged

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-711	4/5/2021	1	Recommend that VAV box HW valve and perimeter heating (TH or BB) valve be modulated together, rather than making perimeter the first stage. Our experience has been the operating the perimeter first can completely satisfy the space temperature, while the VAV box is still discharging cool air, which can be perceived as drafty from occupants.	We have updated sequence.	Acknowledged
M-712	4/5/2021	1	Depending on manufacturer, 3-way diverting valves can be difficult to find. Recommend use 3-way mixing valve and install it on the return line for the same intent.	The intent is a mixing valve.	OK
M-712	4/5/2021	2	Is there also a moisture sensor, so that snowmelt is not turned on when it is cold and dry outside?	There is a moisture sensor in slab. Have updated diagram.	Acknowledged
M-712	4/5/2021	3	This sensor not indicated in diagram below.	There is a moisture sensor in slab. Have updated diagram.	Acknowledged
M-712	4/5/2021	4	There should be no automatic make-up water. When make-up is required, the pre-mixed glycol solution should be added manually to tank, when low level alarm is activated.	We will evaluate and update as necessary.	OK
M-801	4/3/2021	1	Recommend third pressure gauge tap (or at least test port) at the inlet of strainers and suction diffusers,	Concur. Added to diagram.	Acknowledged
M-801	4/3/2021	2	Recommend a flow measuring device (orifice or venturi with test ports, or similar) at variable speed pumps for use in TAB.	We will not include flow measuring devices due to budget constraints.	OK
M-801	4/3/2021	3	Recommend 3-valve only at AHU-101; use 2-way for all other AHUs.	We will use 3-way valve on AHU-102 and everything else will be 2-way.	OK
M-802	4/3/2021	1	Recommend provide pressure gauge (or at least test port) at inlet of strainer as well.	Concur. Added to diagram.	Acknowledged
M-802	4/3/2021	2	Recommend third pressure gauge tap (or at least test port) at the inlet of suction diffuser.	Concur. Added to diagram.	Acknowledged
M-802	4/3/2021	3	Recommend a flow measuring device (orifice or venturi with test ports, or similar) at variable speed pumps for use in TAB.	We will not include flow measuring devices due to budget constraints.	OK
M-802	4/3/2021	4	What is condensate drain material? Recommend CPVC for acid resistance.	Added to specifications.	Acknowledged
M-803	4/3/2021	1	Recommend 3-valve only at AHU-101; use 2-way for all other AHUs.	We will use 3-way valve on AHU-102 and everything else will be 2-way.	OK
M-804	4/3/2021	1	Recommend reconfigure piping to avoid bullhead tees.	We have these fittings calculated into our head calcs and will leave them as they are.	OK
M-805	4/3/2021	1	Recommend reconfigure piping to avoid bullhead tees.	We have these fittings calculated into our head calcs and will leave them as they are.	OK
M-806	4/2/2021	1	Should warming kitchen be exhausted, rather than return, to prevent food odors from migrating throughout the AHU-101 space? Basis of design narrative indicates exhaust will be provided.	A kitchen that is not used to cook is not required to be exhausted per ASHRAE IC-62.1-2016-1. There are no cooking appliances and owner did not intend to use this space as a cooking kitchen. We will update the basis of design.	OK
M-806	4/2/2021	2	Should warming kitchen be negative pressure, to help contain food odors within the space?	No cooking will occur in space.	OK
M-901	4/2/2021	1	Does copy/print room require exhaust for compliance with IAQ LEED credit? Basis of design narrative indicates exhaust.	Typical office copy print is not required to be exhausted per ASHRAE IC-62.1-2007-25. This is not being used for a LEED credit. We will update the basis of design.	OK
M-901	4/2/2021	2	Does copy/print room require exhaust for compliance with IAQ LEED credit? Basis of design narrative indicates exhaust.	Typical office copy print is not required to be exhausted per ASHRAE IC-62.1-2007-25. This is not being used for a LEED credit. We will update the basis of design.	OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
M-901	4/2/2021	3	Coordinate and verify with architect all full height partitions, and assure that openings and transfer ducts are provided as necessary to assure return airflow back to AHU.	Concur. We have evaluated.	OK
M-901	4/3/2021	4	Does perimeter restroom need heat (ERH-A), since there is no warm supply air into space?	We added ERH-A to this space.	Acknowledged
M-903	4/2/2021	1	Coordinate and verify with architect all full height partitions, and assure that openings and transfer ducts are provided as necessary to assure return airflow back to AHU.	Concur. We have evaluated.	OK
M-904	4/2/2021	1	Does copy/print room require exhaust for compliance with IAQ LEED credit? Basis of design narrative indicates exhaust.	Typical office copy print is not required to be exhausted per ASHRAE IC-62.1-2007-25. This is not being used for a LEED credit. We will update the basis of design.	OK
M-904	4/2/2021	2	Coordinate and verify with architect all full height partitions, and assure that openings and transfer ducts are provided as necessary to assure return airflow back to AHU.	Concur. We have evaluated.	OK
M-905	4/2/2021	1	Is discharge above sidewalk allowed by code?	NFPA-54 requires the vent to terminate a minimum of 7 feet above grade when located adjacent to public walkways.	OK
M-905	4/3/2021	2	Recommend provide a schematic flow diagram similar to M-802 for snowmelt boiler system.	We will leave as delegated design. Due to budget constraints this alternate will not likely be selected.	OK
M-905	4/3/2021	3	Recommend a glycol make-up unit for this system.	Concur. We show a chemical feed pot and added a keyed not.	OK
M-905	4/3/2021	4	Where is piping manifold for snowmelt system, and clarify how piping gets from manifold to underground distribution.	Manifold is a delegated design by snow melt system supplier. See keynote 1.	Acknowledged
M-905	4/3/2021	5	Coordinate with site drawings to make sure they have appropriate details for snowmelt system, including insulation under slab/paving.	See keynote 1.	Acknowledged
M-908	4/3/2021	1	Should this be designated as AHU-103A?	Correct. Have changed to AHU-103A.	OK
P-011	4/5/2021	1	Coordinate with structural, as they show only a single sump pit.	Concur, there is a single sump and will update our schedule and plans.	Acknowledged
P-011	4/5/2021	2	Size/annotate all underground drainage in this area; referenced detail only include above slab piping.	If an enlarged plan is present all annotation is shown on the enlarged plans and not on the overall plans. Typical of all comments. This is shown on the enlarged plan detail 1on P-402	OK
P-011	4/5/2021	3	Should there be a floor drain under the sink, with indirect waste piping from the sink?	We will keep the direct drain.	OK
P-101	4/5/2021	1	Is it appropriate for the overflow roof drains to discharge into the areaway? They are not readily visible unless you are inside the areaway.	There is also overflow from the area way to the exterior at grade to visible identify an issue.	OK
P-101	4/5/2021	2	Is there a chase required to conceal these risers?	Storm pipes will be exposed.	OK
P-101	4/5/2021	3	Need condensate drain piping from ductless split system indoor units.	We allow this to be field routed and indicate it on Keynote 7 on M-201.	OK
P-102	4/5/2021	1	Is there a chase required to conceal these risers?	Storm pipes will be exposed.	OK
P-102	4/5/2021	2	Need condensate drain piping from ductless split system indoor units.	We allow this to be field routed and indicate it on Keynote 11 on M-202.	OK
P-103	4/5/2021	1	Is there a chase required to conceal these risers?	Storm pipes will be exposed.	OK
P-201	4/5/2021	1	Recommend avoid water piping at ceiling of MDF if possible to route elsewhere.	There is a hard ceiling in the MDF. There is not alternate routing to the chase.	OK
P-201	4/5/2021	2	Recommend move this WH-1 to here, for better access to courtyard.	This location was arch driven and will keep where we have it. The WH on the other side should give them plenty of access.	OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
P-201	4/5/2021	3	Specify required GPM for all balancing valves.	We will show balancing valve flows on P-803 and P-804.	OK
P-202	4/5/2021	1	Specify required GPM for all balancing valves.	We will show balancing valve flows on P-803 and P-804.	OK
P-203	4/5/2021	1	Specify required GPM for all balancing valves.	We will show balancing valve flows on P-803 and P-804.	OK
P-301	4/5/2021	1	If this is a countertop ice maker, does it need a floor drain or funnel drain under the sink?	No.	OK
P-401	4/5/2021	1	Pipe sizes missing and water heaters and mixing valve; not indicated at detail on P-501 either.	We have added pipe sizes to drawings.	Acknowledged
P-401	4/5/2021	2	Show associated hydro-pneumatic tank on plan.	Booster pumps will be removed from project.	OK
P-402	4/5/2021	1	Specify required GPM for all balancing valves.	We will show balancing valve flows on P-803 and P-804.	OK
P-403	4/5/2021	1	Recommend moving DHWR tap and balancing valve closer to end of line.	We moved to wellness room so it can be accessible through lay-in ceiling. Shower room has hard ceiling.	OK
P-501	4/5/2021	1	Detail needs to show drainage and condensate neutralization from vent stacks.	We added condensate neutralization kit to detail.	OK
P-501	4/5/2021	2	Does recirc pump need to run continuous for Legionella control, or is aquastat control still acceptable?	We are not aware of any code requiring continuous operation of recirc pump.	OK
P-501	4/5/2021	3	Should safety relief valves be piped separately to floor, rather than combined to a single outlet?	Yes. We will be removing one DWH so it will be a single discharge.	OK
P-501	4/5/2021	4	Digital water meter not shown on floor plans or DDC temperature control drawings.	Domestic water meter added to drawings. Detail 4 on M-701 shows utility monitoring.	OK
P-502	4/5/2021	1	Is a detail needed for a dual level deck drain (for alternate deck at level 2 above the mechanical room?	Per Arch the material chosen will allow free flow to roof below.	OK
P-503	4/5/2021	1	Are these details applicable? Did not see any heat tracing on plans or schedules.	There is not any heat tracing in project and details have been removed.	OK
P-503	4/5/2021	2	Recommend specify to follow firestopping manufacturer's installation instructions, per UL listing of product.	Added note to detail.	Acknowledged
P-503	4/5/2021	3	Show associated hydro-pneumatic tank (scheduled) in detail.	Booster pumps will be removed from project.	OK
P-601	4/5/2021	1	Does a dual-level deck drain also need to be scheduled?	Per Arch the material chosen will allow free flow to roof below.	OK
P-601	4/5/2021	2	Please clarify confusing description - is it undermount or drop-in? Is faucet low-voltage electric with transformer, or water turbine-powered?	Concur. Modified description	Acknowledged
P-601	4/5/2021	3	Please clarify confusing description - Is faucet low-voltage electric with transformer, or water turbine-powered?	Concur. Modified description	Acknowledged
P-601	4/5/2021	4	Please clarify "specified in another division." Is it a completely tiled shower specified in Div 9? Is the shower basin by Div 22, and only the walls are tiled by Div 9?	All of the shower will be div 09 and have added a note.	OK
P-601	4/5/2021	5	Not consistent with P-011, which appears to show direct waste piping to sink.	Will remove this note.	Acknowledged
P-601	4/5/2021	6	Please indicate flow requirements.	Added flow requirements to schedule.	Acknowledged
P-601	4/5/2021	7	Coordinate with structural drawings, which show only a single sump pit.	Concur, there is a single sump and will update our schedule and plans.	Acknowledged
P-601	4/5/2021	8	Does this need to be oil-minder type pump, that does not operate if oil is sensed?	Added note to have an oil sensor.	Acknowledged
P-601	4/5/2021	9	Tank should be shown on plans and details, with associated piping arrangement.	Booster pumps will be removed from project.	OK
P-601	4/5/2021	10	Recommend specify ECM motor.	We will keep the PSC.	OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
P-803	4/5/2021	1	Add note #3 here for balancing valve?	All have been updated with an individual keynote showing flow for each balancing valve.	Acknowledged
P-803	4/5/2021	2	Specify required GPM for each balancing valve.	All have been updated with an individual keynote showing flow for each balancing valve.	Acknowledged
P-804	4/5/2021	1	Add balancing valves on DHWR at level 2.	Concur. We have annotated.	Acknowledged
P-804	4/5/2021	2	Specify required GPM for each balancing valve.	All have been updated with an individual keynote showing flow for each balancing valve.	Acknowledged
Spec Section 220513-2.0.D	4/5/2021	1	Should specify shaft grounding rings for VFD-driven motors.	Added to 2.0.E.	Acknowledged
Spec Section 220513-2.0.E	4/5/2021	2	Should add requirements for permanent magnet ECM motors.	We didn't specify any ECM motors on plumbing equipment.	OK
Spec Section 220533	4/5/2021	3	Is this section applicable? Did not see any heat tracing scheduled or shown on dwgs.	Concur. Removed this section.	Acknowledged
Spec Section 220716-3.0-I	4/5/2021	4	Is this appropriate for condensing gas-fired domestic water heaters?	We will leave in and review.	OK
Spec Section 220716-3.0-J	4/5/2021	5	Recommend that blanket insulation not be used where exposed in mechanical rooms.	We are evaluating all of the insulation and jackets as a part of the VE efforts.	OK
Spec Section 220716-3.0-J	4/5/2021	6	Is this intended to be additional insulation over factory-insulated gas-fire domestic water heaters (tank type)?	No. We removed this portion.	OK
Spec Section 220719-2.0-B	4/5/2021	7	This is not approved for installation in return air plenums unless it is max 25/50 flame spread/smoke developed rated.	Added requirement.	Acknowledged
Spec Section 220719-3.0-J	4/5/2021	8	Is flexible elastomeric approved for installation in return air plenums?	Armacell has a 25/50 and will add this to specification.	OK
Spec Section 220719-3.0-K	4/5/2021	9	Is the intent for PVC jacketing over all piping, even where concealed in walls or above ceilings?	It was originally only required in exposed areas but this is all being evaluated as a part of VE efforts.	OK
Spec Section 221116-2.0-C	4/5/2021	10	Recommend galvanized piping be eliminated.	Galvanized is required for NG piping outdoors per National Grid Blue Book.	OK
Spec Section 221119-2.0-E	4/5/2021	11	Cast iron should not be used for potable water.	Removed cast iron valve.	OK
Spec Section 221123-1.0-E	4/5/2021	12	Should seismic requirements be deleted from this project (not required in Seismic Design Category B)?	Booster pumps will be removed from project.	OK
Spec Section 221311.0	4/5/2021	13	Need spec for sump pump at elevator pit.	Added elevator sump to 22 13 19.	Acknowledged
Mechanical Specification Review					
Spec Section 230513-2.0-E	4/5/2021	2	Should add requirements for permanent magnet ECM motors.	Added ECM motors.	Acknowledged
Spec Section 230519-2.0-J	4/5/2021	3	Are thermal energy meters required? Did not see any on drawings.	We do not have thermal energy meters and removed from specification.	OK
Spec Section 230523-3.0-P	4/5/2021	4	Should any reference to TAB for existing systems be deleted?	Concur, we have removed TAB for existing systems.	Acknowledged
Spec Section 230713-2.0-A	4/5/2021	5	Were board and blanket fiberglass insulation products intentionally omitted?	We will evaluate insulation systems through VE discussions.	Acknowledged
Spec Section 230713-2.0-A	4/5/2021	6	Does specified flexible elastomeric insulation meet 25/50 flame spread/smoke developed requirements?	Yes.	OK
Spec Section 230713-3.0-H	4/5/2021	7	Do return ducts within plenum returns require insulation?	Return duct does not require insulation.	OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
Spec Section 230713-3.0-I	4/5/2021	8	Is it the intent that ALL ductwork be insulated with 1-inch thick flexible elastomeric insulation with stucco aluminum jacketing? Why not allow fiberglass blanket with FSK, concealed above ceilings; fiberglass board with ASJ or FSK in mechanical rooms; and only require aluminum jacket where visible in finished spaces or subject to damage?	We will evaluate insulation systems through VE discussions.	OK
Spec Section 230716-3.0-H	4/5/2021	9	Would fiberglass blanket be acceptable where concealed; and fiberglass board where exposed in finished spaces?	We will evaluate insulation systems through VE discussions.	OK
Spec Section 230716-3.0-I	4/5/2021	10	What is the value in providing PVC jackets on concealed equipment?	We will evaluate insulation systems through VE discussions.	OK
Spec Section 230716-3.0-I	4/5/2021	11	Is it the intent to provide PVC jackets over both fiberglass and elastomeric insulation?	We will evaluate insulation systems through VE discussions.	OK
Spec Section 230719-3.0-AA	4/5/2021	12	Would flexible elastomeric also be acceptable for CHW?	We will evaluate insulation systems through VE discussions.	OK
Spec Section 230719-3.0-AA	4/5/2021	13	Insulation thickness must vary, depending on pipe size, to be reasonable and still comply with energy code (2" insulation on 3/4" piping will not fit in 4" stud wall).	Added pipe size breakdowns.	Acknowledged
Spec Section 230719-3.0-AA	4/5/2021	14	For outdoor hot gas piping, would you consider cellular glass (will not absorb moisture)?	yes, We have included.	OK
Spec Section 230719-3.0-BB	4/5/2021	15	Is the intent to provide PVC jacket on ALL indoor piping? It seems excessive for concealed piping in walls or above ceilings.	We will evaluate insulation systems through VE discussions.	OK
Spec Section 232113-1.0-B	4/5/2021	17	Need spec for glycol make-up unit, and glycol chemicals.	We will evaluate. This equipment will likely be removed.	OK
Spec Section 232113-3.0	4/5/2021	16	Are pressure-seal joints also acceptable?	Pressure -seal joints have been removed from the specification	Acknowledged
Spec Section 232123-2.0-B	4/5/2021	18	Scheduled pumps are vertically mounted units.	Removed the Horizontally mounted.	Acknowledged
Spec Section 232300-2.0-A	4/5/2021	20	Is ALL refrigerant piping copper, including 4" suction lines for chillers?	Manufacturers recommend copper but allow steel. We will keep copper in specification and allow a contractor VE recommendation.	OK
Spec Section 232300-3.0-D	4/5/2021	19	Are soldered joints allowed, or should all joints be brazed?	Concur. We have removed the reference to soldered joints.	Acknowledged
Spec Section 232923-1.0	4/5/2021	22	Recommend specify with appropriate sections that VFDs furnished with equipment must also meet this spec.	Concur.	Acknowledged
Spec Section 232923-2.0-A	4/5/2021	21	Indicate what manufacturers are acceptable. To minimize harmonics, recommend specify only ultra-low harmonic active front end or matrix drives, such as ABB ACH-580-31 or Yaskawa Z1000U.	We added ABB and Alen Bradley per BNL request.	Acknowledged
Spec Section 233300-1.0-B	4/5/2021	23	Remote damper operators are listed here, but could not find them within Part 2 of this section.	Concur. We removed Remote damper operators from part 1.0	Acknowledged
Spec Section 233300-3.0-A	4/5/2021	24	Suggest specify installation of remotely operated manual volume dampers where installed above inaccessible ceilings.	Concur. We added remotely operated manual volume dampers.	Acknowledged
Spec Section 233416-1.0-B	4/5/2021	25	This section appears to cover fan types that do not exist on this project, and not cover the in-line centrifugal fans specified (Cook SQN).	We will review.	OK
Spec Section 236426-2.0-A-13	4/5/2021	1	For what purpose? Evaporator is indoors.	This is standard from chiller manufacturers.	OK
Spec Section 236426-2.0-A-17	4/5/2021	26	Please clarify if this is applicable to remote evaporators?	Remote evaporators will have insulation.	OK
Spec Section 239200-2.0-A	4/5/2021	27	Coordinate requirements with project; could not locate any chilled water flow meters.	We will leave in specification.	OK

