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

#### State of West Virginia **Solicitation Response**

Proc Folder:	1644514				
Solicitation Description:	escription: Martinsburg Readiness Center Design Commissioning Services				
Proc Type:	Central Purchase	Central Purchase Order			
Solicitation Closes		Solicitation Response	Version		
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00000208495 ZDS LIMITED LIABILITY COMPANY							
Solicitation Number:	CEOI 0603 ADJ2500000019						
Total Bid:	0	Response Date:	2025-03-24	Response Time:	15:02:14		
Comments:							

FOR INFORMATION CONTACT THE BUYER
David H Pauline
304-558-0067
david.h.pauline@wv.gov

Vendor

Signature X

FEIN#

DATE

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

Line	Comm Ln Desc		Qty	Unit Issue	Unit Price	Ln Total Or Contract An	nount
1	1 Martinsburg Readiness Center Design Commissioning Services					0.00	
Comm	Code	Manufacturer		Specifica	ation	Model #	
811015	508						

#### **Commodity Line Comments:**

#### **Extended Description:**

Provide professional architectural and engineering design services per the attached documentation.







Expression of Interest to Provide Professional Engineering Commissioning Services

Martinsburg Readiness Center Addition/Alteration

> CEOI 0603 ADJ2500000019 March 25, 2025

MECHANICAL / ELECTRICAL / IAQ / ENERGY / COMMISSIONING

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# SECTION I.

## **Executive Summary Letter Project Goals & Objectives**





MECHANICAL • ELECTRICAL • INDOOR AIR QUALITY • ENERGY • COMMISSIONING • FORENSIC

March 24, 2025



WV Department of Administration Purchasing Division 2019 Washington Street, East Charleston, WV 25305-0130

Please accept our Expression of Interest to provide Professional Engineering Commissioning Services for the **Martinsburg Readiness Center Addition/Alteration**.

**ZDS Design/Consulting Services** was founded in 1994 with Corporate Offices located at 135 Corporate Center Drive, Suite 532, Scott Depot, WV 25560. The project will be assigned to **ZDS'** principal-in-charge of planning/design, who will follow the Project from inception through completion and has full authority to execute a binding contract on behalf of **ZDS**: **Todd A. Zachwieja, PE, CEM, LEED AP – Principal and CEO** of **ZDS Design/Consulting Services**: 304-755-0075; Fax: 304-755-0076; Mobile: 304-545-4550; Todd.Zachwieja@ZDSDesign.com; www.ZDSDesign.com



We will provide MEP Commissioning Services for the proposed Martinsburg Readiness Center Addition/Alternation. Our proposed Team of professionals has a history of successful projects, including hundreds of facilities within West Virginia and surrounding states. Our team has engineers in Morgantown and Columbia, MD, and in our corporate offices near Charleston, WV. ZDS has commissioned, designed and coordinated upgrades for projects of all sizes, budgets, and schedules. We have managed new construction and renovation projects through dialogue and proper planning with the Owners and Contractors to phase the work successfully and minimize the impact on the occupants' daily activities. We will communicate closely with the appropriate WVArNG representative(s) to ensure that our approach to the Project will address your needs and concerns. Realizing the similarity of our mission and the desire to serve West Virginia clients, we will be honored to work with you.

The total number of Design/Commissioning projects exceeds 4,000 when looking at the work of our companies with the project costs ranging from less than \$10 million to over \$1 billion. Our professionals are dedicated to performing quality services while considering our client's needs, scheduling, and budgets. Our Team carries liability insurance coverage in compliance with local and state laws and proof of Insurance can be provided as necessary to fulfill the requirements of this project.

The Team's combined Services encompass many projects and complex systems, including High Performance and LEED projects. Some recent Peer Review/Commissioning projects include \$33 million Bldg. #1, #3 & #4 renovations at the WV Capitol Complex, \$43 million LEED Silver Certified maintenance hangar/fuel cell facility for the West Virginia Air National Guard at Yeager Airport, a LEED Gold Certified Research facility for Harvard University, and a \$45 million addition and renovations to William R. Sharpe, Jr. Hospital for the WV Dept of



Health and Human Resources, Weston, WV. We also provide those services for many commercial facilities, schools, hospitals, government agencies, and universities.

**FDE** has provided commissioning services on thousands of commissioning projects, including projects of \$1 billion and more in construction value. They employ over 60 engineers and commissioning specialists, and they can play a valuable role in teaming with

**ZDS**. **FDE** provided commissioning services for the Marine Corps Base in Kaneohe Bay, Hawaii, covering 669,000 sq. ft.; Strathmore Concert Hall, North Bethesda, Maryland; \$40 million LEED Gold Certified VCU Monroe Park Campus Cary Street Gym in Richmond, Virginia; University of Mary Washington Anderson Center located in Fredericksburg, Virginia; and the 180,000 sq. ft. Pauley Pavilion renovation with a 60,000 sq. ft. expansion for the University of California, Los Angeles, California which is expected to receive a LEED Certification. **FDE** is also the prime commissioning agent for the 710,000 sq. ft. National Bio and Agro-Defense Facility in Manhattan, Kansas. This project is ongoing and has a budget of \$850 million.

#### **PROJECT GOALS & OBJECTIVES**

2.1. Attend pre-design, design, construction, and post-construction meetings as pertains to duties outlined in ASHRAE 189.1 Section 10.3.1.2:

✓ The Cx process for the project begins in design as FDE works with ZDS and the State of West Virginia/WVArNG to review the Owner Project Requirements (OPR) as it pertains to the Basis of Design (BOD). These documents serve as the basis for the peer review of the Construction Documents. We also take this exercise as an opportunity to learn the Owner's expectations and objectives for our Cx process so we can tailor the process to their specific needs. Meetings will be attended, and site visits will be performed, as required, to fulfill the scope of the services during planning, design document preparation, construction activities, and post-construction/occupancy, including trend logging and off-season testing to meet the ASHRAE 189.1 section 10.3.1.2 requirements.

2.2. Conduct reviews of the design documents to ensure compliance with the Owner's project requirements and the project specifications:

✓ The design services include peer reviews of the Construction Documents at specific milestones for Peer Review comments and meeting ASHRAE 189.1 10.3.1.2 requirements. We can also provide the Cx specifications for areas within our scope of services. Our peer review focuses on coordinating the mechanical and electrical systems, focusing on the controls and sequences of operation, which historically have been where many challenges have occurred. We aim to assist the team in providing clear and precise documents while providing solid, unambiguous directions on the commissioning process to the contractors.

We also focus on building detail into the commissioning specifications for key deliverables to ensure adequate documentation for the Owner. Our Team's services will provide an independent and objective technical review of the project's design, or a part thereof, conducted at specified stages of design completion by one or more qualified professionals to enhance the quality of the design and to confirm compliance with the OPR and BOD. We include an example of a Peer Review for a government project in Section V. Generally, the Owner and design team will develop the Owner's Project Requirements (OPR), and the Basis of Design (BOD) during predesign, and updates will occur throughout the design process as needed. We will review the OPR and BOD to identify any conflicting requirements between the documents and will provide professional judgment on whether there is adequate detailed information for the project to be undertaken. A peer review may include specific focus areas that are of expressed concern and may also include a constructability review, which is the review of effective and timely integration of construction knowledge into the conceptual planning, design, construction, and field operation of a project to achieve project objectives efficiently and accurately at cost-effective levels to reduce or prevent errors, delays, and cost overruns. Constructability reviews will cover installation concerns, proper sequence, and scope where construction phasing is described in contract documents, as well as the details in specifying integration between systems.

2.3. Develop a commissioning plan for testing of equipment, systems, and controls as outlined in ASHRAE 189.1 Section 10.3.1.2:

ZDS and FDE can engage in the project immediately upon award. We will develop a Cx Plan to outline the responsibilities of non-construction contract entities. For commissioning work, we discuss precedent schedules with the owner Team and other stakeholders regarding areas of importance during the project planning and construction phase, working with them to insert the commissioning requirements into the master schedule. We are experienced in project management tools, using Newforma and other project software for data, schedule, and resource management. While we understand the challenges associated with multiple subcontractors working side by side on the same systems, our process strives to limit the time spent testing partially completed systems. We will coordinate with the contractors to optimize our functional testing sequencing when requested to test partial systems. For example, if the heating water systems are operational but the cooling water systems are still incomplete, we would request that we are not limited to testing just one AHU but rather test multiple systems (AHUs, FCUs, VAV boxes, etc.) on the heating sequences. We would then wait until the cooling systems are fully complete and operational and then similarly test multiple systems. The ASHRAE 189.1 standard is essentially equivalent to the LEED Enhanced Commissioning requirements. FDE/ZDS has extensive experience with LEED Enhanced projects, and ZDS's personnel are very involved with ASHRAE, achieving Premier Status for the WV Chapter. Sr. Mechanical Engineer from FDE, David W. Rush, PE, has personally been the Cx Project Manager for over 40 projects that have received LEED Certification, and all but 3 of them included the Enhanced option.

2.4. Verify the installation and performance of the systems to be commissioned, including completion of the construction checklist and verification:

**ZDS** and **FDE** have extensive hands-on commissioning experience and operational knowledge of building infrastructure, which will provide the expertise needed for a successful project. Our proven experience in energy-efficient award-winning facilities will bring options

that improve comfort and provide long-term energy-efficient solutions. We will verify the installation and performance of the systems to be commissioned through review and completion of the Pre-functional Test forms and the Functional Performance Test forms that will be utilized to complete the "checklist and verification" documents outlined in the commissioning plan. Systems that are seasonally dependent on commissioning will be tested and demonstrated post-occupancy as soon as the system(s) can be operated in proper conditions.

ZDS will conduct a Design Phase Cx Kickoff meeting to coordinate with the Owner and design stakeholders regarding developing and incorporating the Cx requirements into the contract documents. The Cx team will review the BOD and OPR documentation to ensure that the requirements and goals are clearly defined. We will then develop Cx specification sections for the design documents. We will offer edits to Division 1 and technical sections to effectively integrate and further define the Cx requirements. These specs will be updated upon each design submission. We will identify and meet with key Owner stakeholders to learn their standards related to the building, such as operations (establish preferences, understand document repositories and CMMS) and design (design and BIM-related standards). Early in the project, we will configure our commissioning portal for the project and determine how to best integrate it with the various other platforms. Our senior technical leads will conduct design peer reviews at each design stage and manage our comments in whatever forum is selected. During the latter stages of design, we will develop the model Cx documentation to be included in the specifications. We will advocate that the Owner begin planning the participation of operations personnel during the Construction and Acceptance Phases. We will also help formulate the concepts that will guide the facility and Cx information in integrating it into the operations forums effectively.

2.5. Verify that a systems manual has been prepared that includes Operations and Maintenance documentation, full warranty information and provides operating staff the information needed to understand and operate the commissioned systems as designed:

The Commissioning Team's services will include reviewing the systems' manual to verify that the information needed by the Owner's personnel is clear, concise, and complete. Equipment and systems' O&M Manuals and complete warranty information will be required to be included in Project documents submitted to the Owner at the completion of the Work. Training of the Owner's personnel will be verified through documentation and written acknowledgment from the Owner on all systems' operations.

2.6. Complete preliminary and final commissioning reports:

✓ A preliminary Commissioning report will be prepared and submitted for review before full occupancy of the facility. The final report will be contingent on the completion of all post-occupancy Commissioning tasks, including, but not limited to, off-season testing. The final Commissioning report and the full systems manual will be provided to the Owner at the completion of the Commissioning.

**ZDS** Design/Consulting Services/**FDE** Team has registered professionals in all the required disciplines to effectively execute the requirements of the project, including:



° Commissioning Services

° Construction Administration

- ° HVAC/Electrical Engineering
- <sup>o</sup> Energy Engineering

Our Team has years of experience and the best expertise to provide the services to fulfill your specific project's needs. Our professional services efforts have been highly effective in the past. We have acted on our client's behalf to help bridge the new technologies and management methods into actual operating practices, saving our clients substantial funds in construction and operating costs. We pride ourselves on being viewed as an extension of the client's staff and successfully incorporating pertinent information about their facility into any proposed solution. Please feel free to contact any of our references about our work. We have an excellent track record and are ready and willing to start on your Project. If there are any questions, please do not hesitate to call.

Sincerely,

Todd A. Zachwieja, P.E., CEM, LEED AP Principal, Chief Executive Officer



# SECTION II.

## **Firm Overviews**



## FIRM OVERVIEW

#### Founded in 1994, celebrating 30 years!

#### ZDS Design/Consulting Services is a three-

generation family owned MEP/Commissioning Engineering Firm located near Charleston, West Virginia. ZDS provides comprehensive professional services for Master Planning/ Feasibility Studies, HVAC, Plumbing, Electrical, Indoor Environmental Quality, Energy Engineering, Forensic Engineering and Commissioning. ZDS has extensive proven high performance building design experience for commercial, governmental, educational facilities, and healthcare experience in 25 states across the country, the State of West Virginia, local government and Federal agencies. Specializing in renovation projects with *proven results of from 30% to over 60% reduction in energy/ operating costs* earning Energy Star Certification and EPAct qualified on government renovation projects!

- Mechanical
- Commissioning

Quality (IAQ/IEQ)

**High Performance** 

3D Scan-to BIM

Indoor Environmental

Sustainable Buildings

- Electrical
- Plumbing
- Fire Protection
- Forensic
- Peer Review

The ZDS team is made up of seasoned professionals who have dedicated their careers to engineering design excellence and quality. We pride ourselves in having the most up to date state of the art technology to provide our clients the very best possible services. We offer **comprehensive** practical solutions to our clients with proven World Class results.



#### COMPANY LEGAL NAME

ZDS Limited Liability Company dba ZDS Design/Consulting Services

#### **OFFICE LOCATION**

135 Corporate Center Dr., Scott Depot, WV 25560

#### FOUNDERS

Todd A. Zachwieja, P.E., C.E.O. Lori L. Zachwieja, C.P.A., C.F.O.

#### Daniel H. Kim, Ph.D.





"Family Owned & Operated Engineering Firm providing Professional Design Services for 30 years"

## **FIRM OVERVIEW**



**ZDS** provides forensic engineering services for the indoor air quality (IAQ) environment and IEQ. These services include: strategic planning for renovation and new construction projects; technical research and writing;

specialized applications software development; corporate and professional training programs; publications support and fulfillment; and site-specific

engineering and scientific consultation. Todd Zachwieja, ZDS Principal, is contributing editor for the following publications:

- Technical Review Panel for the publication of the *INvironment*<sup>™</sup> *Handbook of Building Management and Indoor Air Quality*, by Chelsea Group and published for Powers Educational Services
- Technical Review Panel for the quarterly publication of the *INvironment*<sup>™</sup> *Newsletter*, by Chelsea Group for Powers Educational Services
- Ventilation for a Quality Dining Experience: A Technical Bulletin for Restaurant Owners and Managers
- The New Horizon: Indoor Environmental Quality, published as a supplement to an issue of Consulting-Specifying Engineer magazine, a trade magazine distributed to roughly 50,000 engineers
- Editorial Advisory Board member reviewing the articles of the monthly publication *INvironment* <sup>TM</sup> *Professional*

**ZDS** provides Indoor Air Quality (IAQ) services for major corporations, government organizations and property owners to resolve their specific facility problems:

- Resolve "sick building syndrome"
- Identify solutions to building-related illnesses due to extensive biological contamination
- Develop solutions for HVAC systems, temperature controls, equipment, operating and maintenance practices for indoor air quality
- Commission new and renovated facilities to minimize or eliminate IAQ issues before problems arise
- Develop and establish master plans as well as conduct training seminars for IAQ of schools and commercial buildings

As one of the nation's leaders in Indoor Air Quality (IAQ), ZDS provides sophisticated technical expertise that enables our client to be proactive in solving and preventing indoor environmental problems.





## **ZDS Commissioning Services**



ZDS assists clients to determine whether equipment meets a facility's operational goals or whether adjustments are needed to improve efficiency and overall performance.

Our expertise assists clients on projects with the following:

- Fundamentals of Commissioning
- Enhanced Commissioning

SEMPER LIBUT

Retro-Commissioning projects

## ZDS offers these and other commissioning services:

- Compliance with LEED
- Construction Document Review
- Performance Documentation
- Equipment Performance Testing
- Value Engineering
- Post-Occupancy Fine Tuning



An integration of nine buildings involving over 1.9 million square-feet including the Capitol, Governor's Mansion, Center for Culture and History, plus six other administration facilities.

The initial years **savings of \$1,079,296** paid for the \$10,108,102 investment costs over time

LEED Certified Candidate



www.zdsdesign.com

## **ZDS Commissioning Services**



www.zdsdesign.com

#### **FIRM PROFILE**

#### **COLLABORATION. INNOVATION. PERSISTENCE.**

#### **FOUNDERS**

Lon Brightbill, PE Jay Santos, PE

#### WHERE WE ARE

Corporate 6760 Alexander Bell Drive Suite 200 Columbia, MD 21046 410.290.0900

Local Presence in 19 states, 50 cities

#### WHAT WE DO

Building Commissioning Controls Engineering Remedial Engineering Training Fault Detection Diagnostics

#### CONTACT

Lon Brightbill, PE Principal, Co-Founder 410.290.0900 lonb@facilitydynamics.com

Jay Santos, PE Principal, Co-Founder 410.290.0900 jays@facilitydynamics.com

www.facilitydynamics.com

FDE was founded in 1989 to bridge the gap between construction and facility operation and to address the challenges of sustainable efficient facility operation. We have maintained that focus with our team of senior professionals who have extensive experience in systems design, construction, training, and operation of mechanical, electrical, and building controls/automation systems.

Our culture is to foster collaboration and inject our unique expertise to help the project team deliver successful facilities. As pioneers in the building commissioning industry, we have an unparalleled resume of successful highly complex facilities.

#### THE TEAM

We believe, and our actions and history show, that it is essential for the commissioning engineer to be a collaborative and constructive team member. Our comprehensive approach combines analysis with state-of-the-art software to create a thorough, efficient, and superior building commissioning process.

Our highly skilled staff have complementary expertise in mechanical and electrical systems design, HVAC controls, electrical testing, systems balancing, training, operations and maintenance, and remedial system analysis. We believe in a process that actively includes our engineers and technicians.

#### **"WE ARE GLAD FDE IS HERE"**

FDE embraces the attitude that the primary goal of commissioning is to deliver:

- High performance and properly operating facility to the Owner
- Well-trained Operations and Maintenance staff
- High quality and continually useful documentation of the facility and of the commissioning process.

Further, we approach our commissioning activities with the highest respect for the various parties in the design and construction processes and their roles. The words 'we are glad FDE is here' is heard often from contractors and owners alike, and we take great pride in compliments like this.





# SECTION III.

## **Description of Project Experience**

#### **Additional Project Experience Brochures**



## **COMMISSIONING EXPERIENCE**





The Prince Jonah Kūhiō Kalaniana'ole (PJKK) Federal Building and United States Courthouse Honolulu, Hawaii



130th Airlift Wing at Yeager Airport, Phase I and Phase II: Aircraft Maintenance Fuel Systems Hangars and Shops

Awarded a **LEED Silver Certification** for each of the two phases

"ZDS's commissioning services were invaluable in helping us understand our facility and ensure the systems were installed as intended and optimized for long-term operating benefits. We would recommend them again!" -WVANG Project Manager



Harvard University Arnold Arboretum Weld Hill Research and Administration Building

#### **LEED Gold Certified**

- Kanawha County Schools
- Kanawha County Commission
- General Motors (GM) of North America
- Maryland Calvert County Indoor Aquatic Center
- Mercer County Schools
- Montgomery County Dept of Correction and Police
- Ohio University Chillicothe Campus
- Raleigh County Schools
- Santa Ana Federal Building Renovations
- Pendleton County Schools

- Tyler County Consolidated Middle-High School
- University of California, Davis School of Veterinary Medicine Instructional Facility
- Washington & Lee University
- WV Air National Guard
- WV Museum of Culture and Natural History
- WV State Capitol Complex
- West Virginia University Downtown Campus
- CAMC General, Memorial Division, Women & Children's Hospital
- Roane General Hospital

#### State of West Virginia Capitol Complex Charleston, WV

Project Cost: \$75,500,000

Size: 1,900,000 ft<sup>2</sup> covering 9 buildings

Date Complete: 1995 to current for latest project

HVAC Renovations, Fire Protection, Peer Review/Commissioning, Electrical Renovations, Consultant for Performance Contracting

#### **Client Reference:**

Patrick O'Neil, Project Manager; Patrick.S.ONeill@wv.gov

Numerous design and renovation projects for the WV State Capitol Complex including engineering planning, design, supervision, preparation of construction documents, specifications, construction administration, and commissioning of HVAC systems, sprinkler systems, plumbing systems, electrical power, lighting, fire alarm, security, technology and communications for many facilities on the WV Capitol Complex:



gn/Consulting

<u>WV Division of Protective Services</u>: Engineering master planning & design for specific life safety issues involving homeland security, fire alarm, sprinklers, emergency power, CCTV, intercom, mass notification and "giant voice" system for all State facilities on the Capitol Complex under a 10-year open-end contract.

<u>WV Division of Culture and History Library:</u> Renovations addressing long-term HVAC and IAQ problems, including fire alarm and fire protection upgrades, were completed in 2011. Renovations conserved energy without sacrificing comfort or indoor air quality.

**District Heating System;** As a consultant to Johnson Controls under a Performance Contracting program to provide master planning and design for the district heating system for the **WV Capitol Complex**. The project included the Master Planning, IAQ evaluation, energy analysis, code analysis and Mechanical design involving more than 1,900,000 ft<sup>2</sup> of facilities including the Capitol Building, Building's #3, #4, #5, #6, #7, Holley Grove, Governor's Mansion and the Culture Center. Master planning & design for central heating plant, DDC controls, Air Handling Unit replacements and retrofits, operating and maintenance, training, heat recovery, fuel conversion, VFD's, variable water volume pumping, steam/heating hot water & chiller optimization, condensate pumping, and steam trap upgrades. ZDS performed 3D scanning and created record drawings for future renovations.

**Bidg. #4 Peer Review/Cx:** ZDS team provided Design Peer Review during the design phase and commissioning services during the construction & acceptance phases of this project to ensure seamless integration, superior functionality, and efficient operation of the major HVAC systems and BAS controls, driving WV Capitol Complex Building #4's success in achieving high-performance standards. The Building is equipped with a Central boiler plant, a Chilled water supply, Dedicated Outdoor Air Systems (DOAS) that supply fresh air to the entire building, and chilled & hot water terminal units. ZDS completed the \$28,574,000.00 Project Completed in 2025.

<u>House Chambers HVAC/Cx:</u> Planning, engineering & design, and construction administration for new supply air fan wall and return fan controls and sequencing with remote new DOAS unit that uses an extension of the existing natural gas service so the DOAS system is not dependent on the steam heating system and is capable of year-round operation. Estimated \$1,250,000.00 Project on-going with ZDS, and 2026 completion.

<u>Multiple Elevator Modernizations:</u> MEP evaluation, planning, and opinion of costs for 33 elevator modernizations at 13 buildings for GSD including documenting existing MEP systems and 3D scanning of Bldg. #1, Bldg. #3, Bldg. #6. Estimated \$19,275,000.00 Project on-going with ZDS and anticipated to occur over six years.



The Capitol Complex renovations are estimated to

save nearly \$2.000.000 annually



over the costs of operating the old systems.

## Kanawha County Commission Judicial Building & Courthouse







"No one else could identify the MEP problems even though many had tried. Yet, ZDS provided an excellent evaluation while working well with our Judges and staff for a very successful project. We use them for all our challenging work." - Kanawha County Commissioner



**ZDS** assisted in identifying a phased approach to addressing and defining Indoor Environmental Quality (IEQ) issues and modifications for the Kanawha County Courthouse.

Total Judicial Bldg. Project Costs:\$13,807,000ZDS Team Project Cost:\$6,737,000Annex Project Size:118,400 ft² latest projects completed 2023Client Reference:Mike Moles, 304-357-0103

ZDS has worked with the Kanawha County Commission on various projects since 1998. The Scanning, most recent involved 3D design/commissioning for **HVAC** & Roof Replacement incorporating cleaning air technology into new energy efficient HVAC system, renovations to the 3<sup>rd</sup> floor and upgrades to the building smoke control system. All major HVAC equipment and the roof replacement work were completed in 2023 on time and in budget. Other past work includes engineering planning, design, bidding and construction administration services for the renovation of the 95,400 ft<sup>2</sup> Judicial Building and a 23,000 ft<sup>2</sup> addition using the ground floor of the parking garage connected to the Judicial Building. The facility includes circuit courtrooms, jury deliberation, attorney conferencing, witnessing, court clerical staff, public research, adult probation, prosecuting, maintenance. voter registration, court administration, and all public areas. The addition included a new entrance, security checkpoint, and lobby to accommodate a building expansion for Juvenile Probation and Family Court.



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William R. Sharpe, Jr. Hospital Weston, WV



Size: 219,754 ft<sup>2</sup> plus 33,000 ft<sup>2</sup> Addition Date Complete: 2017 219,754 ft<sup>2</sup> Renovation plus 33,000 ft<sup>2</sup> New Construction



Prime for Engineering Master Planning, HVAC Renovations, Lighting Upgrades, Emergency Generator, Fire Protection, Electrical Renovations, Roof Replacement, Commissioning, 3D Scanning. Consultant for all MEP engineering through IKM, Inc. for the addition.

MEP Engineering design and Commissioning services for both the HVAC/lighting/roof Renovation project retrofitting Hospital and the patient wing addition. Comprehensive MEP engineering and commissioning services for a central domestic hot water services, central boiler/chiller plant and 1.8 MW bi-fuel emergency generator system. Central heating plant with three 10.5 Million BTU heating hot water boilers with low NOx burners to meet DEP emission requirements. VWV Pumping for heating, cooling and domestic hot water. Integrated DDC controls for central monitoring, troubleshooting and control including demand control ventilation and outside air measuring/monitoring. The HVAC system is also an integral part of the smoke control system. Lighting systems upgraded to LED and controlled to minimize energy. IAQ enhancements were incorporated into the high performance HVAC systems. Careful phasing, and the need to disrupt only small portions of the Hospital at a time, resulted in an extended construction period.



Renovations resulted in a <u>48% reduction</u> in lighting and <u>28.8% reduction</u> in energy for HVAC renovations over ASHRAE 90.1-2001 standards qualifying the project for EPAct.