Page	Markup Date	#	BVH Comments	Engineer's Comments	BVH Back Check Comments
Spec Section 239200-2.0-D	4/5/2021	28	Please clarify if this project gets a new operator workstation (located in mechanical room), in addition to reusing existing workstation (web server?).	Concur, Added workstation to mechanical room.	OK
Spec Section 239200-2.0-L-6	4/5/2021	29	Is this thermal energy meter applicable; could not find on drawings?	We will leave in A231:F512specification.	OK

COMMISSIONING PLAN

Brookhaven National Laboratory
Science User Support Center
Upton, New York

06/21/2023

Project No. 21-20-016

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Written by Michael Gannon, PE, CCP, CEM, LEED AP

TABLE OF CONTENTS

COMMISSIONING PLAN APPROVAL

This Commissioning Plan serves as a guide to the commissioning of facilities, utilities, and equipment for the Brookhaven National Laboratory – Science User Support Center Project. The purpose of this Commissioning Plan Approval page is to indicate that the members of the Commissioning Team have reviewed and accepted the information contained herein for use on the above-mentioned project.

WRITTEN BY	DATE
Commissioning Authority: Salas O'Brien	
Printed Name: Michael Gannon, PE	
Signature	
APPROVED BY	**DATE**
Owner: Brookhaven Science Associates	
Printed Name: Andrea Clemente	
Signature	
APPROVED BY	**DATE**
Architect/Engineer:	
Printed Name:	
Signature	

REVISION HISTORY

Revision A will be released for use as a planning tool with open issues if necessary. As more information becomes available, interim revisions (B, C) will be issued as necessary. After all open issues have been resolved; Revision 0 will be issued for approval. Following approval, revisions will be traced with the next sequential integer (1, 2). Following formal approval of Revision 0, each subsequent revision will require formal approval.