Construction Costs: Phase I HVAC Cost \$
ARRA Funded Lighting Upgrade Costs
Comprehensive Renovation Cost \$

Addition Project Cost

 Upgrade Costs
 \$ 1,403,000

 upgrade Costs
 \$ 618,700

 ation Cost
 \$30,000,000

 \$13,500,000

## **ZDS Commissioning Services**



#### ZDS Commissioning Project Experience

- Air National Guard Phase I & II Replacement Aircraft Maintenance & Fuel Cell Facility, WV
- Beckley Stratton Middle School, Raleigh County, WV
- Ben Franklin Career & Technical School, Kanawha County, WV
- Bluefield Primary School, Mercer County, WV
- Mountain Valley Elementary School, Mercer Co WV
- Clendenin Elementary School, Kanawha Co WV
- Cuisset Residence, Charleston, WV
- General Motors (GM) of North America
- Harvard University Arnold Arboretum Weld Hill Research and Administration Building, MA
- Independence Middle School, Raleigh County, WV
- Kanawha County Commission Judicial Bldg.
- Mabscott Elementary School, Raleigh County, WV
- Calvert County Indoor Aquatic Center, MD
- Montgomery County Departments of Correction and Police, MD
- New Spencer Middle School, Roane County, WV
- Ohio University Chillicothe Campus, Stevenson Library and Bennett Hall
- Pendleton County High/North Fork Elem, WV
- PJKK Federal Building, Hawaii
- Roane General Hospital, WV
- Santa Ana Federal Building Renovations, CA
- Shady Spring Middle School, Raleigh County, WV

- Stratton Elementary School, Raleigh County, WV
- University of California, Davis School of Veterinary Medicine Instructional Facility
- Tyler Consolidated MS/HS Phase I & II, Tyler County, WV
- Tyler County Commission 911 Ctr/Courthouse
- Washington & Lee University
- Webster County High School, Webster County, WV
- Webster Springs Elementary School, Webster County, WV
- William R. Sharpe, Jr. Hospital
- WV Museum of Culture and Natural History
- WV State Capitol Complex

## Additional Commissioning Project Experience by ZDS Personnel:

- CAMC General Division, CAMC Memorial Division, CAMC Women & Children's Hospital
- Kanawha County Schools Capitol High School
- United Hospital Center
- WVU Downtown Campus



## **ZDS School Commissioning Experience**



www.zdsdesign.com

# Pendleton County School Pendleton County Middle/High School HVAC & Roof Renovations

**ZDS** provided professional architectural and engineering design, bidding, construction administration, and commissioning services for HVAC and roof upgrades at the Pendleton County Middle/High School and North Fork Elementary School to meet Indoor Air Quality and today's energy codes.

The initial step in the project was to provide engineering investigations of existing conditions where **ZDS** performed 3D Scan-to-BIM for reliable and accurate 3D capture of "built" conditions to use in design, bidding, and construction. The 3D scans were also valuable to communicate remotely between the Owner and Contractor.

The work included but was not limited to, twenty (20) new Roof Units, VAV Terminal Units, VRF cassette systems, Condensing Units, DOAS systems, indoor/outdoor Vertical Air Handling Units, Energy Recovery Ventilators, general exhaust fans; Kitchen Make Up Air Unit and hood exhaust. Bi-polar ionization was incorporated into the HVAC systems. The roofs were upgraded to meet today's Energy Codes.

The Project also required new and modified HVAC ductwork modifications and gas piping for the HVAC systems, comprehensive DDC Buildings' controls upgrades, new electrical service at the Elementary school, and other electrical upgrades associated with the new equipment. The energy-efficient design will provide excellent long-term operating savings to the Pendleton County Schools. A new Fire Alarm system was provided for the Elementary school and the adjacent Harold Michaels Building. The schools remained occupied, and phasing of the Work was critical throughout the Project, which is on track to be completed on schedule.

Project Costs: \$8,362,722 SBA funds, \$200,000 Local funds School Size: 138,560 square feet Contacts: (304) 358-2207 Charles Hedrick, Superintendent: cfhedric@k12.wv.us J.P. Mowery, Business Manager: jmowery@k12.wv.us



#### Kanawha County Schools Riverside High School HVAC/Lighting Renovations



Riverside High School, built in 1997, the academic wing's HVAC system consisted of four large Dual Duct custom Rooftop units and gas-fired packaged DX rooftop units to serve the other areas of the school. The Dual Duct HVAC equipment was unique to the County and the only school to have this HVAC system type, challenging the maintenance department. The school went through a Performance Contracting Program around 2011 when original pneumatic controls were retrofitted along with other upgrades; however, the utility usage for this school was still nearly twice the national average.

**ZDS'** goal for the design of HVAC, roof replacement, and lighting renovations was to reduce the overall energy usage by 50% while improving comfort and Indoor Air Quality. Many HVAC systems were analyzed and energy modeled, resulting in selecting a closed-loop geothermal HVAC system using indoor high-efficient heat pumps, eliminating the Dual Duct units, and replacing them with VAV Dedicated Outside Air Units (DOAS). Air cleaning technology was incorporated into the HVAC systems. The existing ductwork from the dual duct system was able to be reused and then VAV boxes were added with Demand Control Ventilation. Other HVAC systems included both water source heat pumps and packaged VAV Rooftop Units. The project included replacing and retrofitting the existing lighting systems with high-efficiency LED sources. The locker areas in the school were converted from heating/ventilation only to full HVAC. The project also included roof replacement concurrent with other renovations.

**ZDS** provided the design and assisted with the bidding and Construction Administration process. Work was designed/phased so construction could occur while the school was in use. In addition to energy savings, the systems are reducing long-term operating and maintenance costs.

High Performance Design using ASHRAE Advance Energy Design Guides saved *64% less energy for HVAC/Lighting systems* from the base years' usage and

#### Incorporates Air Cleaning Technology in HVAC System.

EUI reduction from 84 to 30.6 and Energy Star Certified!

Construction Costs: \$17,400,000 completed in 2023 School Size: 189,318 square feet Contact: Chuck Smith, Director/Support Services: (304) 348-6148



#### **Tyler County Schools** Tyler Consolidated Middle/High School HVAC Upgrades, Auditorium Additions/Renovations









The project qualified for EPAct for energy efficient design, using over 50% less energy than schools designed using ASHRAE 90.1-2007.

**ZDS** provided professional engineering design, bidding, construction administration, and commissioning services for HVAC upgrades at the Tyler Consolidated Middle/High School to meet Indoor Air Quality and today's energy codes. The initial step in the project was to provide engineering investigations of existing conditions where **ZDS** performed 3D Scan-to-BIM for reliable and accurate 3D capture of "built" conditions to use in design, bidding, and construction. The demolition and new work to be included in **Phase I** of the project included two (2) new highly efficient chillers piped so they could be used even during winter months, three (3) new high-efficient condensing boilers, variable water volume hydronic pump system, VAV Air-Handling Units, VAV Blower Coil Units, Fan Coil Units, Energy Recovery Ventilators, DDC control upgrades, select new hydronic piping and ductwork for the equipment, exhaust fans, electric work associated with serving the new HVAC system equipment and new electrical panel-boards. **Phase II** work includes DOAS units for classrooms, air cleaning technology, and lighting upgrades to LED. Also, it includes renovations to the auditorium to performance hall standards, providing a highly efficient programmable lighting system and high-performance audio sound system, which is a showcase for the community and the best auditorium for a WV school.

Estimated Phase I Project Costs: \$4,796,903, SBA funding \$3,698,578 Estimated Phase II Project Costs: \$11,518,024 Date Completed: Phase I was completed in 2019; Phase II completion in 2024 School Size: 188,156 square feet Contact: Ms. Amanda Kimble, Dir. Child Nutrition, Facilities & Support Services (304) 758-2145 ext. 111, akimble@k12.wv.us





#### Kanawha County Schools Ben Franklin Career Center HVAC/Roof Renovations

The **ZDS** team conducted an extensive study and performed a 3D Scan-to-BIM of the facility to develop comprehensive existing conditions and assist KCS with procuring SBA funds. The work was done in two (2) phases HVAC equipment, to replace the aging ductwork, and piping. It included electrical upgrades accommodate the to new equipment, new lighting throughout, roof replacement, and new exterior overhead doors for the shops. **ZDS** provided Design, Bidding, Construction Administration, and services. Commissioning Work was designed and phased so construction could occur while the school was in use.



**ZDS** involved the Faculty and Staff in the design to address specific HVAC, Electrical needs and Future IT Expansions. Specialized custom energy-efficient HVAC was included to meet the challenging comfort and Indoor Air Quality needs for the Welding, Machine, Wood, Sheetmetal, HVAC, Diesel and Heavy Equipment Shops and the remaining school. HVAC systems include 100% dedicated outside air systems (DOAS) with energy recovery.

The project qualified for EPAct for energy efficient HVAC design while <u>using over 27.3% less energy for</u> <u>HVAC</u> and over <u>60% less energy for Lighting</u> than schools designed using ASHRAE 90.1-2007.

Project Costs: \$9,651,722 with SBA Funding \$6,992,759 School Size: 78,050 square feet Contact: Chuck Smith, Director: (304) 348-6148 Charles Wilson, AIA, (Retired): (304) 533-6149



#### Piedmont Elementary School HVAC Renovations

**ZDS** performed MEP design, 3D Scan-to-BIM, bidding and CA services for the replacement of an existing custom multizone unit, associated DDC controls and refurbished other HVAC units that had failed and were in need of constant maintenance/repairs. The work included necessary electrical modifications to serve the new rooftop unit. Project was completed within the budget allocated by the County.

The project qualified for EPAct for energy efficient design while <u>using over 27% less energy for HVAC</u> than schools designed using ASHRAE 90.1-2007.

Project Costs: \$352,090, Project under budget! School Size: 31,500 square feet Contact: Chuck Smith, Director: (304) 348-6148 Charles Wilson, AIA, (Retired): (304) 533-6149



#### Kanawha County Schools New Clendenin Elementary School Commissioning

**ZDS** team provided commissioning services for the new high performance School at Clendenin equipped with cutting-edge systems. The Facility is served by a wellfield that encompasses 400foot wells. Ventilation and IAQ are provided by DOAS units. The commissioning team optimized control strategies to improve overall performance and functionality of the systems. Commissioning team adapted the ASHRAE guidelines, made a significant positive impact on the project, and assisted the facility staff in becoming more aware of the HVAC system that was installed. The Cx team identified and brought the deficiencies to the forefront in a timely manner.



Unique feature: Geothermal water-cooled VRF system coupled with DOAS system

Construction Costs: \$37,860,513; SBA Funds \$26,851,044 School Size: 68,450 Square Feet Contact: Chuck Smith, Director/Support Services: (304) 348-6148



#### **COMMISSIONING EXPERIENCE**

#### **Montgomery County Public Safety Headquarters**

Gaithersburg, MD

#### PROJECT DETAILS

**SIZE** 408,000 SF

#### PROJECT SPECIFICS

Renovation

Performance Excellence Electricity Renewal (PEER from Green Business Certification)

#### Formerly the National Geographic Headquarters and later GE Park, this landmark building become a place of smart consolidation and improved space for the county's employees and its citizens at large.

Montgomery County and its Public Safety employees were working out of separate buildings at a heavy financial leasing cost to the city for many years. After overcrowding and outdated fixtures were making productivity impossible, the County elected to co-locate the Police Station and the Public Safety staff into one functional space.

Currently, the Headquarters building houses the Central County Police, and County Fire Rescue Services, the Office of Emergency Management, Homeland Security (OEMHS), the 1st District Police Station and select Department of Transportation services.

Due to the building taking on so many roles and being retro-fitted for multiple uses over a 50 year period, occupant comfort and HVAC systems were declining. In two separate work phases, Facility Dynamics Engineering was tasked to investigate and identify the cause of the issues, provide recommendations for resolving, and make calibration or setpoint type adjustments where applicable; some minor repairs were made where accomplishable with nominal effort. In the second phase, The second phase was the investigation and minor implementation phase where we did a more systematic floor-by-floor, space-by-space testing, calibration, and adjustment of the system components. The calibrations, adjustments, and minor repairs implemented during the process have made substantial improvements to the comfort level throughout the building.



#### STATEMENT OF QUALIFICATIONS

#### Henrico County, Hermitage Advanced Career Education Center

Henrico, VA

#### **PROJECT DETAILS**

**SIZE** Varies, 21 Projects

**DATE** 2012-Present

#### Facility Dynamics Engineering was recently awarded a term contract with Henrico County and Henrico County Public Schools.

The new Hermitage Advanced Career Education (ACE) center provides a means to accelerate student access to skilled training and real-work experiences that will prepare them to be better prepared for their future success. The spaces have been developed to incorporate technology and equipment currently used in each industry and provide flexibility to support new growth opportunities.

The building includes a condenser water system (with cooling tower, pumps, and boilers), dedicated outside air unit for ventilation, water source heat pumps for zone temperature and humidity control. The forum space has a dedicated single zone RTU with water source heat pump coil and hot gas reheat coil for zone temperature and humidity control.

The new 12,500 SF **Firehouse 20** includes 11 bunk rooms, a drive-thru apparatus bay for 3 vehicles, fitness room, kitchen, offices, dayroom, training room, PPE storage, decontamination room, laundry, and lounge areas. A packaged variable volume roof top unit provides fresh air to the building through series and fan powered terminal units. The terminal units include zone sensors with local set point adjustment for thermal comfort control.

The apparatus bay includes an exhaust/make-up air system triggered by CO and NO2 sensors in the space. This system operates in addition to the vehicle exhaust management system. There is a standby generator on-site designed to power the entire facility as needed. Most of the HVAC systems are managed through a Schneider Electric Tridium based building automation system which is accessible from Henrico OneStop.



# SECTION IV.

## **Proposed Team Staffing Plan**

Team Certifications Team Resumes Project Approach



## **Organizational Chart / Proposed Team**

#### State of WV Purchasing Division

Martinsburg Readiness Center Design Commissioning Services





## **EXPERIENCE OF KEY PERSONNEL**



#### Principal-in-Charge

**Ted (Todd) A. Zachwieja,** P.E., CEM, LEED AP, ZDS founder with over 45 years of experience in MEP design, energy management, IAQ, Performance Contracting and commissioning. Nationally recognized for expertise in IAQ, LEED and Certified Energy Manager.

#### Chief Technical Officer MEP Engineer/Commissioning



**Ted A. Zachwieja III,** P.E., CEM with over 20 years of experience and specializes in MEP design, energy management, IAQ and commissioning. Forerunner in adoption of 3D scanning for buildings for use in MEP design for renovations. Extensive experience in IT systems administration. Co-authored BIM Training for Autodesk University. Legend-in-Energy Award recipient.



#### MEP Project Engineer/Mgr

**David Cotton, PE, LEED AP BD+C,** has over 18 years of experience in the design and construction of over 500 projects. As a project manager he successfully manages projects from start to finish in design, bidding, commissioning and construction administration.



#### **Senior Electrical Designer**

**Edison Adkins,** is a Technology Solutions Designer with 25+ years experience in the construction industry, including 17+ years with a systems integrator.



#### **MEP Engineer**

**Paul O'Dell,** P.E., has 30 years of engineering experience involving the analysis, design, project management, specifications' writing and construction management on many projects.





#### **MEP Engineer**

**Vineel Busa, PE, BCxP** has a Masters in Mechanical Engineering and is working on his PhD in Project Management. He has over 8 years experience in HVAC and commissioning.



#### **MEP Designer**

**Meher Meka, BSEE, EI,** with over 10 years of experience and has a Masters Degree in Electrical Engineering and is experienced in Power Distribution & Protection, lighting design, lightning protection, fire alarm, communications and schematics.



#### **MEP Designer**

**Billy Smith**, with a Bachelors Degree in Mechanical Engineering, provides design, bidding, construction administration, and commissioning support for mechanical, plumbing, fire protection, and electrical systems.

## Certifications




# Todd Zachwieja, PE, CEM, LEED AP

Todd has over 45 years of experience involving the analysis, design, construction management and specifications for mechanical engineering, heating, ventilating, air conditioning, plumbing, fire protection, electrical and lighting, as well as indoor environmental quality analysis, **building system commissioning** and forensic engineering for educational, governmental, military, commercial, industrial and health care clients. Prior to starting a consulting engineering firm, Todd Zachwieja coordinated comprehensive energy conservation programs resulting in annual energy savings of millions of dollars. He has managed a profitable regional office for one of the country's largest energy companies that service the southeastern United States. Todd also developed computer modeling programs for building energy analysis and monitoring. He has been invited as an industry leader to present technical papers and speak at professional conferences both regionally and at the National Conference on Building Commissioning.

Todd selected and designed the pilot project for one of the largest geothermal heat pump applications in the Eastern US including designing custom geothermal rooftop AHU's. He has retrocommissioned HVAC systems for millions of square-feet for facilities located in 10 states. He has been involved with the WV School Building Authority and the WV Department of Education for over 30 years. Todd designed renovations to many existing schools which received *Energy Star Certifications* placing them in the nation's top 25% of energy efficiency schools. *The College Planning and Management Magazine* featured Todd and his work with a major University for the performance contracting programs that save millions of dollars in energy and operating costs. Most projects also qualified for EPAct which requires buildings use over 50% less energy than buildings designed using ASHRAE 90.1.

**K-12 & Commissioning EXPERIENCE** - Hundreds of K-12 Schools both public and private in West Virginia Counties of Calhoun, Clay, Fayette, Grant, Greenbrier, Hardy, Harrison, Jackson, Kanawha, Lewis, Logan, Marion, McDowell, Mercer, Mingo, Monroe, Ohio, Pendleton, Pleasants, Pocahontas, Putnam, Raleigh, Randolph, Ritchie, Roane, Summers, Taylor, Tucker, Tyler, Upshur, Webster, Wirt and Wyoming. Allegheny County Maryland School District and schools in Ohio and Pennsylvania. Retro Commissioning for General Motors North American Operations.

- Ben Franklin & Carver Career Centers & Cx
- New Bluefield Primary School Cx
- Clay High School Renovations Cx
- New Clendenin Elementary Commissioning
- New Mountain Valley Elem Commissioning
- New Stratton Elementary Commissioning
- South Charleston Middle & High Schools
- New leager Elementary Energy Star
- Greenbrier East & West High School
- Greenbrier East & West Middle School
- Harvard University Commissioning
- Petersburg High School Renovations
- Elkins Middle Renovations Energy Star
- Independence Middle Renovations/Cx
- Glenwood K-8 School
- James Monroe High School
- Winfield High School Renovations
- Mabscott Elementary Renovations/Cx
- Woodrow Wilson High School
- Marsh Fork Elementary School
- New Spencer Middle School Cx
- New Southside K-8 School

- New Timberline Elementary Cx
- New Trap Hill Middle School
- New Shady Spring Middle & Cx
- Princeton Middle School Energy Star
- Liberty/Independence High Schools
- George Washington High School
- Tucker County High School
- Webster County High School
- Ritchie County Middle/High School
- Riverside High Renovation- Energy Star
- North Marion High School Renovations
- Pleasant Hill Elementary School
- South Charleston High School
- Webster Springs Elementary Energy Star
- New Spencer Middle Commissioning
- Tyler Consolidated Middle/High School Cx
- St. Mary's School, Clairsville, OH
- St. Marys High School & Cx
- Kanawha Co. Judicial Bldg. & Cx
- WV State Capitol Complex Bldgs. #3 & #4
   Commissioning
- Washington & Lee University Cx
- West Virginia University Commissioning





# PROFESSIONAL REGISTRATIONS



Fire Investigation Certification under the direction of Peter Vallas, Sr.

Certified Energy Manager (C.E.M.) National Certification No



CEM

LEED Accredited Professional, National Certification through USGBC No.

# **EDUCATION**

Masters of Science in Engineering Management from West Virginia University College of Graduate Studies.

> Bachelor of Science in Mechanical Engineering from West Virginia Institute of Technology.

# Todd Zachwieja, PE, CEM, LEED AP

# PROFESSIONAL AND COMMUNITY AFFILIATIONS

Past President 2013-14, current Governor - WV ASHRAE Chapter, Served as ASHRAE's Energy and Technical Affairs Chairman for six years. Recognized by ASHRAE Region VII in 2014 with the David Levine Award of Excellence, Presidential Award of Excellence,

Recognized by the International Who's Who of Professionals Recognized nationally as West Virginia's Business Man of the Year Recognized by AEE nationally in 2007 as a Legend in Energy Recognized by AEE nationally in 2008 as a Charter Legend in Energy Charter Life Member of the Association of Energy Engineers Professional Affiliate Member of the American Institute of Architecture Associate Member West Virginia Society for Healthcare Engineering Member of the International Code Council Member of the National Society of Professional Engineers

# **OTHER RECOGNITIONS**

Selected by WVU and the WV Division of Energy to train Code officials and the design community on ASHRAE 90.1 State Energy Code

Presented at regional and national conferences including the annual National System Commissioning Conference

Contributing editor and served on the Editorial Review Panel for "The Handbook of Building Management and Indoor Air Quality"

Contributing editor "Ventilation for a Quality Dining Experience"

Contributing editor and served on the Editorial Review Panel for INvironment Professional, Power Prescriptions and other publications and articles featuring Indoor Air Quality (IAQ) and MEP engineering systems

Energy Star Certified for facilities in the nation's top 25% of energy efficiency

1<sup>st</sup> Place 2014 ASHRAE Technology Award, Region VII

LEED Silver Certified WVANG Fuel Cell/Maintenance Hangar, Charleston, WV

LEED Gold Certified Harvard Arboretum, Boston, MA

First ASHRAE bEQ certified building in West Virginia, 2015

1st Place 2023 ASHRAE Technology Award, Region VII



























# Ted Zachwieja III, PE, СЕМ

Ted, a third generation engineer and Principal in the firm, has over 20 years of experience in building construction design industry that includes award winning designs including the first Net Zero 911 Center in WV and technology awards for design innovation in multiple facilities. Innovation in *lighting design/controls, technology*, engineering design, communication methods and management of the design process are the areas of his expertise. As a pioneer and a believer in technological processes, Ted has championed Integrated Design Practices and Commissioning that has become the fabric of ZDS's day-to-day operations.

Ted develops ZDS's 3D Scanning and BIM services which have assisted in collecting key existing conditions for renovation projects, forensic engineering, historical preservation, and high definition reality capture. Ted has in-depth experience on collection, registration, and scan to BIM processes. He has provided training and developed materials for best practices when using 3D scan data. Ted's 3D scanning experience includes governmental, educational, health care, industrial, and commercial facilities. He also has experience in speaking on how 3D laser scanning impacts our industry today.

Ted is the Engineer-of-Record for design projects. As Engineer of Record he is responsible for all aspects of the project and takes a hands-on approach to the overall management, design and construction of the project. He works well with all stakeholders involved throughout the entire project lifecycle.

As Chief Technical Officer Ted develops and deploys a strategy of forward thinking and strategic development for ZDS' Integrated Design Processes, research and development into new technologies for improving quality of services for our clients.

Ted's project experience includes design and commissioning for electrical, lighting, security, IT, A/V, heating, ventilating, air conditioning, plumbing, fire protection, and acoustical systems for educational, health care, industrial and commercial facilities. His experience encompasses working both on new construction and renovation projects. He also is experienced in historical facilities including theatrical. He has significant experience in designing, commissioning and implementing efficient lighting and HVAC systems for various commercial, healthcare and educational facilities.

Ted maintains an active membership with the ASHRAE professional society and also has a lifetime membership in the Association of Energy Engineers. He maintains an active continuing education towards today's standards and codes as well as participates in ASHRAE at both a local and society level. He served on the Electronic Communications Standing Committee with ASHRAE. He has designed renovations to existing K-12 schools which received *Energy Star Certifications* placing them in the *nation's top 25% of energy efficiency* schools.





# PROFESSIONAL REGISTRATIONS

Professional Engineer:

Florida West Virginia

Certified Energy Manager (C.E.M.) National Certificate



# CEM

# EDUCATION

Bachelor of Science in Mechanical Engineering from Rochester Institute of Technology, Rochester, NY

# AWARDS AND RECOGNITIONS

Awarded 2012 Legend in Energy by the Association of Energy Engineers

Awarded acceptance into ASHRAE's 2015 Leadership University

ASHRAE Blue Ribbon Award of Excellence Co-Author at Autodesk University

> 1st Place 2023 ASHRAE Technology Award, Region VII

Energy Star Certified for facilities in the Nation's top 25% of energy efficiency



# Ted Zachwieja III, PE, CEM

# **DESIGN/COMMISSIONING EXPERIENCE**

- University of Charleston Virtual Dissection Lab, Innovation Center, Gorman Hall/Eddie King Gym Renovations including Sports Facility designed for televising NCAA sporting events, site utility upgrades for campus natural gas, medium voltage and water service upgrades.
- Marshall University, Jomie Jazz, Harris Hall, Smith Hall Renovations
- WV Higher Education Policy Commission S. Charleston Tech Center Master Planning
- Ben Franklin Career Center Renovations EPAct Qualified
- Bluefield Elementary, High School & Vocational EPAct Qualified
- Glade Middle School Energy Star Certified
- Kanawha County Judicial Building Renovations EPAct Qualified
- Kanawha County Schools County-Wide includes Master Planning, Renovations
- New laeger Elementary Schools Energy Star Certified
- Office of Chief Medical Examiners Renovations and Commissioning
- Pendleton Co Middle/High School, North Fork Elem Renovations EPAct Qualified
- Princeton Middle and High School HVAC Renovations Energy Star Certified
- Raleigh County Schools County-Wide
- WVDHHR Master Planning, renovations, Lighting Upgrades for seven healthcare facilities
- Mercer County Technical Education Center
- Riverside High School HVAC/Lighting Renovations Energy Star Certified
- Tyler County 911 Center with solar Net Zero
- Tyler County Courthouse Additions, Renovations and Commissioning
- Tyler Consolidated Middle/High School HVAC Renovations EPAct Qualified
- WV State Capital Complex Master Planning & Campus-wide renovations
- West Virginia University Renovations
- WV DHHR Healthcare Facilities master planning, additions/renovations, lighting renovations - *EPAct Qualified*



# Professional Affiliations

Member of ASHRAE WV Chapter

Prior Membership Promotions Chair WV ASHRAE Chapter

> Prior Chapter Secretary WV ASHRAE Chapter

Lifetime member of the Association of Energy Engineers

Associate Member WV Society for

Healthcare Engineering





# **OTHER RECOGNITIONS**

Presented and co-authored at regional and national conferences

Energy Star Certified for facilities in the nation's top 25% of energy efficiency for many facilities

1<sup>st</sup> Place 2014 ASHRAE Technology Award, Region VII

First ASHRAE bEQ certified building in West Virginia, 2015

1<sup>st</sup> Place 2023 ASHRAE Technology Award, Region VII

ASHRAE Blue Ribbon Award of Excellence

2012 Legend in Energy by the Association of Energy Engineers

2015 ASHRAE Leadership University Recipient













# Vineel Busa, PE, BCxP, MSME

Vineel is a professional Mechanical Engineer with a Masters Degree in Mechanical Engineering and over 8 years experience in HVAC, Refrigeration and Commissioning. Technically sophisticated engineering professional with solid history of effective integration, and deployment of HVAC systems. Experience in designing, commissioning and implementing award winning efficient HVAC systems for commercial, governmental, healthcare and educational facilities.

Vineel's comprehensive knowledge of many mechanical systems, building automation controls, hands on HVAC controls programs, and ability to optimize controls for energy efficiency and the Owner's needs is invaluable for Commissioning.

He is experienced hands-on in designing VAV HVAC, DOAS systems, Variable Refrigerant Flow systems, Steam Systems, central plant hydronic systems, Geothermal systems and Building Automation System receiving Energy Star Certification and ASHRAE awards. He is also proficient in Revit, AutoCAD, IESVE, Navisworks, energy modeling and Autodesk Recap. Vineel is experienced in utilizing point clouds in the development of Scan to Building Information Modeling (BIM) and performing 3D scanning. Vineel is well-versed in technical specification writings and development of construction drawings. He has hands-on experience in performing Functional Performance Testing in leading Commissioning projects.