DOCUMENT REVISION HISTORY			
Revision	**Date**	**Description**	**Prepared By**
A	May / June 2021	Initial Commissioning Plan	CMD
B	June 2021	Commissioning Plan with revisions based on BNL comments	CMD
C	April 2023	Formatting and Logo Updates	CMD

COMMISSIONING TEAM

The Commissioning Team will consist of committed representatives of the owner, design team, and individual trade contractors. The following table identifies each member of the Commissioning Team as well as their affiliation with the project and a brief overview of their responsibilities during the commissioning process. The cooperation and participation required of the individuals listed below is essential in order to successfully complete the commissioning process.

Team Member	Company	Role	E-Mail	Responsibility
Michael Gannon	Salas O'Brien	Commissioning Authority	Michael.gannon@salasobrien.com	Implement and direct the commissioning process, functionally test building systems, provide summary report.
Paul D'Amore	Salas O'Brien	Building Envelope Commissioning Authority	paul.damore@salasobrien.com	Implement and direct commissioning process, inspect building envelope systems, witness envelope testing, provide summary report.
	Burns & McDonnell	Engineer		Develop BOD based on project requirements. Include all aspects of commissioning in the Contract Documents.
	Gensler Architects	Architect		Develop BOD based on project requirements. Include all aspects of commissioning in the Contract Documents.
Andrea Clemente	Brookhaven Science Associates	Owner	aclemente@bnl.gov	Assist in the development of the BOD and project requirements, including schedule and operational details.
	E.W. Howell Co. LLC	Construction Manager / General Contractor		Ensure commissioning is integrated into the construction process, including schedule.
	Premier Mechanical Services Inc.	Mechanical Contractor		Assist in development of specific commissioning procedures. Support the functional testing process.
	Bana Electric Corporation	Electrical Contractor		Assist in development of specific commissioning procedures. Support the functional testing process.
	Ambrosio & Company Inc.	Plumbing Contractor		Assist in development of specific commissioning procedures. Support the functional testing process.
	Evolution Piping Corporation	Fire Protection Contractor		Assist in development of specific commissioning procedures. Support the functional testing process.

Team Member	Company	Role	E-Mail	Responsibility
Tom Brogan	Integrated Controls Environmental, LLC	Temperature Controls Contractor	tbrogan@intgegratedcontrols.com	Assist in development of specific commissioning procedures. Support the functional testing process.
	Airpath Testing Services, Inc.	Test and Balance Contractor		Assist in development of specific commissioning procedures. Support the functional testing process.

OVERVIEW

The Brookhaven National Laboratory - Science and User Support Center (SUSC) will be a new publicly accessible facility located along the main entrance to Brookhaven National Laboratory (BNL). The building will be the first part of the Upton Square development located outside the secured perimeter of BNL, and will be the first building visitors see as they arrive. The building will be a total 75,588 gross square feet (GSF) of visitor processing facilities, offices, conference facilities, and support functions.

The intent of commissioning the SUSC project is to make every effort to ensure that the environmental quality of the facility is acceptable and satisfies the design parameters, prior to its occupancy. Additional goals of commissioning are to provide documented confirmation that a facility fulfills the performance requirements of the building owner, occupants, and operators. This is accomplished by providing quality assurance of the installation and functionality of the building systems and equipment. With this in mind, Brookhaven Science Associates has retained the services of Salas O'Brien to act as the Commissioning Authority (CxA) on this project.

The term commissioning refers to the comprehensive evaluation of a building project to ensure that the finished facility operates within the guidelines and parameters dictated by the owner's project requirements. The intended physical and architectural characteristics of a given space, the number of occupants, and the types of activities that take place within it have a direct impact on how the control systems of that space operate. Modern buildings include various control systems capable of controlling environmental properties such as space conditioning, lighting, and noise level. The facility's environmental quality is directly related to how well the aforementioned fields interact with one another.

As the Commissioning Authority, Salas O'Brien will supervise and oversee the commissioning process. This process is best described as a systematic verification to determine that each individual system functions as intended. In addition to this work, the Commissioning Agent will develop and utilize functional test procedures that will be used to verify and document the performance of those systems being commissioned. If there are deficiencies identified within a particular system during the commissioning process, then the CxA will facilitate discussions with the owner, Construction Manager (CM), and the design team. Dependent on the outcome of these discussions, the owner will finalize their decisions on how they will proceed in bringing the systems to an acceptable standard.

This commissioning plan has been developed by Salas O'Brien to act as an informational document to clarify how the commissioning process shall proceed. This plan will outline the responsibilities of the commissioning authority, owner, design team, and contractors.

This project has been designed and built to meet the requirements of the High Performance and Sustainable Buildings (HPSB) Guiding Principles as outlined in DOE O 413.3B. The Principles are defined as follows:

- Employ Integrated Design Principles
- Optimize Energy Performance
- Protect and Conserve Water
- Enhance Indoor Environmental Impact of Materials
- Assess and Consider Climate Change Risks

COMMISSIONING PROCESS

The CxA has developed this Commissioning Plan which outlines the responsibilities and procedures that will be used throughout the duration of the commissioning process. The Plan identifies which systems are to be commissioned, and provides an overview of the methods of verification and documentation that will be utilized by the CxA. Preliminary schedules for the functional testing of the systems will be outlined. This preliminary Commissioning Plan will be reviewed by the owner. After approval of the Commissioning Plan, the CxA will be responsible for presenting and reviewing it with the commissioning team. This

Commissioning Plan will be updated to more accurately reflect the specific requirements of this project as the job progresses. The members of the commissioning team will participate in the commissioning process as outlined below.

Design Reviews

The CxA shall perform reviews of the Contract Documents at both the Schematic and Construction Document phases (two reviews with a back-check) based on the project requirements outlined in the Project Objectives Document (POD) and the Basis of Design (BOD). In addition to reviewing the design for compliance with the POD and BOD, the CxA will assess the design for energy efficiency, proper function, ability to be commissioned, and completeness.

This process can be minimized with the completion of the POD and BOD prior to design review so all parties may have a clear understanding of the owner's requirements and design criteria during the review. The owner has the final decision-making authority over inclusion of any review comments into the design.

Specifications

The CxA will develop the commissioning specifications for the project to accomplish two key objectives:

- Provide general commissioning specifications that detail project requirements.
- Provide specific requirements for special systems and equipment (including building envelope), early submissions of necessary O&M manuals, and training plans and other key tasks.

The CxA will develop and provide the general commissioning specifications sections and will work with the design team to develop language regarding equipment or system-specific commissioning requirements to be included in other sections. Specification Section 019113 "General Building Systems Commissioning Requirements" will be provided by the CxA for the Design Development submission.

Controls Review

The CxA will perform a review of the designed control systems strategy. The intent of the review is to verify that the strategy will meet the project requirements and the needs of commissioning process, i.e., functional performance testing. The CxA will also review the controls specifications to assure that all necessary requirements for coordination with the Testing, Adjusting and Balancing (TAB) subcontractor are included.

Controls Checkout Plan

As noted in specification section 239200, the controls subcontractor will develop and submit a control checkout plan detailing the process they intend to use to verify the installation and functionality of the controls system, including a step-by-step description of the process and forms they will use to document the controls checkout. The controls subcontractor will coordinate with the TAB subcontractor to ensure that appropriate control equipment is available for use, and training has been provided to the TAB subcontractor for completion of the TAB work.

Testing, Adjusting and Balancing

As noted in specification section 230593, the TAB subcontractor will develop and submit a TAB Strategies and Procedures Plan including a description of how the control system will be used during the TAB execution, for review and comment within 30 days to commencement of TAB work. The CxA will review the plan for effectiveness and coordination and may provide comments on the plan. The CxA does not approve the plan. The controls subcontractor shall also review the plan for feasibility of use by the controls system.

TAB work must be performed after the controls system has been completed and all checkout and start-up documentation has been completed by the controls subcontractor to assure accurate testing, adjusting and balancing. The CxA will verify the air and water balancing by spot checking systems, reviewing completed balancing reports, and through selected site observation.

Pre-Functional Checklists

The CxA will produce pre-functional checklists that are filled out ***by the installing contractors*** prior to the start of functional testing. These checklists are tools to help the CM and subcontractors verify that the installation complies with the Contract Documents. Any deficiencies that are found can then be corrected early in the process when the contractors are fully mobilized on site. The pre-functional checklists will be created for all equipment included in the Scope of the Commissioning PProcess, as defined later in this document.

The CxA still performs a full verification of the installation as part of the functional testing; however, the pre-functional checklists shall be used by the installing contractors to verify systems and equipment are ready for the CxA to perform functional testing.

Functional Testing

The CxA will coordinate, supervise, and participate in the Functional Performance Testing (FPT) of the building systems and equipment. This testing will be done in accordance with the approved functional test procedures, and the results will be recorded on the functional test sheets provided by the CxA. The contractors will provide trained technicians that have participated in the installation of the systems and equipment being tested to assist in the functional testing process. The Owner will also provide operational staff to participate in the functional testing.

The CxA provides a master list of functional performance test sheets in the appendix of the plan and develops procedures in a sequential written form, and coordinates, oversees, and documents the actual testing. Conditional variations such as emergency modes and opposite seasonal testing are identified in the test sheets. Some test sheets may include requests for DDC trend logging to confirm system operation.

When a piece of equipment or system has been verified by the contractors as ready for testing, they will notify the CxA and that piece of equipment and/or system will be examined for commissioning readiness. Once deemed complete, the functional testing will commence.

If the system appears not ready for testing or fails during the testing process, the CxA will update the online tracking database, BlueRithm, and notify the contractors and owner that BlueRithm has been updated. This update will describe any and all deficiencies, and what the recommended action is to correct any problems. If assistance is needed from the design team, a request will be incorporated into BlueRithm asking for such recommendations and/or comments from the design team. Any review comments should be provided via BlueRithm. After review and approval, this notice shall be given to the respective contractors. Once the contractors have made any necessary corrections, they will update BlueRithm stating that the corrective action was taken. Once a corrective item has been completed, the CxA shall resume testing this outstanding item.

The CxA will keep the Owner, Design Team, and Contractors informed of the process of this testing by providing regular updates on BlueRithm. If the test results do not comply with the test standards, the CxA will facilitate a meeting between the owner, design team, and contractors to resolve the issue. The CxA will provide recommendations of what actions should be taken and moderate discussions concerning any outstanding issues. The owner and the design team will provide the final decision of what approach will be taken and direct the responsible parties to take corrective action.

If the test fails more than one re-test due to the lack of appropriate action by the contractors, the CxA will call a meeting to discuss appropriate resolutions and procedures. The final testing results for each test will be included in the CxA's Commissioning Report which will be submitted to the owner upon completion of the commissioning process.

Building Envelope

Design Reviews

The CxA shall perform design reviews for the building envelope as specified above in the Commissioning Process.