# PROJECT EXPERIENCE

- WV Capitol Complex Campus Heating System Renovations Buildings #1, #3, #4, #5 and #7 over multiple phases, & House Chamber HVAC Renovations
- WV State Capitol Complex Bldgs. #1, #3 Renovations & Bldg. #4 Commissioning
- WV Chief Medical Examiners Lodox CT Scanner Renovations, Commissioning
- WVARNG Brushfork Armory HVAC Renovations EPAct Qualified
- Kanawha County Judicial Building Renovations/Commissioning EPAct Qualified
- Roane General Hospital Commissioning
- Veteran Administration Clarksburg Hospital Mechanical BIM
- Veteran Administration Huntington Hospital Mechanical-Electrical BIM
- Marshall University—Jomie Jazz HVAC Renovations
- New Bluefield Elementary School Commissioning
- Clay County High School Commissioning EPAct Qualified
- North Fork Elementary School HVAC/Roof Renovations, 3D Scanning, Scan-to-BIM and Commissioning - *EPAct Qualified*
- Pendleton County Middle/High School HVAC/Roof Renovations, 3D Scanning, Scan-to-BIM and Commissioning *EPAct Qualified*
- New Tyler 911 Center high performance "Net Zero" facility and Commissioning
- Tyler County Courthouse Additions/Renovations and Commissioning
- Riverside High School HVAC/Lighting Renovations Energy Star Certified
- New Spencer Middle School Commissioning
- New Clendenin Elementary School Commissioning
- Raleigh County Schools: 6 Schools Renovations & Commissioning
- New Clendenin Elementary Commissioning
- St. Marys High School Renovations, Commissioning
- New Stratton Elementary School Commissioning
- New Pocahontas County 911/EMS Center
- New Coalfield Elementary School Commissioning





# PROFESSIONAL REGISTRATIONS

Professional Engineer: West Virginia

ASHRAE BCxP Building Commissioning Professional

# **EDUCATION**

VIT University Bachelor of Science in Mechanical Engineering

Southern Illinois University Edwardsville Master of Science in Mechanical Engineering

University of Cumberlands Working on PhD in Project Management

# AWARDS AND RECOGNITIONS

Certified by ASHRAE in HVAC Design Essentials & Applications

1st Place 2023 ASHRAE Technology Award, Region VII

Energy Star Certified for facilities in the

Nation's top 25% of energy efficiency





# David Cotton, PE, LEED AP BD +C



David is a professional Mechanical Engineer with over 18 years of experience in the design and construction of over 500 projects having construction values up to \$35 million. His commissioning/ design experience ranges from commercial, industrial, institutional, healthcare, education, restaurant, retail, government, airport, and recreational facilities.

David collaborates well with fellow engineers, architects, owners, contractors, code officials and vendors to meet the goals and objectives. As a project manager he successfully manages projects from start to finish in design, bidding, construction administration and commissioning.

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# PROJECT EXPERIENCE

- Tyler County Courthouse Additions/Renovations
- Tyler County 911 Center Net Zero
- Belmont County Commission Coroner, Records & Health Dept. Facility
- Oglebay Wilson Lodge Renovations
- New Clendenin Elem Commissioning
- Mabscott Elem Renovations/Cx
- Independence Middle HVAC/Roof Renovations and Commission
- Harrison County 911/EMS Center
- Shady Spring Middle HVAC Retrofit/Cx
- Maxwell Hill Elem HVAC Renovations/Cx
- Braxton County 911/EMS Center
- Saint Marys K-8 School Renovations
- Tyler Consolidated MSHS Commissioning
- Dominion Office Building LEED Gold
- Mon General Hospital Echo Renovations
- Mon Health LTAC for Acuity
- United Hospital Ctr POB 4th Fl Retrofit
- Clarksburg Comprehensive Care Clinic Renovations
- Jerry Dove Medical Office Building
- Medbrook Building HVAC Replacement
- Pocahontas County 911/EMS Center
- Mylan Pharmaceuticals
- Beckley Police Station
- Doddridge County Athletic Complex
- Boy Scouts of America, Rex W. Tillerson Leadership Center
- White Hall Public Safety Building

- Webster County 911/EMS Center
- Beitzel/Pillar Innovations Office Building
- Percival Hall Absorption Chiller and Cooling Tower Replacement
- Tyler Consolidated MS/HS Renovations and Commissioning
- Thrasher Engineering Office Building, Bridgeport
- Upshur County 911/EMS Center
- WVU Creative Arts Center Rehearsal Hall
- WVU Towers Dining Hall Renovations
- WVU Athletic Performance Center
- HP Hood Addition/Renovations, Winchester, VA
- Dominion Office Building, Delmont, PA
- University of Pittsburgh Softball Practice Facility
- Westmoreland Community and Technical College, Indiana, PA
- WVU Alumni Center
- WVU Biomedical Research Facility
- WVU Milan Puskar Locker Room Retrofit
- NOAA GOES-R Supercomputing Center, Fairmont, WV
- WV Capitol Complex Bldg. #1, #3 & #4 Renovations and Commissioning
- Renaissance Academy Morgantown, WV
- City of Bridgeport WWTP
- City of West Union WWTP & WTP
- VA Medical Center; Audiology Task Lab Clarksburg, WV
- Mylan Park Aquatic Center



# PROFESSIONAL REGISTRATIONS

Professional Engineer:
West Virginia
Maryland
Virginia
Ohio
Pennsylvania

LEED AP BD+C Professional Accreditation NCEES Record Certificate USGBC Commissioning Badge

# **EDUCATION**

Bachelor of Science Mechanical Engineering WV Institute of Technology

# **MEMBERSHIPS**

WV ASHRAE, Past President

National Fire Protection Association

WV Society of Healthcare Engineers

# **RESUMES**

# **Dave Stabler, PE**

SENIOR ELECTRICAL ENGINEER

# **EDUCATION**

University of Maryland, College Park Masters of Science Systems Engineering

University of Maryland, College Park Bachelor of Science Computer Science

Lehigh University Bachelor of Science Mechanical Engineering

# REGISTRATIONS

Professional Engineer, MD



As the Electrical Commissioning Lead, Dave brings nearly 35 years of experience to every project and his expertise is an integral component to the success of a project. Electrical systems are a major component of more complex and continuous use facilities such as hospitals and data centers and David brings his diverse background in these various systems to every job.

Similar to the rest of our team, David uses our hands-on approach with clients and ensures that the client and the facilities managers understand the electrical systems. He will serve as the Electrical Lead preparing specifications, coordinating and participating in site testing, reviewing completed test forms and results, and verification of systems operation. He has performed electrical commissioning services for a variety of facilities including: data centers, research labs, (ABSL, BSL 2/3 and 4) office buildings, university/college campuses, assisted living and hospitals.

# **RELEVANT EXPERIENCE**

#### West Virginia University

Dave served as the Project Manager and provided the design and construction phase commissioning services to the Basketball Practice Facility.

Morgantown, WV

#### Montgomery County, Multiple Projects

Dave has worked with Scott Stoutenborough and Mike Furst on multiple projects for the County including the Judicial Center Annex and various investigation projects at County facilities. Montgomery County, MD

# Maryland Public Health Laboratory

Dave performed commissioning services of the 234,000 SF build-out of laboratory areas that embraced open and modular configurations, closed labs for isolated heating, BSL-3 lab, pre-screening labs, and a self-contained ABSL-3 lab. The project achieved LEED Silver certification. Baltimore, MD

# **RESUMES**

# David Rush, PE

SENIOR MECHANICAL ENGINEER

# **EDUCATION**

University of Maryland, College Park Masters of Science Systems Engineering

University of Maryland, College Park Bachelor of Science Computer Science

Lehigh University Bachelor of Science Mechanical Engineering

# REGISTRATIONS

Professional Engineer, MD



Since 2005, David Rush has served as a Project Manager / Senior Mechanical Engineer with the Facility Dynamics Engineering team on multiple projects throughout the Baltimore/Washington corridor. His focus has been on educational institutions extending from K-12, higher education facilities including science buildings, cancer research, and laboratories.

He brings over 40 years of experience in Facilities Management/ Engineering and Controls Engineering to every project along with a dedicated attention to detail and fiscal project approach. As a former steward of public monies in his role as a Senior Mechanical Engineer for the UMCP Department of Facilities Management, he values where dollars are spent on projects and understands the importance of doing every task with purpose and intent.

David has worked with ZDS Design and Consulting Services for five years on nearly 20 projects with the State of West Virginia (State Consolidated Lab, awarded in 2024), West Virginia General Services Division, West Virginia University, Mercer County Public Schools, Kanawha County Schools and Raleigh County Schools.

# **RELEVANT EXPERIENCE**

#### Work with ZDS Design

David has led the Cx specification development and the Final Cx Plans, has started the commissioning process for this with CACEA, the Controls and Commissioning Engineering Application that FDE utilizes to execute Cx projects and completed functional performance testing.

#### West Virginia General Services Division

With ZDS Design, David has performed design commissioning services that included review of documents, specifications, held commissioning meetings, Building 1 PFCs and coordinated all efforts with stakeholders.

#### Community College of Baltimore County, Carol Diane Eustis Center

Facility Dynamics Engineering is currently providing commissioning services to the new \$65M, 120,000 SF Health Careers and Technology Building (HCTB) that provides labs, classrooms and offices for the students and professors. The project is intended to be completed in the Fall of 2020 and is being designed to meet LEED Silver certification. Essex, MD





Our Team has provided design for new facilities and renovations and commissioned the Mechanical/ Electrical/Plumbing systems for many projects. By commissioning the systems, we verify operation in accordance with design intent, fine-tune the equipment to actual building conditions and assist Owner personnel after occupancy to improve comfort, assist with training, and improve operating costs. We understand the scope of services outlined in the RFP and will meet the requirements. Our Team has extensive experience in the commissioning requirements described in the project scope of the RFP, which are common for many of our projects.

**Design Phase – OPR, BOD, Design Review and Specifications:** We will review design documents to identify any potential issues related to commissioning of the systems and equipment, future maintenance and operations, and compliance with ASHRAE 90.1 (current West Virginia State Energy Code) restricted to HVAC systems. We assist in the preparation of the Owner's Project Requirements (OPR) and Basis of Design (BOD) and provide comments or recommendations, and develop a preliminary commissioning plan to define the process and participation of parties involved in performing commissioning activities. We prepare commissioning specifications for incorporation into the construction documents to define the commissioning process and requirements of all parties involved in the process.

**Construction Phase:** During the construction phase of the project, we review pertinent equipment submittals and utilize them in developing project specific pre-functional checklists and functional performance testing criteria. We maintain an Issues Log and continually track the progress of resolving issues by working with the Owner, design team and contractors. Our Team will coordinate the commissioning process through meetings, integration of commissioning into the construction schedule, witnessing of installations and testing, and submission of reports. Our team has a database of over 4,000 commissioning projects with the experience and expertise of issues encountered and solutions that we can access when we need additional resources to assist in overcoming challenges that occur. We believe this database of knowledge accumulated over the last three decades provides you with an excellent resource and the best value for your project.

Acceptance and Warranty Phase: We will be involved in functional testing of the DDC controls and coordination and verification of the TAB process for this project. We will witness the commissioning of systems and equipment testing identified for the project; witness and/or verify functional testing of the identified systems and equipment, with particular emphasis on the HVAC equipment and controls. We will maintain an Issues Log, review training procedures and O&M manuals and provide comments to assist in the training process. We will prepare a final commissioning report in accordance with the RFP requirements and the standards of care for the industry. We will review warranties for equipment for compliance with contract documents, perform follow-up site visits and review operations with Owner personnel. We will document issues and report findings that the Contractor or others may need to address while the project is still under warranty. These would be sent through the Owner and design team for proper action.





**Distribution of Tasks:** ZDS /FDE Team personnel will attend all required project meetings and perform the on-site witnessing and verifications. Various individuals on our team will be fully involved with developing and completing the documentation required for commissioning of the project and the final commissioning report.

**FDE's** engineers will provide commissioning assistance throughout the project and peer review of developed testing procedures and checklists and completed documentation. Due to the vast knowledge and expertise our team possesses, we will distribute tasks to the individuals whose strengths are ideally matched to provide the most efficient and effective results coinciding with the timing the tasks need performed. Having access to a solid team provides greater flexibility to have the appropriate staff involved as needed during the commissioning process.

**Travel:** ZDS is ideally located to perform the commissioning services required for the Board of Education. Our office is in Teays Valley, WV, and **FDE** has offices in Western Virginia located within a reasonable drive to project location. We will have a Team Member attending project and commissioning meetings as required and for coordinating all documentation.

Integration of Commissioning and Minimizing Time Delays: Our Team works with designers, contractors and Owners to weave in our commissioning process and integrate the commissioning activities into the construction schedule to not upset the typical process of construction. We work hard to identify items early in construction to minimize those kinds of issues that are discovered when it's too late to solve them without impacting the overall schedule. We also are able to "flex up" with staff, if necessary, within reason to accommodate a compressed commissioning schedule to-ward the end of a project.

**Fostering Teamwork and Cooperation from Contractors and Designers and Minimizing Adversarial Relationships:** Our Team embraces the attitude that the primary goal of commissioning is to deliver (i) a high-performance and efficiently operating facility to the Owner, (ii) a well-trained Operations and Maintenance staff; and (iii) high quality and continually useful documentation of the facility and of the commissioning process. Further, we approach our commissioning activities with respect for the various parties in the design/construction process and their roles. Our approach strives to solve problems before they occur, working closely with contractors and technicians in the field to identify and address problems. While we most commonly work independently (directly for the Owner), we take pride in the fact that we are often referred to new clients by contractors whose work we have commissioned in the past. Please ask about our ability to communicate while working together to resolve the challenges that arise during the construction process.

**Determining the Appropriate Level of Commissioning Effort:** We will work with the WVArNG and other Owner representatives to define the appropriate level of commissioning services and sampling for all systems and equipment to achieve the desired goals of the commissioning process. Through our many years of commissioning experience, we have been able to hone our approach and fine-tune our procedures in performing the tasks associated with commissioning common equipment and systems seen on similar projects. This experience allows us to assign the appropriate duration of time and level of effort needed to achieve a high level of performance and results for our projects.





**Sampling Strategy:** Our Team typically employs a "sampling" strategy for the systems/equipment subject to commissioning. This sampling strategy sets forth a means for limiting the scope of actual testing (usually for time and /or budgetary reasons) with the goal that the quality of the installed work does not suffer. We employ a randomly-chosen, percent-based sampling strategy for repetitive equipment such as VAV boxes, fan coils, VRF units and perhaps even AHUs (although we prefer doing all major AHU's when funding permits), depending on the Owner's needs and requirements.

For example, a job with 100 VAV boxes of a certain type with a 10% sampling (sampling rates may be dictated by budget and complexity) will have 10 VAV boxes selected at random for testing. Sampling is effective for repetitive equipment because problems that generally occur with these items tend to be pervasive across the project. For instance, we commonly find problems with VAV boxes related to programming/configuration of the controller, which is typically copied and installed in all other boxes of like kind. On the hardware side, we might find a deficiency with the way the damper actuator was mounted/aligned with the shaft and find through sampling that it was done that way for many or all boxes. In both cases, we can issue an Action Item for the Contractor to revisit all units we suspect to be involved and to take corrective measures. We then retest another sample set of our choosing to determine if the problem still exists.

**Approach to Testing & Correcting Problems:** By employing staff who are familiar with controls, troubleshooting, and facility operation, we prefer to approach the process of commissioning by first allowing the contractor to ensure the system is properly started and ready for functional testing. The contractor is responsible for documenting the start-up procedure, after which our engineers and technicians take the lead and guide the contractors through the process of performing the functional tests while we observe and document the results. When problems are identified, we work with the corresponding contractor and together devise a means for correcting the problem as rapidly and cost-effectively as possible. We will frequently develop a relationship with the construction team and Owner that allows us to perform common corrective measures in a 'real time' fashion. (Major items are of course turned back to the contractor and engineers for remediation). Field corrections that are routinely identified and performed in coordination with the contractors include:

- Sensor calibrations.
- Minor BAS programming changes.
- BAS control loop tuning and stabilization.
- Minor mechanical corrections (damper linkages and positive positioners).





Our team has access to an extensive inventory of tools and equipment that can be used by our field staff during commissioning projects. In addition to routine checking of calibrations and performance, our instrumented approach is often invaluable for eliminating the guesswork when troubleshooting problems. While we do witness Contractor's work using their instrumentation, we also coordinate with the WVArNG on additional field testing to complement our Commissioning efforts.

Our commissioning engineers have access to sets of calibrated, traceable instruments for temperature, air and hydraulic pressure, humidity, and electrical/multimeters. Specialty instruments that are shipped for use as needed when included in the scope include ultrasonic flow meters, infrared cameras, vibration analysis equipment, sound and light measurement equipment, gauge sets, and portable datalogging equipment for measurement needs.

For commissioning work, we provide precedent schedules to the Owner of the construction schedule, working with them to insert our schedule requirements into the master schedule which is typically the Prime Contractor. We would coordinate it with the Owner's team and all other stakeholders. We are experienced at using project scheduling software for schedule and resource management. While we understand the challenges associated with multiple subcontractors working side by side on the same systems, etc., our process strives to limit the time spent on testing partially completed systems. When requested to test partial systems, we will coordinate with the contractors to optimize our functional testing sequencing. For example, if the heating water systems are operational but the cooling water systems are still incomplete, we would request that we are not limited to test just one AHU but rather test multiple systems (AHU's, FCU's, VAV boxes etc.) on the heating sequences. We would then wait until the cooling systems are fully complete and operational and then test multiple systems in a similar fashion.

At all levels, our employees take ownership of their actions and view safety as a responsibility to themselves, their families, and their customers. Our team follows the construction sites safety requirements and any specific requirements by the Owner. We also receive continuing safety training, and our team is empowered to stop any process when a situation arises that the employee is not trained for, equipped to deal with, or is otherwise dangerous due to unforeseen circumstances. We are committed to the health and safety of all employees, customers, partners, and the communities we serve. As the situation around COVID-19 occurred, we adapted to those challenges.





For communication with the contractors and clients, we provide our Commissioning plan that outlines all key party's roles in the Commissioning process. We provide periodic updates as the Commissioning process progresses that include Observation reports from on-site visits and Issues Logs of items that need resolved. E-mailing updates to parties that are part of the commissioning process are provided on an as-needed basis. On larger complicated projects we use a web portal. The web portal is a well vetted, time tested, Cx Platform that dates back over 20 years ago that is managed by FDE. Key features include:

- Cx Dashboard that provides for instant graphical representations of progress and statistics of issue status by responsible party.
- Intuitive object-oriented object tree that provides a representation of the commissioned systems, components and devices and provides access to the several applicable contexts of information (issues, checklists, tests, etc. that apply to each of the elements).
- Action List/Issues Log that allows real time management of issues via both the web and email.
- Web based Cx file repository intuitively organized and indexed. This repository could be provided on a hard drive for use in the asset and maintenance management systems, as applicable.
- Pre-functional Testing and Checkout that allows granular web-based management of individual checklist items.
- Functional Testing that allows granular web-based management of individual functional test and maintenance of a history of functional tests.
- Project directory which contains the contact information for Cx team members.
- An Event calendar that can be used to schedule and coordinate Cx meetings, equipment startup, etc.

Any or all the functions listed above are available to augment, supplement, and enhance the variety for projects and delivery methods. On smaller projects like this one, we provide Prefunctional Test forms and Functional Testing that are required to be completed by the Contractors and spot checked by us. We strongly recommend the responsible Contractors perform Pre-Functional check lists for all included equipment even though we may be functionally testing a sampling of the like type of equipment (refer to examples provided). Action List/Issues Logs as noted in the examples can be implemented easily across the Construction Phase for enhanced project continuity, especially on smaller projects.





ZDS SPEC INSTRUMENTATION

All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Installer for the equipment being tested. For example, the Mechanical Contractor shall ultimately be responsible for all standard testing equipment for the HVAC system and controls system, except for equipment specific to and used by Testing and Balancing Contractor in their commissioning responsibilities. The Installer shall provide two-way radios or communication through cell phones when available.

- A. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents, shall be included in the base bid price to the Contractor and left on site, except for stand-alone data logging equipment that may be used by the CxA.
- B. Temporary Data logging equipment and software required to test equipment will be provided by the CxA but shall not become the property of the Owner.
- C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5□F and a resolution of + or 0.1□ F. Pressure sensors shall have an accuracy of + or 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.



# SECTION V.

# References

**Client Testimonial Letters** 

Sample Commissioning Documents



**ZDS** has worked on hundreds of projects in West Virginia including many with Governmental agencies. We encourage you to call the references listed below:



- <u>Ron Adkins</u>, Construction Manager, WV Air National Guard & WVDHHR: (304) 957-0205, or (304) 634-9379; former Project Manager for WVANG and current Construction Mgr. for many projects with WV DHHR as well as William R. Sharpe Jr. Hospital additions, renovations and commissioning.
- <u>Gary Boyd</u>, Director of Facility Services, University of Charleston & WVU: (304) 357 -4871, garyboyd@ucwv.edu; worked on projects at both WVU and University of Charleston involving MEP systems since 1990's.
- 4. <u>Chuck Smith,</u> Director/Coordinator Support Services, Kanawha County Schools & Kanawha County Commission: (304) 395-9352, dcsmith@mail.kana.k12.wv.us; for projects with Kanawha County Schools as well as previous projects with the Kanawha County Commission.
- 5. <u>Mike Moles,</u> Maintenance Director, Kanawha County Commission: (304) 533-7888, mikemoles@kanawha.us; worked on Kanawha County Judicial Center Renovations.
- Patrick O' Neil, Building Project Management Specialist, General Services Division—Engineering Section: (304) 352-5514, Patrick.S.Oneill@wv.gov; for projects at the WV Capitol Complex.



- 1. <u>Richard Morse</u>, Capitol Projects Manager, The County of Henrico Virginia: (804) 501-7227, mor33@co.henrico.va; Building Commissioning Services, Controls Engineering, Engineering Consulting.
- Jim Taylor, Virginia Department of Behavioral Health & Developmental Services: (804) 840-71558; jim.taylor@dbhds.virginia.gov; Building Commissioning Services, and other Engineering Services.





# Gary Boyd MA CEFP

2300 MacCorkle Ave. SE | 304 357-4871 | garyboyd@ucwv.edu

# March 12, 2024

# To Whom it May Concern

I have worked with the ZDS design team on multiple projects which include a chilled water interconnect loop, the UC Innovation Center, the UC athletic arena, and most recently, the UC Virtual Dissection Lab.

The Dissection lab project was a fast-tracked project that had many innovative components that had to be perfectly aligned to ensure the lighting was correct, the cooling for the computers mounted in the ceiling was sufficient, and headsets were accessible and properly positioned to name a few. I was extremely impressed with the speed and efficiency that ZDS provided to design and complete this project over the Summer and have this innovative space ready for our students for the 2022 Fall semester. The cooling, lighting, equipment placement and aesthetics have performed flawlessly, ZDS designed a high-quality show piece for UC in record time.

ZDS also took on the task of developing the MEP for the new athletic arena and addition of the Innovation Center and new athletic offices. This project included 3D imaging of the space prior to construction. The project also included LED lighting, a chiller and chilled water distribution with a roof mounted cooling tower and roof mounted AHUs. The Wehrle Innovation Center and Athletic Arena have served UC extremely well over the past 6 years, the arena has become the choice location for the UC graduation ceremony since completion. The plumbing, electrical, and HVAC systems have performed extremely well due to the quality of the design and specifications that ZDS provided. I highly recommend ZDS for their impressive attention to detail, skilled design team, and commitment to their projects.

Gary Boyd - University of Charleston Director of Facilities



Michael Pickens 172 Oak Street Dunbar, WV 25064 (304) 400-9993

# **RE: ZDS Design/Consulting Services**

I have had the privilege to work with ZDS Design/Consulting Services' principals and many of their staff since working at the School Building Authority in the 1990's in my roles at the School Building Authority to my current role as Executive Director of the Office of School Facilities at the West Virginia Department of Education.

When an emergency issue arose, they would immediately make themselves available to help. ZDS's principal, Todd Zachwieja, did not hesitate to board a helicopter during a weekend to help assess the damage to the State's school facilities when damaging floods occurred. Helicopters were the only way to reach many of the facilities because the roads had been washed away or were impassible. Anytime a challenging issue has arisen that no one knew how to resolve, ZDS has stepped up to solve the challenges. Their extensive engineering knowledge of energy efficient systems, HVAC, controls, lighting, power and plumbing systems has always been at the leading edge in the industry, providing innovative solutions that also minimize energy and operating costs. I have always considered their approach in engineering design and commissioning for buildings to be the best and would highly recommend them to anyone.

Their ability to work with the State Fire Marshal and other agencies – while guiding everyone to a practical design approach – always provided each project with the best value. They are much more than excellent design engineers; they also understand the importance of operating and maintaining equipment and have hands-on knowledge to troubleshoot and also commission to ensure our projects were a great success. Their combined engineering design and commission skills prove to be invaluable.

ZDS Design/Consulting Services was also selected to help the WV Department of Education and the School Building Authority in writing new codes and standards to raise the bar for the entire State. They were chosen because their projects were a success while we were having challenges with others. Todd Zachwieja was also asked to teach school facility staff members, and his reference books continue to be used today. I would always think of ZDS first whenever a challenge would occur, knowing I would get the best results possible.

I trust ZDS's staff in their technical expertise and their approach in solving challenging engineering issues and believe that anyone who uses them will be as satisfied as I have been. They are worth it!

Sincerely,

hickof F. Fraker

Michael E. Pickens



# **ELSWICK & ASSOCIATES, LLC**

To Whom It May Concern:

I am distinctly honored to provide this letter of recommendation for ZDS Design/Consulting Services to your organization. I have known ZDS's principals and many of their staff since working with Ted and Todd Zachwieja at West Virginia Institute of Technology located in Montgomery, WV, from the 1970's, while I was the Physical Plant Director there. That relationship continues through today. Their knowledge of energy efficient systems related to Heating, Ventilating, and Air-Conditioning (HVAC), Building Automation Systems (BAS), lighting, power distribution, and plumbing systems has always been at the cutting edge of the industry. They have routinely provided innovative solutions to complex design challenges while minimizing energy and operating costs and enhancing maintenance efficiency. I have always considered their approach to engineering design and commissioning systems first for higher education, hospitals and schools to be superior and I would recommend them to anyone.

Throughout my career I have continued my working relationship with Ted and Todd Zachwieja and Jim Watters while I was Director of Facilities Management at Charleston Area Medical Center (CAMC), General Division, located in Charleston, WV. During that time, they provided mechanical, electrical, and plumbing (MEP), engineering, and construction administration services for all areas of CAMC's facilities. Their knowledge of health care code and practical design approach always provided the uniqueness required for the scope of the work. They understood the importance of operating and maintaining equipment and used their hands-on knowledge to ensure all our projects were on schedule and within budget. As a matter of fact, Todd led the first energy services performance contract in West Virginia. Through Todd's leadership, CAMC saved in excess of \$800,000.00 annually in energy costs and those savings were used for mechanical, electrical, and infrastructure upgrades at all three CAMC divisions. Ted, Todd, and Jim also assisted in many other projects at all CAMC divisions, including commissioning the work implemented as part of the energy savings program. Their combined engineering design and commissioning skills proved to be invaluable.