Specifications

The CxA shall provide a commissioning specification, as specified above in the Commissioning Process. This specification shall include building envelope.

Building Enclosure Testing Plan

The CxA will develop a Building Enclosure Testing Plan, to be included with this Cx Plan as an appendix. The intent of this testing plan is to consolidate all major building envelope field testing required by the owner and included in the project specifications into one location for the Commissioning Team's use and reference. The testing plan will include a matrix of that identifies required field test standards, testing locations, testing quantities, testing parameters, and criteria for testing to be considered successful. This matrix will also identify which party is responsible for engaging a testing agency to complete the specified test. Additionally, the testing plan will include descriptions for each of the required test types and roles and responsibilities of the various Commissioning Team members.

The testing plan is built based on the owner's documented requirements and the project specifications. Often times, these resources may contain missing pieces of information that are necessary to fully inform the execution of testing. In these cases, the testing plan will attempt to address these gaps in information with the CxA's recommendations. The fully completed plan will be submitted to the owner as a draft copy for review and approval before being incorporated as an official appendix in the Cx Plan.

Submittal Review

The CxA will review all pertinent building enclosure submittals and shop drawings that relate to the air, thermal, drainage, and vapor barriers for the building's walls, roofs, glazing, slabs, and foundations. The CxA will review submittals and shop drawings primarily from divisions 07 and 08, with select submittals and shop drawings coming from other divisions, such as division 03. The submittal review process will be finalized between the CxA, CM, Owner, and Architect of Record (AOR), but in general the CxA's review should be concurrent with the AOR, with comments submitted to the Owner and AOR for consideration and possible inclusion in the AOR's formal response to the CM.

Building Enclosure Checklists

The CxA will produce building enclosure checklists at the start of construction, during the Building Envelope commissioning kick-off meeting. These checklists are specific to individual envelope assemblies and are to be filled out ***by the installing contractors*** prior to any concealment of the assembly. Where applicable, checklists will also include sub-items to ensure readiness for in-situ field testing. These checklists are tools to help the CM and subcontractors verify that the installation complies with the Contract Documents. Given the Building Envelope will progress in different stages, and at different rates at various parts of the building, checklist completion will be required by installing contractors at 25% installation and 100% installation. The

25% milestone helps address the rolling nature of envelope construction by verifying that initial installations are in compliance with the Contract Documents prior to their concealment.

Site Observation & Field Testing

The CxA will perform periodic visits to the project site in order to track progress on building enclosure checklists and to inspect progress on envelope assemblies. The CxA should expect to begin performing following the envelope commissioning kick-off meeting, on an approximate monthly basis. The CxA may choose to adjust the frequency of inspections depending on the pace of construction pertinent to the envelope. Envelope assemblies to be inspected include the air, thermal, drainage, and vapor barriers for the wall, roofs, glazing, slabs, and foundations.

The CxA will also plan to be on-site to witness most critical in-situ envelope field testing identified in the Building Enclosure Testing Plan. The CxA will verify proper execution of the specified testing and will help interpret results of the testing and verify compliance with the specified pass/fail criteria.

The CxA will provide follow-up reports for site inspection and test witness visits and will also review 3rd party test agent reports and comment if necessary.

All open issues/concerns that arise as a result of CxA visitation and review of third party test reports will be documented in BlueRithm (see page 18) for follow up and resolution.

COMMISSIONING SCHEDULE

Incorporation of commissioning into the project schedule requires coordination among the commissioning team members. During the Design Phase, time must be allowed for development, review, and revision of the project requirements and BOD. In addition, design review response and revision should be incorporated into the schedule.

During construction, it is essential that the flow of information and materials include the CxA, and that time for the CxA's review and any required revisions be allowed. The CxA will work with the lead individuals on overall project scheduling, typically the architect and CM to ensure that the commissioning milestones are included.

Detailed testing and training schedules will be developed by the CxA and CM as construction progresses establishing sequential priorities to ensure work progresses in a logical manner that supports the commissioning process. Examples of sequential priorities that will be required for the project include:

- Equipment may not be temporarily started until proper construction start-up checkout and documentation has been performed.
- Functional testing does not begin until construction and start-up checkout and TAB have been completed for any given system (this does not preclude a phased approach).
- The controls system and the equipment it controls are not functionally tested until all control points have been calibrated and all related control testing completed.

RESPONSIBILITIES

Commissioning Authority

The CxA will prepare a preliminary commissioning plan and submit this plan to the Owner for review. The CxA will adjust the document based on the Owner’s assessment and related comments and submit it for final approval. The CxA and the owner will review the final commissioning plan with the Contractors

involved. Specific responsibilities vary with the management scenario and the CxA's specific scope of services. Ideally, the same party or firm acts as CxA through all project phases, as detailed below.

Design

During design, the CxA directs commissioning activities, possibly performing many of them, depending on the management scenario in place. Core commissioning responsibilities are:

- Reviewing the designer's BOD, plans, and specifications, ensuring they meet the project requirements.
- Developing the initial commissioning plan.
- Perform peer reviews of the 50% and 100% Design Development documents with back-check of IFC set.
- Ensuring that commissioning, training, and documentation requirements are reflected in the construction Contract Documents.

Construction

During construction, the CxA is in charge of the commissioning process and makes final recommendations to the owner about functional performance of commissioned building systems and assemblies. The CxA is an advocate for the owner, acting as independently and objectively as possible. Core commissioning activities during construction include, but are not limited to:

- Review the "For Approval" level of construction submittals of systems in the commissioning scope.
- Review of equipment/systems installations, duct and pipe pressure tests, flushing and cleaning and start-up through select site observation and review of reports.
- Organize, plan, develop, and execute functional performance testing.
- Review traditional O&M manuals.
- Verify operator training.
- Develop and present the Systems Training Manual.
- Develop and present the Commissioning Final Report.

Post Occupancy

During occupancy and operations, the CxA helps resolve commissioning issues and directs opposite season / deferred testing, if applicable. The CxA will participate in a ten-month near-end warranty review of system and assembly performance.

Owner

The Owner will review the preliminary commissioning plan and provide comments to the CxA. As required, they will meet with the CxA to clarify any changes to the document. The owner will approve the final document. With the CxA, they will review the final commissioning plan with the contractors involved.

Owner's Project Management Staff

The Owner's Project Management staff's ultimate responsibility is to see that the Commissioning Plan is executed. The Owner should include commissioning responsibilities in all commissioning team members' scopes of services, make sure there is sufficient time for commissioning in the project schedule, ensure the CxA is receiving cooperation from other team members, and ensure that other owner responsibilities (developing the project requirements, having O&M staff participate during construction) are fulfilled. The

owner ensures that all design review and construction phase issues identified through commissioning are resolved in a timely manner.

Owner's Operations Staff

Design

During design, this staff contributes to reviews of the designer's BOD, plans, and specifications.

Construction

During construction, this staff may:

- Assist in reviewing selected submittals.
- Assist in construction observation, verifying completion of construction checklists, and observing start-up.
- Participate in or witness testing.
- Review O&M and systems manual.
- Participate in training.

Post Occupancy

The Owner's O&M staff's role and responsibilities are:

- Participate in a post occupancy / near-end-of-warranty review with the CM, designer, and CxA.
- Share any warranty or construction-related items, and cooperating with CxA in executing the post occupancy commissioning activities.
- Assist in resolving issues identified during the review sessions.

Design Team

The design team will understand the commissioning process as outlined in the commissioning plan, and provide participation as detailed in the plan or as requested by the owner.

Design

Design professionals should develop complete Basis-of-Design (BOD) documentation, including design narratives, rationale, and criteria, according to their scopes of services, and update this document with each new design submission. They provide input to the commissioning plan, respond to questions and concerns by the CxA and others, respond to design review comments, and incorporate commissioning requirements in construction Contract Documents.

Construction

During construction, designer's responsibilities include:

- Review the commissioning plan.
- Attend selected commissioning meetings.
- Answer questions about system design and intended operation.
- Update design narratives in the BOD to reflect as-built conditions.
- Respond to or incorporate the CxA's comments on construction submittals and O&M manuals.
- Help resolve design-related issues raised during commissioning.

- Submit required portions of the systems manual.
- Working with the CxA in the review of the building envelope system including roofing, walls, curtain walls, windows, and door assemblies.

Post Occupancy

The design team's role and responsibilities are:

- Participate in a post occupancy / near-end-of-warranty review with the CM, owner, and CxA.
- Assist in providing any corrective solutions to warranty or construction-related issues identified, and cooperating with CxA in executing the post occupancy commissioning activities.

Additional tasks sometimes required are to present system description overviews for primary systems during O&M staff training, review and approve testing plans and procedures, review completed test forms, or witness selected tests.

Construction Managers

The Construction Manager's (CM) role shall be to ensure the contractors are executing their commissioning responsibilities according to the commissioning plan and help resolve issues. Throughout the commissioning process, the CxA will generate documents containing deficient or outstanding items and share them with the commissioning team. It is important that the CM obtain all necessary information back from the subcontractors for communication back to the CxA via the on-line tracking database ***(BlueRithm)***. This is necessary to assure proper issue tracking and proper close-out of any outstanding items identified throughout the commissioning process.

Design

The CM reviews commissioning requirements and performance criteria for coordination, schedule, and cost implications.

Construction

The CM's role and responsibilities are:

- Ensuring subcontractors' commissioning work is completed and cooperating with CxA in executing the commissioning plan.
- Providing input into the commissioning plan.
- Integrating the commissioning schedule into the overall project schedule.
- Participating in commissioning meetings.
- Responding to questions and issues raised by the CxA.
- Resolving issues identified during commissioning and coordinating correction of identified deficiencies.
- Providing equipment, system and assembly data and information needed by the CxA
- Provide man-lifts, scaffolding, swing staging, and/or fork-truck and operators as needed for the CxA's inspections and as needed for the building envelope testing agency's field testing.
- Performing specified training.
- Submitting required portions of the systems manual.

Post Occupancy

The CM's role and responsibilities are:

- Post occupancy / near-end-of-warranty review with the owner, designer, and CxA.
- Ensuring subcontractors are responding to warranty items and cooperating with CxA in executing post occupancy commissioning activities.
- Resolving issues identified during commissioning and coordinating correction of identified deficiencies.

Trade Contractors

Design

Trade contractors of specialty or complex systems or designs should review commissioning requirements and performance criteria of their systems for coordination, schedule, and cost implications.

Construction

The responsibilities of the installing trade contractors (and vendors, as appropriate) include:

- Cooperating with the CxA (and the Contractor's Commissioning Manager, when applicable) in executing the commissioning plan.
- Providing input into the commissioning plan.
- Coordinating with other trades as necessary to facilitate a smooth and complete commissioning process.
- Participating in commissioning meetings.
- Responding to questions and issues raised by the CxA.
- Executing and documenting tasks in the construction checklist and start-up process.
- Assist the CxA with the functional testing of equipment and systems.
- Participating in resolving issues identified during commissioning.
- Correcting identified deficiencies and responding to deficiency notices via the on-line tracking database (***BlueRithm***).