I also worked with ZDS Design/Consulting Services while I was Director of Facilities, Planning and Management at Washington & Lee University in the 1990's. They designed, acted as the construction project manager and commissioned the campus chilled water plant and distribution system to address the needs of the growing campus while fast tracking the project from start to finish in just nine months. I would always think of ZDS first whenever I was faced with a challenge, knowing that I would get the best technical expertise available.

> 513 Havana Dr. Charleston, WV 25311 304.542.8877

Likewise, ZDS helped establish one of the first performance contracting programs in the State of Ohio's higher education system for Ohio University, saving the Athens campus millions annually while the savings were used for the mechanical, electrical and building automation improvements to generate the savings.

I have the utmost confidence in the technical expertise, the collaborative approach and ethical standards of ZDS Design/Consulting Services. Furthermore, these individuals are truly honorable professionals. In this regard, if you have questions or need additional information, please don't hesitate to contact me.

Sincerely,

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Bill Elswick, MBA, CEO



SAMPLE #1

**Design Peer Review** 

MECHANICAL • ELECTRICAL • INDOOR AIR QUALITY • ENERGY • COMMISSIONING • FORENSIC

WV Department of Administration General Services Division 112 California Avenue, 5th Floor Charleston, WV, 25305

## **RE: Building #4 99% Construction Document Submission Peer Review**

Dear

We have reviewed the December 10, 2021, Owner Review WV Capitol Complex Building #4 99% Construction Drawings prepared by and their consultants limited to HVAC systems and Vertical Transportation systems.

#### 99% Construction Specification Comments:

#### Section 23 0593 Testing Adjusting and Balancing for HVAC

- Add to 1.5 and/or 3.17 as appropriate "The TAB Contractor shall report deficiencies directly to GSD and Commissioning Authority (CxA) in addition to Mechanical Contractor (MC). TAB Contractor shall be required to accompany MC to verify adjustments on all devices and permit witnessing by GSD/CxA of selected activities. TAB Contractor shall communicate/cooperate fully with MC, GSD and CxA and include those costs in bid. The GSD and CxA shall have the option to require the TAB to reverify any balancing readings requested, and those costs shall be included in bid."
- 2. Remove from the list of TAB Contractors in the specifications section 1.8, A.

### Section 23 0713 Duct Insulation

- Clarify if the design intent is to stay with externally wrapped mineral fiber blanket 1-1/2" thick insulation on supply duct within the exterior walls or lined with flexible elastomeric duct liner. Some earlier discussions included "bubble wrap" for a thinner wrap insulation. Currently only mineral fiber blanket 1-1/2" thick insulation is specified in section 3.7, A. GSD will accept fiberglass insulation liner in transfer ducts that are sized for 500 fpm or less for acoustics.
- 2. Section 3.7, F Transfer Air Ducts show internally lined and refers to 233113 which would then be flexible elastomeric duct liner. Verifying that is the design intent.

Section 23 0900 Automatic Temperature Control System

- 1. Paragraph 1.5, 8, a Water Temperature: Plus, or minus 0.18°F instead of 1°F (chilled water sensors).
- 2. Paragraph 2.3, D, 5 add "and the Commissioning Agent" after so the CxA has web browser access for commissioning activities.
- 3. Paragraph 2.6, C. Other Electronic Sensors, incorporate the following:

- a. Hydronic temperature sensors Immersion (Water) Temperature: Plus, or minus 0.18°F reporting accuracy. Insertion Elements for Liquids: Brass or stainless-steel socket with minimum insertion length of 2-1/2 inches. The accuracy for chilled and hot water temperatures should be at a higher accuracy than space temperatures to allow for improved accuracy for Commissioning activities and future energy reporting.
- b. Verify Carbon Monoxide Sensor accuracy is adequate over the setpoints for alarming. Typical action levels are at 30 ppm as an example.
- c. Electrical Service Power Monitoring/metering shall be performed through the existing switchgear which is capable to provide a full data set of information. It shall communicate directly with the DDC Control system via Modbus to provide the energy variables measured. Controls contractor shall verify type and size prior to bidding and provide all necessary interfaces to fit application at no additional cost to the Owner.

# Section 23 0993 Sequence of Operations for HVAC Control System:

- 1. Provide sequence of operations for the following that did not appear to be shown in the 99% documents:
  - a. Sequence of Operation for chilled water valves shown on central plant primary loop and the secondary loop. Provide unique identifiers on motorized valves for clarity on Drawing H401 to reference in the sequence of operations.
  - b. Clarify if all perimeter FCU's have dehumidification sequence or only selected FCU's that show a humidity sensor in that given space. Clarify which FCU's are being controlled when a space humidity sensor is intended to cover multiple spaces.
  - c. Include sequence of operation for hot water convector CV-61.
  - d. Include emergency gas shut down sequence and the gas solenoid valve so gas is shut off to all boilers. Clarify if local audio/visual alarm at each boiler room exit.
- 2. Paragraph 3.6 Hot Water System
  - a. Clarify if local audio/visual alarms are included in the project for emergency shut down or carbon monoxide alarming.
  - b. Paragraph C ATC subcontractor shall coordinate with boiler manufacturer to ensure that alternate leader is programmed in the Boiler Management System, which allows the alternate leader to automatically assume control of the Boiler Management System should the Master boiler lose communication.
  - c. Paragraph D, 4 references Condensing Boilers specs 235216 which should also include the required controls coordinating language. Clarify which boiler controls setpoints are changeable from the Trane Controls remotely instead of having to physically go to the boiler control panel to change (i.e., hot water supply setpoint based on outside air which GSD prefers to be only at the boiler controller).
  - d. Paragraph L, 7 and 16 What is GFT System Pressure?
- 3. Paragraph 3.9 Variable Air Volume DOAS Air Handling Unit AHU-71
  - a. Add a pre and post occupancy purge for DOAS unit (i.e. 30 minutes adjustable). Typical occupied periods are from 6 am until 6 pm on working weekdays. Weekends are typically unoccupied
  - b. Add coordination language to B, a, ATC shall coordinate AFMS calibration and max flow settings with AHU manufacturer.
  - c. Add coordination language to D, 1, a, and 2,a, The ATC shall obtain initial static pressure setpoints for supply and exhaust from TAB.
  - d. D,3, a, 2), Add two additional Temperature sensors located in the supply duct after the heat exchanger and after the preheating coil to points list and show on drawing H403.

Modify sequence of operation to say "When the temperature sensor upstream of preheat coil located after the heat exchanger is below 34°F (adjustable) the DDC system shall modulate defrost coil HW control valve in order to maintain the air temperature upstream of preheat coil above that setpoint."

- e. D, 4, a, Define relative humidity setpoint (i.e., 60% adjustable).
- f. D, 4, b, Clarify sequence and define supply air dry bulb temperature setpoint.
- g. D, 5, b, refers to dynamic space air temperature setpoint described below. Clarify design intent.
- h. F, clarify the design intent for night setback. The DOAS is intended to be off during unoccupied periods.
- i. K, 5, & 6, clarify this is for both supply and exhaust.
- j. K, 11, AI Space Differential Pressure clarify how this point is used in sequence or is it only informational?
- k. K, 36 & 37 clarify this if for each VFD.
- 4. Paragraph 3.10 Exhaust Fans (and Supply Fans) paragraph B, 1, a Can exhaust fans and supply fan be furnished with the dampers instead of by the ATC subcontractor? This can save costs if that option is available.
- Paragraph 3.11 Smoke Control Systems Coordinate with Trane related to the Smoke control system since its typically under the electrical division and its important to distinguish between Controls work and work performed by Fire Alarm Contractor/others so it's clear who is responsible for specific work.
- 6. Delete 3.16 Hot Water Cabinet Unit Heaters since this is no longer applicable to the project.
- 7. Paragraph 3.17 Hot Water Unit Heaters, B, delete last sentence "An aquastat shall prevent the unit heater's fan from operating when hot water supply temperature drops below setpoint of 100°F (adjustable) and replace with "Two-way control valve shall operate on call for heat and prevent fan and heat from operating when outside air temperatures are above 65°F (adjustable). Also add "AO" to paragraph D for "two-way control valve" control.
- 8. Paragraph 3.18 Smoke Dampers (and Combination Fire/Smoke Dampers) Clarify work between ATC and others. According to the local Trane representative, the ATC could monitor the end switches but wouldn't typically carry the dampers or power for these dampers as this would customarily be provided by others. Clarify which sub-contractor should be responsible for furnished and installing duct smoke dampers and provide wiring between detector and combination fire/smoke damper actuator if not ATC. Division 233300, 2.3 says Control dampers furnished by ATC; however, 2.4 Fire Dampers and 2.5 Combination Fire and Smoke Dampers indicate the MC is responsible for those dampers and presumably the Division 26 Contractor is responsible for power and detectors. MC should be responsible for furnishing and installing Fire Dampers and combination Fire and Smoke Dampers.
- 9. Delete 3.19 Carbon Monoxide Monitoring Clarify basis of design for carbon monoxide setpoints for alarming. Check the accuracy of sensing element is sufficient for that setpoint defined in section 230900 will meet those values. "Whenever the room CO sensor detects levels of 30 ppm (adj.) of CO for more than 15 minutes (adj.) or above 40 ppm any time (no delay) a 24-volt strobe light and alarm horn shall sound an alarm. Blue strobe/horn equal to Kele Model 869STR-B-AQ (24V) shall be furnished and installed by Controls Contractor. Also, provide test button for manual testing of alarm device located in the room. Locate horn/strobe in room or in the adjacent room in location approved by the Owner/ Engineer. Provide signage

to label strobe/horn of "Carbon Monoxide". Confirm size/color of lettering with Owner." Add "AI – CO Levels" to points list.

- 10. Paragraph 3.21 Electric Service Usage Monitoring. The controls contractor shall field investigate existing switchgear interface to confirm the following points can be obtained through Modbus and fully coordinate and cooperate with the Electrical Contractor (EC) to confirm requirements within the main distribution panelboard (MDP) for the ATC's interface. Provide reset kWH and reset Min/Max/Avg. inputs from the BAS to the power meter. Provide the following energy data inputs to the BAS:
  - a. kW, Real Power (Total and Each Phase)
  - b. kVAR, Reactive power
  - c. kVA, Apparent Power
  - d. Power Factor: 3-phase average and per phase
  - e. Power Demand: Most Recent and Peak
  - f. Demand Configuration: Fixed, Rolling block, and external sync.
  - g. Average, Minimum and Maximum Real Power
  - h. Voltage, by phase Line to Line, Line to Neutral and 3-phase average
  - i. Diagnostic alerts
  - j. Amps, Average Current (Total and Each Phase)
  - k. KWH Consumption

## Section 23 5216 Condensing Boilers

- 1. Add to gas train requirements The boiler shall be constructed in conformance to ASME Section IV, ASME CSD-1 and UL 795 provided by the boiler mfr.
- 2. Include boiler control system including user interface and multiple boiler control sequence of operation required to be performed by boiler controls and clarify communication requirements between boilers since boiler control is performed by boiler controller not ATC. Require boiler mfr. to coordinate with DDC contractor prior to submittals.
- 3. Include combustion testing over the range of operation.

<u>Section 233300 Air Duct Accessories</u> - Incorporate Fire Damper inspection/testing into Division 23 specs where appropriate, possibly under 3.2 in this section.

- Fire dampers and combination fire/smoke dampers shall be tested per NFPA 80 "Standard for Fire Doors and Other Opening Protectives", Chapter 19 "Installation, Testing and Maintenance of Fire Dampers". Testing will comply with the requirements of the office of the West Virginia State Fire Marshal and other Authority Having Jurisdiction (AHJ). In addition, per NFPA 80, new fire dampers shall be inspected and tested one (1) year after Substantial Completion of the Project.
- 2. In general, inspection and testing procedures shall be as follows:
  - a. Full unobstructed access to the fire or combination fire/smoke damper shall be verified and corrected as required.
  - b. If the damper is equipped with a fusible link, the link shall be removed for testing to ensure full closure and lock-in place if so equipped. GSD requests two spare links be provided for each damper and set in locations acceptable to the Owner (i.e. ideally located near each damper). Provide access doors adequately sized (i.e. width of duct where possible).
  - c. The operational test of the damper shall verify that there is no damper interference due to rusted, bent, misaligned, or damaged frame or blades, or defective hinges or other moving parts.
  - d. The damper frame shall not be penetrated by any foreign objects that would affect fire damper operations.

- e. The damper shall not be blocked from closure in any way.
- f. The fusible link shall be reinstalled after testing is complete.
- g. If the link is damaged or painted, it shall be replaced with a link of the same size, temperature, and load rating.
- h. All inspections and testing shall be documented indicating the location of the fire damper or combination fire/ smoke damper, date of inspection, name of inspector, and deficiencies discovered.
- i. The documentation shall have a space to indicate when and how the deficiencies were corrected.
- j. All documentation shall be maintained and made available for review by the AHJ.
- k. Reports of changes in airflow or noise from the duct system shall be investigated to verify that they are not related to damper operation.
- I. All exposed moving parts of the damper shall be dry lubricated as required by the manufacturer.
- m. If the damper is not operable, repairs shall begin without delay.
- n. Following any repairs, the damper shall be tested for operation in accordance with these requirements.
- o. All maintenance shall be documented in accordance with items h, i and j above.

## 99% Construction Drawings Comments:

In general, verify adequate service clearance exists for all ceiling style FCU's/SCB's for filter access, coil servicing, etc. Example areas include FCU-245, FCU-345, FCU-445, & FCU-545.