Post Occupancy

The responsibilities of the installing trade contractors (and vendors, as appropriate) include:

- Post occupancy / near-end-of-warranty review with the owner, designer, and CxA.
- Ensuring proper response to warranty items and cooperating with the CxA in executing post occupancy commissioning activities.
- Resolving issues identified during commissioning and correction of identified deficiencies.

Commissioning-related activities of trade contractors are to prepare O&M manuals and submissions to the systems manual and provide training on commissioned systems and assemblies.

COMMISSIONING DOCUMENTS

In order to gain a complete understanding of the design intent and desired functionality of the systems and equipment to be commissioned, the CxA requires several documents from the owner, design team, and contractors. It should be noted that the CxA will view the Contract Documents (plan drawings, specifications, etc.) as taking precedence over any other forms of project documentation.

The documents utilized by the CxA include but are not limited to:

Basis of Design (BOD)

- The Basis of Design is the documented primary decision-making process and assumptions behind design decisions made to meet the Owner's project requirements. It describes the systems, assemblies, conditions, and methods chosen to meet these requirements.

Project Objectives Document (POD)

- The Project Objectives Document is a written document that details the functional requirements of a project and the expectations of how it will be used and operated. This includes project and design goals, measurable performance criteria, budgets, schedules, success criteria, owner's directives, and supporting information. It also includes information to assist the project team to properly plan, design, construct, operate, and maintain systems and assemblies.

Contract Documents

- Contract Documents include all addenda, trade plan drawings, specifications, sequences of operations, etc., as produced by the Architect and/or Engineer of Record and their consultants to obtain construction bids.

Construction Checklists

- Construction checklists are detailed sheets used by the CxA to ensure all equipment is installed per the Contract Documents. These sheets are customized by the CxA for the specific piece of equipment or specific system being commissioned.

Submittals

- Equipment submittals and shop drawings are detailed specification sheets and assembly details of the exact equipment to be installed as part of the project. Submittals and shop drawings are produced by the manufacturer, supplier, or fabricator of the equipment for review and approval by the Architect or Engineer of Record. The CxA also reviews applicable submittals to ensure conformance with the commissioning plan.

Change Orders

- Change Orders are changes to the Contract Documents that occur after a project price has been bid or negotiated. Regardless of the cause, Change Orders can change the scope of the project or affect the commissioning requirements of the project or specific systems.

Manufacturer-Approved Equipment Start-Up Reports

- Equipment manufacturers possess the most detailed knowledge regarding the equipment they provide. All applicable information provided by manufacturers will be incorporated in the commissioning process.

O&M Manuals and Associated Equipment Manufacturers' Documentation

- Operation and Maintenance (O&M) manuals and associated equipment manufacturers' documentation will be used to generate the construction checklists and are key components of the training of operations and maintenance personnel.

Commissioning Plan

- This is an overall plan, developed during design and updated throughout the process that provides the structure, schedule, and coordination planning for commissioning. The Commissioning Plan is updated as the project progresses from pre-design, through design and construction.

Pre-Functional Checklists

- Pre-Functional checklists are detailed sheets created by the CxA and used and filled out by the installing contractors to ensure all important equipment details are included in the installation and proper operation of each piece of equipment. These sheets are customized by the CxA for the specific piece of equipment or specific system being commissioned.

Mock-Ups

- Mock-up (BECx or MEP systems): A system, or component of a system, that is constructed ahead of other similar pieces of equipment that allows the commissioning agent and the installing contractors the ability to evaluate the installation and verify it meets the contract document requirements. It allows early testing of system / equipment applications, user interfaces, component interaction techniques and check out of the building automation logic.

Functional Performance Test Sheets

- Functional Performance Test Sheets (FPTS) are detailed sheets used by the CxA to ensure all important equipment parameters are verified during the initial operation of the equipment for the commissioning process. These sheets are customized by the CxA for the specific piece of equipment or specific system being commissioned.

Indoor Air Quality (IAQ) Assessments

- The acceptance tests and the functional performance tests, together with the documentation requirements of the commissioning process, will allow factors that affect IAQ such as outdoor air ventilation rate, ventilation effectiveness, and contaminant removal and control to be documented and verified.

System Training Manual

- The Systems Training Manual will provide the information needed to understand, operate, and maintain the systems and/or to inform others about the systems. It is to be the repository of all updates and corrections as they occur.

BlueRithm

- BlueRithm is an on-line tracking database and is used by the CxA to track issues and assign responsibility for corrective action. All members of the design / construction / commissioning team will be given access to BlueRithm as required to respond to issues or deficiencies.

Commissioning Notices

- The Commissioning Notice is a report generated by the CxA that identifies the project progress as it relates to building commissioning. The commissioning notice is a summary of current issues from the on-line tracking database (***BlueRithm***). The commissioning notice is distributed to the owner, design team, and responsible contractors, when applicable, at commissioning progress meetings. The commissioning notice identifies and tracks the corrective action of deficiencies identified by the CxA.

Commissioning Reports

- The CxA will write and submit a final commissioning report detailing, for each piece of commissioned equipment or assembly, the adequacy of equipment or assemblies meeting the Contract Documents. The following components are typically included:
    - Description of the project requirements
    - Description of the project specifications
    - Verification of installation (commissioning notices)
    - Functional performance tests sheets
    - O&M documentation evaluation
    - Training program evaluation
    - Value of the commissioning process
    - Outstanding issues
    - Systems manual
    - Post occupancy review

  Noncompliance items will be specifically listed. A brief description of the verification method used (manual testing, trend logs, data loggers, etc.) and observations and conclusions from the testing will be included. The final commissioning report is updated after occupancy / operations-phase commissioning.

SYSTEMS TO BE COMMISSIONED

The following is a list of the equipment and/or systems that will be commissioned, where applicable, in this project:

- Hot Water Heating System: Includes any and all of the following equipment: hot water boilers, heating pumps, heating coils, hydronic balancing, variable frequency drives, controls, valves, unit heaters, cabinet unit heaters, baseboard heaters.
- Cooling Systems: Includes any and all of the following equipment: Chillers, remote evaporators, chilled water pumps, heat exchangers, hydronic balancing, variable frequency drives, valves and controls associated with the central cooling system and stand-alone split DX systems.
- Air-Handling Systems: Includes any and all of the following equipment: As a minimum, all of the air-handling units, return air fans will be thoroughly checked for proper operation and control. The units will be verified for their operation as heating, cooling, and ventilation systems, including outdoor air economizer. Unit shutdown and start-up will be verified.
- Supply Air Distribution Systems: 100% of the installed terminal variable air volume boxes will be tested to provide a thorough evaluation of their operation; all variables will be covered by exposure, occupancy, and critical and sound sensitive areas.

- Exhaust Fans: 100% of the general exhaust fans will be verified for proper operation and their interaction with total building air balance.
- All Direct Digital Controls (DDC) shall be verified for proper operation as they relate to the above equipment including interfaces for remote monitoring. All security and system interlocks associated with the control system shall be commissioned.
- Spot checking of air and water balancing readings including space pressurization.
- Building domestic cold water, hot water, sanitary waste and vent systems, water heaters, emergency eyewash, recirculation pump, backflow preventer assembly and snow melt system.
- Any sump / ejector pumps and leak detection systems.
- Electrical Testing: Typically, the job specifications will purchase the following scope of services regarding electrical equipment testing by the electrical contractor:
    - Grounding systems
    - Security and access control
    - Medium- and low-voltage cables.
    - Panelboards / switchboards.

  It is the intent of our commissioning effort to coordinate and document the testing of the electrical systems only as noted above based on the testing requirements set forth in the Contract Documents.
- Lighting controls, including scheduled systems and occupancy sensors.
- Fire alarm and fire protection system and security interlocks – commissioned only as they relate to the above-named systems such as HVAC shutdown in a fire alarm condition.
- Emergency response radio repeater system.
- Elevators.
- Motor-operated roller shades.
- Building Envelope Systems including the air, thermal, vapor, and drainage planes of the major envelope assemblies including the walls, roof, foundation, slab, and fenestrations, as well as the interfaces between these assemblies.

COMMISSIONING PHASE PROCESS OVERVIEW

Commissioning During Design

Objectives

Design Phase commissioning objectives include the following:

- Identify the scope for the commissioning process.
- Develop a commissioning plan.
- Verify the BOD document against the project requirements.
- Verify plans and specifications against the BOD and project requirements.
- Develop the commissioning plan for the construction and occupancy / operations phases.
- Develop and incorporate commissioning requirements into project specifications.
- Define training requirements for O&M personnel.

- Perform commissioning-focused design reviews.
- Accept the design-phase commissioning process activities.

Additional Commissioning Team Tasks

Additional Design Phase responsibilities of the commissioning team (led by the CxA, who is frequently responsible for these requirements) include the following:

- Build and maintain cohesiveness and cooperation among the project team.
- Assist the owner in preparing requests for project services that outline commissioning roles and responsibilities developed in the commissioning plan.
- Ensure that commissioning activities are clearly stated in all project scopes of work.
- Develop scope and budget for project-specific commissioning process activities.
- Identify specialists who will be responsible for commissioning specific systems and assemblies.
- Conduct and document commissioning team meetings.
- Inform all commissioning team members of decisions that result in modifications to the project requirements.
- Integrate commissioning into the project schedule.
- Track and document issues and deviations relating to the project requirements and document resolutions.
- Write and review commissioning reports.

Commissioning During Construction

Objectives

Commissioning during construction (also known as the ***acceptance phase***) should document and verify that:

- All systems and assemblies are provided and installed as specified.
- All systems and assemblies are started and function properly.
- The systems manual is updated and provided to facility staff.
- Facility staff and occupants receive specified training and orientation.

Additional Commissioning Team Tasks

Pre-Functional Verification

A detailed schedule for all commissioning activities, with specific dates consistent with overall project construction schedule will be developed, with the assistance of the owner's operations and maintenance personnel, to assist the CM in scheduling the responsible subcontractor to assist where necessary.

As part of the pre-functional process, a list of all equipment and systems involved in the commissioning process shall be developed. This list will be compiled based on construction document reviews, shop drawing submittals, and input from the design team and owner. The following most occur prior to the start of functional testing:

- HVAC systems and associated subsystems have been completed, calibrated, and started up and are believed to be operating in accordance with the Contract Documents.

- Automatic control systems have been completed and calibrated and are believed to be operating in accordance with the Contract Documents.
- Testing, adjusting, and balancing procedures have been completed, and all TAB reports have been submitted and reviewed and discrepancies corrected and accepted.
- A statement shall be issued certifying that all work has been completed and equipment and systems are operational in accordance with the Contract Documents.

Based on this list of equipment to be commissioned, pre-start / start-up documentation for all equipment and systems involved in the commissioning process must be provided by the contractors prior to any functional testing. This documentation must include detailed, step-by-step procedures used in the start-up of the equipment and must clearly indicate all manufactures required checkout procedures and evidence that such procedures have been thoroughly completed. This documentation shall also clearly state that such equipment has been put through the appropriate season startup process, conducting the functional performance tests on each piece of equipment and system. Provisions for verifying all relevant data, recording the results obtained, and listing the parties involved in each start-up and checkout must be included in the documentation.

Functional Testing

The CxA will direct the performance of all functional test procedures. The CxA will provide a bi-weekly report or Commissioning Notice of the progress of the functional testing via BlueRithm. The CxA will provide recommendations and moderate meetings with all parties to discuss solutions to any problems identified during the testing. The final testing results for all tests will be included in the CxA's commissioning report which will be submitted to the owner upon completion of the commissioning process.

The owner is recommended to provide time for their operations staff to participate in the functional testing under the supervision of the CxA. The owner will review all weekly reports and Commissioning Notices. When required they will review the functional test reports with the design team and direct the contractors to take corrective action were deemed necessary. As required, the owner will review with all parties any problems identified during the functional testing process. With the design team, the owner will direct appropriate parties to take corrective action to solve problems identified during the testing process.

If so desired by the Owner, the Design Team will assist the Owner in reviewing the CxA's reports. As required, they will review with all parties any issues identified during the functional testing process. With the Owner, the Design Team will direct appropriate parties to take corrective action to solve problems identified during the testing process.

The contractors will assist the CxA in the functional testing by providing the correct personnel when requested by the CxA. The contractors will act in a timely manner to correct any problems described in any of the commissioning reports. The contractors will document all corrective actions taken as noted on the commissioning reports. The contractors will participate in discussions with all parties to determine possible solutions to any problems encountered during the functional testing. As directed by the owner and design team, the contractors will take required actions to correct problems identified during the functional testing process.

Opposite Season / Deferred Functional Testing

The purpose of opposite season or deferred functional testing is to evaluate the performance of selected equipment during design weather conditions that may not have been available during the initial functional testing. Ideally cooling equipment needs to be functionally tested under hot, humid summer conditions to ensure proper operation in accordance with design specifications. The same is true for heating hot water and steam systems of which require colder, winter climates. The testing is to ensure that capacity and control requirements have been met. Any documented construction related problems will be shared with

College of the Holy Cross
Student Townhouses Project

PRE-FUNCTIONAL SYSTEM CHECKLIST

VRF System Fan Coil Units

Contractor	*Company*	*Signature*	*Date*
Mechanical Contractor			
Electrical Contractor			
Controls Contractor			
General Contractor			

PROJECT:	**Student Townhouse Project**	**FCU ID #**	
LOCATION:	**Bldg 1 – Unit 1-AB**		

ITEM	OK	COMMENT
VRF System Fan Coil Units per specification 238129 approved submittal		
Startup completed and report submitted to BVH for review		
Specified equipment ID installed per section 230553-2.1 & 3.2		
Ductwork ID installed per section 230553-2.4 & 3.4		
Adequate access for servicing all components		
Unit is securely supported with threaded rods		
Disconnect switch installed and operation verified		
Fan rotation verified		
Duct insulation completed		
Ductwork installation completed		
Ductwork flexible connections installed per 233300-3.1-G		
Piping insulation completed		
Piping ID installed per section 230553-2.3 & 3.3		
Balancing completed and report submitted		
All controls programming completed and point-to-point checkouts sent to BVH for review		
All safeties and alarms programmed, installed and operating		
COMMENTS:		

College of the Holy Cross
Student Townhouses Project

PRE-FUNCTIONAL SYSTEM CHECKLIST

VRF System Condensing Unit

Contractor	*Company*	*Signature*	*Date*
Mechanical Contractor			
Electrical Contractor			
Controls Contractor			
General Contractor			

PROJECT:	**Student Townhouse Project**	**Equipment ID #**	**ACCU**
LOCATION:			

ITEM	OK	COMMENT
VRF System Condensing Unit per specification 238129 approved submittal		
Startup completed and report submitted to BVH for review		
Specified equipment ID installed per section 230553-2.1 & 3.2		
Adequate access for servicing all components		
Unit installed on cast-in-place concrete equipment base		
Unit is securely supported on stand		
Vibration isolation installed		
Wind baffle, louver or hood installed		
Disconnect switch installed and operation verified		
Fan rotation verified		
Piping insulation completed		
UV protection installed on exterior piping insulation		
Piping ID installed per section 230553-2.3 & 3.3		
Building penetrations sealed		
All controls programming completed and point-to-point checkouts sent to BVH for review		
All safeties and alarms programmed, installed and operating		
COMMENTS:		

PROJECT:	Student Townhouse Project	Equipment ID #	ACCU
LOCATION:			

ITEM	OK	COMMENT

College of the Holy Cross
Student Townhouses Project

PRE-FUNCTIONAL SYSTEM CHECKLIST

VRF System Energy Recovery Ventilator

Contractor	*Company*	*Signature*	*Date*
Mechanical Contractor			
Electrical Contractor			
Controls Contractor			
General Contractor			

PROJECT: **Student Townhouse Project** **Equipment ID #**

LOCATION:

ITEM	OK	COMMENT
VRF System Energy Recovery Ventilator per specification 238129-2.6 approved submittal		
Startup completed		
All electrical connections completed		
Specified equipment ID installed per section 230553-2.1 & 3.2		
Ductwork ID installed per section 230553-2.4 & 3.4		
Adequate access for servicing all components		
Unit is securely mounted		
Vibration isolation installed		
Disconnect switch installed and operation verified		
Fan rotation verified		
Clean filters installed		
Ductwork completed		
Ductwork flexible connections installed per 233300-3.1-G		
Ductwork insulation completed		
Duct liner installed – not required on exhaust per RFI 18		
Motorized dampers installed and moves freely		
Volume dampers installed		
Fire smoke dampers installed and tested with local authority		
Louvers installed per detail 7 on M201		

PROJECT:	Student Townhouse Project	Equipment ID #	
LOCATION:			

ITEM	OK	COMMENT
Balancing completed and report submitted		
All controls programming completed and point-to-point checkouts sent to BVH for review		
All safeties and alarms programmed, installed and operating		
COMMENTS:		

College of the Holy Cross
Student Townhouses Project

PRE-FUNCTIONAL SYSTEM CHECKLIST

VRF System Branch Controller

Contractor	*Company*	*Signature*	*Date*
Mechanical Contractor			
Electrical Contractor			
General Contractor			

PROJECT:	**Student Townhouse Project**	**Equipment ID #**	**BC-1-1**
LOCATION:	**Bldg 1-Unit 1-AB**		

ITEM	OK	COMMENT
VRF System Branch Controller per specification 238129 approved submittal		
Startup completed and report submitted to BVH for review		
Specified equipment ID installed per section 230553-2.1 & 3.2		
Adequate access for servicing all components		
Disconnect switch installed and operation verified		
Unit is securely supported		
Isolation valve installed upstream of unit		
Isolation valves installed on each circuit		
Drain piping completed		
Piping insulation completed		
Piping ID installed per section 230553-2.3 & 3.3		

COMMENTS:

College of Holy Cross – Student Townhouses Project
Worcester, MA
Date: 7/31/2023

VRF System
(Serving Building 2- Unit-AB)
Condensing Unit – ACCU-1
Energy Recover Ventilator – ERV-1
Fan Coil Units
Branch Selector – BC-2-1

FUNCTIONAL PERFORMANCE TEST – RECORD SHEET

A. Documentation Requirements

Prior to the functional performance test and verification process, the Commissioning Agent requires the following documentation:

1. Balancing Report
2. Operations and Maintenance Data
3. Completed Pre-Functional Checklists
4. Verify Owner Training is Complete or Scheduled

B. System Components

Prior to the functional performance and verification process, the Commissioning Agent shall verify all major system components, capacities, configurations and support functions are consistent with the design or documentation received. The following shall be verified:

1. Unit Identification

   Manufacturer: Mitsubishi
   FCU Model: Varies (see submittal)
   Condenser Model: PURY-HP120TNU-A
   Branch Selector Model: CMB-P1016NU-J1

2. ERV Identification

   Manufacturer: Lossnay
   Model: LGH-F470RVX2-E

3. Verify equipment start-up service on all equipment has been completed and report submitted.

   Compliance: X
   Non-compliance: ____

   Remarks:

4. Verify installation of central master controller (record location).

   Compliance: X
   Non-compliance: ____

   Remarks: ***Panel located in IT closet B102***

5. Verify the installation of ***Condensing Units*** per approved submittal and specification 238129:			
	Yes		***No***
ACCU-1			
Unit is installed with ample amount of access for maintenance and repair of all components.	X		
Equipment is labeled per specification section 230553-2.1 & 3.2	Note		
Unit is installed level and plumb	X		
Unit installed on cast-in-place concrete equipment bases	X		
Unit installed on stand	X		
Vibration isolation installed – pads installed under supports	X		
Building penetrations sealed	X		
Refrigerant insulation completed (UV coating provided) – UV has been taped over to strap liquid and suction lines together	X		

Remarks: ***Sticker provided on unit. Engraved tag required per spec.***
8/11/23: ID of units was determined and accepted by Holy Cross

6. Verify the installation of ***Indoor Units (FCUs, BCC, ERV)*** per approved submittal and specification 238129:			
	Yes		***No***
ERV-R-01			
Unit securely supported	X		
Ductwork installation completed – flexible duct connectors installed connecting duct to unit	X		
Ductwork insulation installed so that vapor barrier is maintained - Insulation maintained through wall or ceiling penetrations	X		
Disconnect switch installed	X		
Clean filters installed	X		
BCC-2-01			
Unit is securely supported	X		
Piping connections completed	X		
All piping insulation completed - Insulation maintained through wall or ceiling penetrations	X		
FCU-1.1 (Kitchen A105)			
Unit securely supported with threaded rods	X		
Ductwork installation completed	X		
Ductwork insulation installed so that vapor barrier is maintained - Insulation maintained through wall or ceiling penetrations	X		
Volume damper(s) installed - Access to volume dampers was very limited for many	Note		
Clean filter installed	X		
Piping connections completed	X		
All piping insulation completed - Insulation maintained through wall or ceiling penetrations	X		
Condensate line installed – confirm proper drainage	X		
Drain pan level sensor installed	X		
Disconnect switch installed	X		

Space controller installed – verify calibration **Measured: 67.2** **Sensor:67.0**	X		
FCU-1.2 (Living Room A105)			
Unit securely supported with threaded rods	X		
Ductwork installation completed	X		
Ductwork insulation installed so that vapor barrier is maintained - Insulation maintained through wall or ceiling penetrations	X		
Volume damper(s) installed - Access to volume dampers was very limited for many	Note		
Clean filter installed	X		
Piping connections completed	X		
All piping insulation completed - Insulation maintained through wall or ceiling penetrations	X		
Condensate line installed – confirm proper drainage	X		
Drain pan level sensor installed	X		
Disconnect switch installed	X		
Space controller installed – verify calibration - Shares t-stat with 1.1	X		
FCU-1.3 (NW Bedroom A101)			
Unit securely supported with threaded rods	X		
Ductwork installation completed	X		
Ductwork insulation installed so that vapor barrier is maintained - Insulation maintained through wall or ceiling penetrations	X		
Volume damper(s) installed - Access to volume dampers was very limited for many	Note		
Clean filter installed	X		
Piping connections completed	X		
All piping insulation completed - Insulation maintained through wall or ceiling penetrations	X		
Condensate line installed – confirm proper drainage	X		
Drain pan level sensor installed	X		
Disconnect switch installed	X		
Space controller installed – verify calibration **Measured: 67.1** **Sensor: 67.0**	X		
FCU-1.4 (N Bedroom A102)			
Unit securely supported with threaded rods	X		
Ductwork installation completed	X		
Ductwork insulation installed so that vapor barrier is maintained - Insulation maintained through wall or ceiling penetrations	X		
Volume damper(s) installed - Access to volume dampers was very limited for many	Note		
Clean filter installed	X		
Piping connections completed	X		
All piping insulation completed - Insulation maintained through wall or ceiling penetrations	X		
Condensate line installed – confirm proper drainage	X		

Drain pan level sensor installed	X		
Disconnect switch installed	X		
Space controller installed – verify calibration **Measured: 67.2** **Sensor: 67.0**	X		
FCU-1.6 (SE Bedroom A103)			
Unit securely supported with threaded rods	X		
Ductwork installation completed	X		
Ductwork insulation installed so that vapor barrier is maintained - Insulation maintained through wall or ceiling penetrations	X		
Volume damper(s) installed - Access to volume dampers was very limited for many	Note		
Clean filter installed	X		
Piping connections completed	X		
All piping insulation completed - Insulation maintained through wall or ceiling penetrations	X		
Condensate line installed – confirm proper drainage	X		
Drain pan level sensor installed	X		
Disconnect switch installed	X		
Space controller installed – verify calibration **Measured: 68.1** **Sensor: 68.0**	X		
FCU-1.8 (Living Room B203)			
Unit securely supported with threaded rods	X		
Ductwork installation completed	X		
Ductwork insulation installed so that vapor barrier is maintained - Insulation maintained through wall or ceiling penetrations	X		
Volume damper(s) installed - Access to volume dampers was very limited for many	Note		
Clean filter installed	X		
Piping connections completed	X		
All piping insulation completed - Insulation maintained through wall or ceiling penetrations	Note		
Condensate line installed – confirm proper drainage	X		
Drain pan level sensor installed	X		
Disconnect switch installed	X		
Space controller installed – verify calibration - Shares t-stat with 1.7	X		
FCU-1.9 (NW Bedroom B201)			
Unit securely supported with threaded rods	X		
Ductwork installation completed	X		
Ductwork insulation installed so that vapor barrier is maintained - Insulation maintained through wall or ceiling penetrations	X		
Volume damper(s) installed - Access to volume dampers was very limited for many	Note		
Clean filter installed	X		
Piping connections completed	X		

All piping insulation completed - Insulation maintained through wall or ceiling penetrations	Note		
Condensate line installed – confirm proper drainage	X		
Drain pan level sensor installed	X		
Disconnect switch installed	X		
Space controller installed – verify calibration **Measured: 67.3** **Sensor: 67.0**	X		
FCU-1.10 (NE Bedroom B201)			
Unit securely supported with threaded rods	X		
Ductwork installation completed	X		
Ductwork insulation installed so that vapor barrier is maintained - Insulation maintained through wall or ceiling penetrations	X		
Volume damper(s) installed - Access to volume dampers was very limited for many	Note		
Clean filter installed	X		
Piping connections completed	X		
All piping insulation completed - Insulation maintained through wall or ceiling penetrations	Note		
Condensate line installed – confirm proper drainage	X		
Drain pan level sensor installed	X		
Disconnect switch installed	X		
Space controller installed – verify calibration **Measured: 67.2** **Sensor: 67.0**	X		
FCU-1.11 (SW Bedroom B202)			
Unit securely supported with threaded rods	X		
Ductwork installation completed	X		
Ductwork insulation installed so that vapor barrier is maintained - Insulation maintained through wall or ceiling penetrations	X		
Volume damper(s) installed - Access to volume dampers was very limited for many	Note		
Clean filter installed	X		
Piping connections completed	X		
All piping insulation completed - Insulation maintained through wall or ceiling penetrations	Note		
Condensate line installed – confirm proper drainage	X		
Drain pan level sensor installed	X		
Disconnect switch installed	X		
Space controller installed – verify calibration **Measured: 67.1** **Sensor: 67.0**	X		
FCU-1.12 (SE Bedroom B202)			
Unit securely supported with threaded rods	X		
Ductwork installation completed	X		
Ductwork insulation installed so that vapor barrier is maintained - Insulation maintained through wall or ceiling penetrations	X		

Volume damper(s) installed - Access to volume dampers was very limited for many	Note		
Clean filter installed	X		
Piping connections completed	X		
All piping insulation completed - Insulation maintained through wall or ceiling penetrations	Note		
Condensate line installed – confirm proper drainage	X		
Drain pan level sensor installed	X		
Disconnect switch installed	X		
Space controller installed – verify calibration **Measured: 67.2** **Sensor: 67.0**	X		

Remarks: ***Piping insulation needs review. Condensate drain sweating with really warm temperatures above ceiling on many units. Connections are also sweating. Issue posted on procore.***

C. Functional Performance Tests

1. Verify operation of the following functions: *Cooling and heating setpoints are adjustable by end user.*			
	Yes		***No***
FCU-1.1 (Kitchen A105) & FCU-1.2 (Living Room)			
Space temperature control – Heating	X		
Space temperature control – Cooling	X		
Fan speed control (Auto/low/medium/high)	X		
Drying mode	X		
Airflow direction	X		
Verify setback capabilities	X		
Verify scheduling capabilities	X		
Drain pan level sensor – shut unit off and alarm	X		
Unit communication alarm	X		
Space temperature alarm - +/- 5 degrees from setpoint Critical if below 50 degrees	X		
FCU-1.3 (NW Bedroom A101)			
Space temperature control – Heating	X		
Space temperature control – Cooling	X		
Fan speed control (Auto/low/medium/high)	X		
Drying mode	X		
Airflow direction	X		
Verify setback capabilities	X		
Verify scheduling capabilities	X		
Drain pan level sensor – shut unit off and alarm	X		
Unit communication alarm	X		
Space temperature alarm - +/- 5 degrees from setpoint Critical if below 50 degrees	X		
FCU-1.4 (N Bedroom A102)			
Space temperature control – Heating	X		
Space temperature control – Cooling	X		

Fan speed control (Auto/low/medium/high)	X		
Drying mode	X		
Airflow direction	X		
Verify setback capabilities	X		
Verify scheduling capabilities	X		
Drain pan level sensor – shut unit off and alarm	X		
Unit communication alarm	X		
Space temperature alarm - +/- 5 degrees from setpoint Critical if below 50 degrees	X		
FCU-1.6 (SE Bedroom A103)			
Space temperature control – Heating	X		
Space temperature control – Cooling	X		
Fan speed control (Auto/low/medium/high)	X		
Drying mode	X		
Airflow direction	X		
Verify setback capabilities	X		
Verify scheduling capabilities	X		
Drain pan level sensor – shut unit off and alarm	X		
Unit communication alarm	X		
Space temperature alarm - +/- 5 degrees from setpoint Critical if below 50 degrees	X		
FCU-1.9 (NW Bedroom B201)			
Space temperature control – Heating	X		
Space temperature control – Cooling	X		
Fan speed control (Auto/low/medium/high)	X		
Drying mode	X		
Airflow direction	X		
Verify setback capabilities	X		
Verify scheduling capabilities	X		
Drain pan level sensor – shut unit off and alarm	X		
Unit communication alarm	X		
Space temperature alarm - +/- 5 degrees from setpoint Critical if below 50 degrees	X		
FCU-1.10 (NE Bedroom B201)			
Space temperature control – Heating	X		
Space temperature control – Cooling	X		
Fan speed control (Auto/low/medium/high)	X		
Drying mode	X		
Airflow direction	X		
Verify setback capabilities	X		
Verify scheduling capabilities	X		
Drain pan level sensor – shut unit off and alarm	X		
Unit communication alarm	X		
Space temperature alarm - +/- 5 degrees from setpoint Critical if below 50 degrees	X		
FCU-1.11 (SW Bedroom B202)			
Space temperature control – Heating	X		
Space temperature control – Cooling	X		
Fan speed control (Auto/low/medium/high)	X		

Drying mode	X		
Airflow direction	X		
Verify setback capabilities	X		
Verify scheduling capabilities	X		
Drain pan level sensor – shut unit off and alarm	X		
Unit communication alarm	X		
Space temperature alarm - +/- 5 degrees from setpoint Critical if below 50 degrees	X		
FCU-1.12 (SE Bedroom B202)			
Space temperature control – Heating	X		
Space temperature control – Cooling	X		
Fan speed control (Auto/low/medium/high)	X		
Drying mode	X		
Airflow direction	X		
Verify setback capabilities	X		
Verify scheduling capabilities	X		
Drain pan level sensor – shut unit off and alarm	X		
Unit communication alarm	X		
Space temperature alarm - +/- 5 degrees from setpoint Critical if below 50 degrees	X		

Remarks:

2. Verify the following airflows:
   - FCUs will be spot checked for design OA from ERV and EA in bathrooms.

Compliance: Notes
Non-compliance:

Remarks: ***Airflows spot checked as required per contract. Not verified on this building.***

3. Verify the following operation and monitoring at central control:			
	Yes		***No***
Each FCU Unit Status – ON/OFF	X		
Each FCU Fan Speed	X		
Each FCU Filter Status & Reset	X		
Each FCU Airflow Direction	X		
Each FCU Alarm Status	X		
Each FCU Operation Mode – (Auto/Dry/Heat/Cool/Fan)	X		
Each Space Temperature	X		
Each Space Temperature Setpoint and Setback	X		
Scheduling Capability	X		
Alarm Logs Accurate	X		
ERV Status and Alarm – alarm code 4116 for fan failure	X		
FCU Controller Communication Alarm – alarm code 6831	X		
FCU Drain Pan Alarm – alarm code 5701	X		

Condensing Unit Alarm – various alarms for condensing failure. Tested temp sensor failures for OA and Pipe – alarm code 5102 and 5113 identified by address, and FCUs on associated unit will shut down and indicate a failure of that system.	X		

Remarks: ***Condensing unit ID not in controller. Contractor to advise***

4. Verify the following information is available and accurate at the facilities workstation:			
	Yes		***No***
Unit ID and Space Served	X		
Space Temperature	X		
Space Temperature Setpoint	X		
FCU Unit Mode	X		
FCU Fan Status	X		
FCU Fan Speed	X		
Compressor Status – alarm of compressor shows as sensor failure and will show alarm code noted above on thermostat and all units on that compressor will be in alarm	Note		
ERV Filter Status	X		
ERV Status	X		
ERV Fan Speed	X		
Forced off – shuts system down	X		
Alarms and Error detail	X		
Trending	X		

Remarks: ***Reviewing with Homans and BCM if condensing unit point is available or the way the alarm comes in for all FCUs associated with the condensing unit is sufficient.***

Appendix A

Must be submitted separate from the proposal response.

Fee Proposal Form: New Westhill High School - Commissioning Agent Services

Please complete your fee in yellow highlighted cells below.

Phase	Fee ($) Lump Sum amount	Notes
I) Design / Pre-Construction Services		
Develop / Maintain OPR (including multiple meetings as required) - 5.1.1 and 5.1.2	$ 5,380.00	
Review/Comment/Advise/Strategize on Design Team's Basis of Design, Energy Model, EUI target - 5.1.3	$ 3,105.00	
Attendance and participation in Energy Design Charrettes (SD, DD) - 5.1.4	$ 1,380.00	
Participate in integrated design and LEED meetings - 5.1.5	$ 1,380.00	
Design review, comments, and review meeting – DD's - 5.1.6 & 5.1.8	$ 7,860.00	
Design review, comments, and review meeting – CD's - 5.1.7 & 5.1.8	$ 9,170.00	
Final back-check of all comments - 5.1.9	$ 3,310.00	
Conduct controls integration meeting - 5.1.10	$ 3,105.00	
Develop commissioning plan - 5.1.11	$ 4,345.00	
Develop Cx Specifications - 5.1.12	$ 1,310.00	
Utility Grant Incentive Meetings, Documentation, Coordination - 5.1.13	$ 4,620.00	
Pre-bid meeting and bidding question responses - 5.1.14	$ 1,310.00	
SUB-TOTAL	**$ 46,275.00**	Notes 1-7 Apply Throughout
II) Construction Phase Services		
Conduct pre-envelope/pre-mechanical kickoff construction meetings (2 meetings) 5.2.1	$ 7,015.00	
Site Visits/Field Reports (20 visits) - 5.2.2	$ 38,500.00	
GeoExchange Field Observations - 5.2.3	$ 9,240.00	
Develop/Track/Verify Construction Checklists - 5.2.4	$ 13,410.00	
Conduct Construction Phase Meetings (24 meetings) - 5.2.5	$ 17,240.00	
Submittal / Change Order reviews - 5.2.6	$ 9,880.00	
Functional test execution and documentation - 5.2.7	$ 192,500.00	
Review/Verify Balancing Report - 5.2.8	$ 1,540.00	
Coordinate Blower Door testing - 5.2.9	$ 2,400.00	
Coordinate Envelope Fog testing (5 tests) - 5.2.10	$ 6,200.00	
Coordinate Additional Envelope testing (5 tests) - 5.2.11	$ 6,200.00	
Oversee Megger testing by Electrical Contractor - 5.2.12	$ 2,310.00	
Systems manual development - 5.2.13	$ 8,020.00	
O&M manual review and training review - 5.2.14	$ 2,930.00	
CTHPB Pre-Occupancy Letter/Report - 5.2.15	$ 770.00	
SUB-TOTAL	**$ 318,155.00**	Notes 1-7 Apply Throughout
III) Occupancy and Operations Phase Services		
Seasonal testing - 5.3.1	$ 6,245.00	
Final Cx Process Report - 5.3.2	$ 5,070.00	
Near-warranty end review - 5.3.3	$ 9,410.00	
Measurement and Verification (12 Months) including monthly data gathering and evaluations - 5.3.4	$ 18,480.00	
Final CTHPBS checklists and letters - 5.3.5	$ 2,010.00	
Final Utility incentive documentation/coordination/submission - 5.3.6	$ 3,550.00	
SUB-TOTAL	**$ 44,765.00**	Notes 1-7 Apply Throughout
TOTAL FEE	**$ 409,195.00**	**See Notes 1 to 7**
Provide Project Team Hourly Rates As A Separate Attachment. Include the methodology for increasing rates due to annual cost of living increases or similar throughout the life of the projects.		
Provide Unit Cost for Additional Site Visits During Constructior	$ 1,540.00	

If the Proposer believes the owner should anticipate a different quantity of site visits during construction, explain here (including quantity)	$	-
Provide Unit Cost for Conductiong Additional Cx Meeings During Construction	$	770.00
If the Proposer believes the owner should anticipate a different quantity of Cx meetings during construction, explain here (including quantity)	$	-
Provide Unit Cost for Additional Test Oversight During Construction	$	1,540.00
Provide Unit Cost for Additional Virtual Meetings	$	770.00

Notes:
1) Proposer's Total Fee shall be a lump sum fee tied to the scope of work herein, not construction cost.

2) Fees are inclusive of any and all meetings required to meet project deliverables and provide proper owner updates, including, but not limited to, periodic school building committee meetings, internal project team meetings, end user working meetings, city leadership meetings, utility grant meetings, and informal discussions as required.

3) LEED Silver Certification and CTHBC documentation are both required (to be led by Architect with participation from CxA).
4) The Owner anticipates at least one early bid package, defined as a separate construction package of select scopes/trades that would normally be bid as part of the main building construction package. The early package is separate from the other OSCGR bid packages (main construction, FFE, IT/AV, Demo/Hazmat) that will need to be developed by the architect. It is not anticipated that early bid packaging will cause an increase in the review burden for the Commissioning Agent (e.g., an early procurement package would be comprised of components that would otherwise be included in the main construction package, and would require review anyways).

5) All fees and unit rates shall contemplate the general timeline for the project. Fees shall be inclusive of anticipated proposer rates/costs across the duration of the project.

6) All costs for travel to and from project sites, food, telephone, postage, data transfer, photographs, printing for Owner use (up to 6 copies of all documents), insurance premiums, and similar expenses shall be included as part of basic services fee and will not be reimbursed by the Owner.

7) All fees above are intended to represent the 'stand alone' value of the anticipated work. Should the Owner elect to forgoe a given service, that amount shall be deducted 100% from the contract value.

Signature: Thomas St. Denis

E-Mail Address: tom.stdenis@salasobrien.com

Company Name and Address: BVH Integrated Services, a Salas O'Brien Company

RFP No. 2024.0194

General Notes for CxA (including any contract commentary):
Proposing firm shall provide all commentary and/or exceptions to the draft contract with this proposal. Failure to provide commentary and/or exceptions shall by constituted by the Owner as the CxA's indication that they have "No commentary or Exceptions" to the contract documents and terms therein.

We take no exceptions to the draft contract.	

BVH Integrated Services, Inc., a Salas O'Brien company

2024 Hourly Rates

Principal-In-Charge	$ 280.00
Associate Vice President and Director	$ 250.00
Project Manager	$ 230.00
Commissioning Project Manager	$ 225.00
Senior Engineer / Senior Designer	$ 205.00
Technology Designer	$ 180.00
Contract Administration	$ 170.00
Engineer / Designer	$ 165.00
Commissioning Provider	$ 165.00
CADD / Revit Technician	$ 140.00
Clerical	$ 100.00

** Hourly rates are reviewed and adjusted on a yearly basis*

Adam Levitus

From: Jon Haehnel <jon.haehnel@salasobrien.com>
Sent: Friday, January 26, 2024 10:41 AM
To: Michael Gannon; LoBalbo, Katherine; Mark, Brandon; Charles Warrington; Tramontozzi, Domenick; Smith, Michael; Larson, Erik
Subject: RE: 2024.0194 City RFP – Commissioning Agent Services for New Westhill High School - Salas

All,
Following up on the alternate pricing for us to perform the fog testing instead of coordinate and witness the fog testing in the base scope. The cost per day for our team to perform fog testing is $3,375 vs. the cost per day to coordinate and witness it is $1,300.

Pleasure meeting all of you, please reach out if you have any questions.

Sincerely,

JON HAEHNEL, CEI, BPI- BA, ES, CABS
Associate Vice President | Director, Building Envelope Services

O 860.760.7506
C 802.522.9713
E jon.haehnel@salasobrien.com

Salas O'Brien

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From: Michael Gannon <michael.gannon@salasobrien.com>
Sent: Thursday, January 25, 2024 3:31 PM
To: LoBalbo, Katherine <KLoBalbo@StamfordCT.gov>; Mark, Brandon <BMark@StamfordCT.gov>; Charles Warrington <Charles.Warrington@collierseng.com>; Tramontozzi, Domenick <DTramontozzi@StamfordCT.gov>; Smith, Michael <MSmith@StamfordCT.gov>; Larson, Erik <ELarson@StamfordCT.gov>
Cc: Jon Haehnel <jon.haehnel@salasobrien.com>
Subject: RE: 2024.0194 City RFP – Commissioning Agent Services for New Westhill High School - Salas

Thank you again for your time this morning. I hope Jon and I were able to answer your questions satisfactorily. Attached, please find a listing of the references provided with the proposal with email addressed included. Contact correction has been updated for the Southington Schools. Additional references have been provided in case the originals are unresponsive. Please keep in mind that these references may still know us as BVH – so Salas O'Brien may not sound familiar.

Also attached is a link to allow you to download the annotated drawings that accompany the BECx peer review comment spreadsheet that was included with the proposal. The drawings are too large to email.

Jon and I will provided the additional pricing that was requested in a separate email later today or tomorrow.

Please feel free to reach out with any additional questions.

Thanks, Mike

MICHAEL GANNON, PE, CCP, CEM, LEED AP
Associate Vice President | Commissioning Project Manager

O 860.760.7467
C 860.539.8048
E michael.gannon@salasobrien.com

Salas O'Brien

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-----Original Appointment-----
From: Larson, Erik <ELarson@StamfordCT.gov>
Sent: Saturday, January 20, 2024 1:29 PM
To: Larson, Erik; Smith, Michael; LoBalbo, Katherine; Tramontozzi, Domenick; Mark, Brandon; Charles Warrington; Michael Gannon
Subject: 2024.0194 City RFP – Commissioning Agent Services for New Westhill High School - Salas
When: Thursday, January 25, 2024 9:00 AM-10:00 AM (UTC-05:00) Eastern Time (US & Canada).
Where: Microsoft Teams Meeting

Mr. Gannon:

We would like to have a follow up meeting with you to review elements of your fee proposal.

Please confirm your availability.

Erik

Microsoft Teams meeting

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