## Drawing H100 Basement HVAC Demo Plan:

1. Add to Coded note #6 Verify if Owner elects for the condensate pump, including associated controls, relatively new steam traps to be turned over to the Owner prior to starting demo and carefully remove those elements for the Owner. Coordinate specific components with the Owner to be turned over to the Owner prior to demolition.

#### Drawing H200 Basement Floor HVAC Plan:

- Clarify the BOD intent for outside air ventilation in the basement that very little is required because it is anticipated to primarily be unoccupied space. Our understanding is the rooms that do not show any outside air ventilation are intentionally done that way (i.e., South Stair Discharge #002, Water #018, Maintenance Storage #024, Boiler Room #025, Maintenance Storage #026, Office Storage F #033, Fire Service #034, Electrical Vault #043, and Maintenance #046). Dehumidification for the basement is accomplished with space humidity sensors engaging dehumidification sequences of operation on FCU's.
- 2. Clarify how makeup air for 462 cfm of exhaust air is reaching Office Storage E #031. Will it require any transfer grilles?
- 3. Move humidity sensors and thermostats currently shown in doorway of Office Storage #033 to appropriate interior wall.

#### Drawing H201 First Floor HVAC Plan:

- 1. Show humidistat in Shared Multipurpose Room #130 also serves FCU-123, 124, 125 and FCU-126 for dehumidification mode since they are the source for moisture removal. Consider Including sequence to minimize chance of the FCU's and SCB-105 from operating in an energy wasteful mode (i.e., SCB cooling when FCU's are in heating mode in the same space).
- 2. Show humidity sensor for FCU-131 and FCU-132 serving Lobby #104 due to the entrance vestibule potential infiltration for dehumidification mode.
- 3. Show humidity sensor and thermostat for FCU-010 serving Office Storage A #035.
- 4. Open Office room #140 shows three thermostats in the same room to serve FCU's. The interior wall thermostat near door is assumed to also serve SCB-101.

- 5. Humidistat shown in Advisor room #166 but not others of similar type/use. Why just this room? Do they impact other rooms for dehumidification?
- 6. Shift access for SAV-106 controls to opposite side for service clearances since SAV-106 is located next to a wall without access on one side.

# Drawing H202 2<sup>nd</sup> Floor HVAC Plan:

- Show humidistat(s) in Open Office Room #210 also serves FCU's for dehumidification mode since they are the source for moisture removal. Currently only one humidistat shown in space (tagged to only serve FCU-202, 203, 204, 205) with five thermostats shown for 14 FCU's and two SCB's. Since there are multiple thermostats in this same space include sequence to minimize chances of the FCU's and SCB's from operating in an energy wasteful mode (i.e., SCB or some FCU's are in cooling when FCU's are in heating mode in the same space).
- 2. Humidistats shown in Membership Manager room #223 and Employee Reporting Manager room #243 but not others of similar type/use? Why just these rooms? Do they impact other rooms for dehumidification?
- 3. Add humidistat in Legal Conf. Room #221.
- 4. Show humidistat(s) in Open Office Room #230 also serves FCU-227, 228, 229, 230, 231, 232, 233, and FCU-234 for dehumidification mode since they are the source for moisture removal. Currently only one humidistat shown in space with six thermostats shown. Since there are multiple thermostats in this same space include sequence to minimize chances of the FCU's and SCB-207 from operating in an energy wasteful mode (i.e., SCB or some FCU's are in cooling when FCU's are in heating mode in the same space).

### Drawing H203 3rd Floor HVAC Plan:

- Show humidistat(s) in Open Office Room #310 also serves FCU's for dehumidification mode since they are the source for moisture removal. Currently no humidistat shown in space with three thermostats shown for 10 FCU's and one SCB. Since there are multiple thermostats in this same space include sequence to minimize chances of the FCU's and SCB's from operating in an energy wasteful mode (i.e., SCB or some FCU's are in cooling when FCU's are in heating mode in the same space).
- 2. Humidistats shown in Dep Director Office room #312, Board Counsel room #317, Executive Director room #319 and Chief Financial Officer room #347 but not others of similar type/use. Why just these rooms? Do they impact other rooms for dehumidification?

### Drawing H204 4<sup>th</sup> Floor HVAC Plan:

- Show humidistat(s) in Open Office between Rooms #434 and #435 (room name/number for that space not shown) also serves FCU's for dehumidification mode since they are the source for moisture removal. Currently no humidistat shown in space with three thermostats shown for FCU-427 thru FCU-430 and one SCB. Since there are multiple thermostats in this same space include sequence to minimize chances of the FCU's and SCB's from operating in an energy wasteful mode (i.e., SCB or some FCU's are in cooling when FCU's are in heating mode in the same space).
- 2. Humidistat shown in Office, 10 room #435 and Office 17 room #444 but not others of similar type use? Why just these rooms? Do they impact other rooms for dehumidification?

# Drawing H205 5<sup>th</sup> Floor HVAC Plan:

 Show humidistat(s) in Open Office Room #510 also serves FCU's for dehumidification mode since they are the source for moisture removal. Currently one humidistat shown in space with three thermostats shown for 8 FCU's and one SCB. Since there are multiple thermostats in this same space include sequence to minimize chances of the FCU's and SCB's from operating in an energy wasteful mode (i.e., SCB or some FCU's are in cooling when FCU's are in heating mode in the same space).

- 3. Humidistat shown in Administrative room #525, Appellate room #532, Habeas room #543 and Office of Legal Representative Director room #541 but not others of similar type use? Why just these rooms? Do they impact other rooms for dehumidification?
- 4. How does humidistat located in Open Office room 530 provide dehumidification when this area is served by SCB-507 which is a sensible only unit?

## Drawing H206 6th Floor HVAC Plan:

- 1. Show humidistat(s) in Open Office rooms #610 and #630 also serves FCU's for dehumidification mode since they are the source for moisture removal. Currently one humidistat shown in office space with room #610 having three thermostats impacting FCU's-606 thru FCU-611 and one SCB and with room #630 having five thermostats impacting FCU's-623 thru FCU-633 and one SCB. Since there are multiple thermostats in this same space include sequence to minimize chances of the FCU's and SCB's from operating in an energy wasteful mode (i.e., SCB or some FCU's are in cooling when FCU's are in heating mode in the same space).
- 2. Humidistat shown in Multipurpose room #611, Maintenance Supervisor room #621, Executive Director room #626, Business room #647, Grounds room #643, and Arch & Eng room #641 but not others of similar type use? Why just these rooms? Do they impact other rooms for dehumidification?

## Drawing H207 Seventh Floor HVAC Plan:

- 1. Would above ceiling type of FCU fit this Copy Room #741 for FCU-712 space better to preserve the floor space?
- 2. Humidistat shown in Judge Office 01 room #713, Judge Office 02 room #731, Judge Office 03 room #736 but not others of similar type use. Why just these rooms? Do they impact other rooms for dehumidification?
- 3. Show thermostat and humidistat for Open Office room #720.
- 4. Verify coil pull service clearances are available for DOAS unit AHU-71. Access doors on entering and leaving side of all coils requested by GSD for servicing.

<u>Drawing H208 Penthouse Floor HVAC Plan</u>: Label disconnect for SF-82 within Penthouse room #801.

<u>Drawing H301 HVAC Enlarged Plan & Elevations:</u> Show bypass filter locations for chilled water and heating hot water for clarification.

Drawing H401 Chilled Water System Piping Diagram:

- Clarify with a sequence of operation how chilled water from central plant flow is regulated for only building #4 needs. Identity the valves shown on chilled water system piping diagram uniquely to clarify in sequence of control. Is the valve shown on the central plant return a twoway modulating control valve used to limit the chilled water back to central plant to minimize pump energy for central plant pumps?
- 2. Show all the P/T ports (Pete's plugs) on flow diagram that are identified in spec section 230519 adjacent to thermowells including entering and leaving sides of central chilled water plant EWT/LWT, on all three ports of V-SC-1, combination filter/feeder, and adjacent to pump headers entering water and leaving, pressure gauges or thermometer locations. Clarify that the test plug kit identified in spec section 230519, paragraph 2.6 shall be turned over the CxA and Owner to use during commissioning efforts instead of at end of the project.
- 3. Can circuit setter for combination filter/feeder be located on return line instead of supply to reduce the risk of the balancing valve collecting debris?

<u>Drawing H402 Schematic Hot Water Piping Diagram</u>: GSD requests for adding P/T ports (Pete's plugs) entering and leaving sides of boilers, combination filter/feeder, and adjacent to pressure gauges.

<u>Drawing H403 Schematic Central Station AHU Diagram</u>: GSD requests for access doors on both sides coils which appears to require adding access doors between plate heat exchanger and coils in two locations from what's shown on this diagram for access to defrost HW coil and preheat coil.

<u>Drawing H602 HVAC Details</u>: Add (two-way or three-way as appropriate) control valve for unit heater Detail #5 since heating will be active all year to avoid heating unit when not required. Add shut-off valve after circuit setter. Delete aqua stat since each unit heater has a DDC space sensor. Incorporate a global lockout of unit heaters to turn off heat whenever outside air temperatures are above 68 degrees (adjustable) into the sequence of operation.

<u>Drawing H603 HVAC Details</u>: Delete detail #7 Piping at cabinet heater detail since no longer applicable to this project. Delete detail #11 Hot Water Unit Heater Piping Detail since its already covered on drawing H602 detail #5.

<u>99% Elevator Review comments:</u> Refer to attached letter from associates for comments on the elevators based on the 99% construction documents prepared by

Please let us know if you have any questions or need any additional information.

Sincerely,

Todd A. Zachwieja, P.E., CEM, LEED AP Principal, Chief Executive Officer Ted A. Zachwieja III, P.E., CEM Chief Technical Officer

2021-12-29 Bldg #4 Revised 99% CD Comments.docx



# SAMPLE #2 Pre-Functional Checklist

AHU (	typical)						
FPT	Date	Type of Test	Function	Component	Device	Expected/Final Results	Status
101	Test Desc	Configuration Check	zz_Control	Sequences -		Installation is per the contract documents.	Didn't Test
CA	Checked compliant	the configuration. Review ce.	ved it against the co	ontract documents and	ensured its		
102	Test Des	Document Review	zz_Control	Sequences		1. Approved Submittals/Shop Dwgs: Yes 2. Operations and Maintenance Data: Yes	Didn't Test
CA	Verified the required documents have been submitted and reviewed them to ensure adequacy. Ensured all data for all components involved with test are included. Verified that linked electronic reports/test results include accurate component designations that match those used on the contract documents and include a method to directly navigate to specific components such as hyperlinks, bookmarks, table of contents with accurate page numbering, etc.					<ol> <li>Completed Start Up Checklists and Tests: Yes</li> <li>Linked Reports (including accurate designations and navigation method): Yes</li> <li>Warranty Information: Yes</li> </ol>	
103	Test Desc	Prerequisite - Air	zz_Control	Sequences		All systems ready; including:Electrical Distribution, Ductwork, Air TAB, Related Piping Systems including: Water TAB, Control Systems .All labeling affixed and adequate access is	Didn't Test
CA	Validated necessary	that all supporting and/or for FPTs on this system.	related systems ha	ve been started and tes	ted to the extent	provided to all components.	
104	Test Desc	Start Up Review	zz_Control	Sequences		Start up was adequate.	Didn't Test
CA	Checked t and the st document	the start up forms and doct art up has been documente ation]	umentation to ensu ed.[ Reviewed the	re the system has been manufacturer's [factory	adequately started y test][start up]		

+1/D	

FPT		<b>T C T</b>					<b>2</b>
	Date	Type of Test	Function	Component	Device	Expected/Final Results	Status
105	Test Des	Graphic - Setup cription	zz_Control	Sequences		BAS graphic was acceptable.	Didn't Test
CA	Reviewe assignme device fr	d graphic for accuracy, qua nt. For inputs manipulate om graphic and obsestive a	ality, and adequate sensor to vaildate g ction of component	inking. Spot check po raphic update. For ou	oints for proper atputs, command		
106	<b>T</b> ( <b>D</b>	Graphic - Setpoints	zz_Control	Sequences		All setpoints are adjustable (none in code).	Didn't Test
CA	Validated from the	cruption I that the setpoints required graphic and/or a function b	d to be adjustable p block menu.	- er the sequence can be	changed directly		
107	Tost Dos	Equip - S/S Feedback	zz_Control	Sequences		'Stop' and 'Start' states displayed on workstation matched command and actual status.	Didn't Test
CA	Send 'Sto	p' and 'Start' Commands.	Observe actual and	displayed status at OI			
108	Test Des	Equip Interlock	zz_Control	Sequences		Equipment interlock in place for proper operation.	Didn't Test
CA	Review p	programming and configure	e system to operate	properly with interloc	ked equipment.		
109		Equip - Power Interrupt	zz_Control	Sequences		A. All devices go to their fail position. Unit stops. [Panel clock keeps correct time/date.] [Interlocked equipment responds per specification].	Didn't Test
CA	Test Des A. Interr	<b>cription</b> upted power to the unit [system)	stem] by [opening	- he disconnect.] [trippi	ing the breaker.]	B. Unit restarts and enters correct operational mode.	
	B. Restor	red power to the unit by [cl	losing the disconne	ct.] [resetting the breal	ker.]		
110	Test Des	Equip - Alarm	zz_Control	Sequences		Alarm enunciatedat at BAS Operator Interface and all other applicable systems.	Didn't Test
CA	Cause eq validates	uipment/unit to go into ala proper enunciation in the o	rm. This is done ir event of an alarm	concert with other fai	ilure tests. This test		
111		Safety Seqs	zz_Control	Sequences		All devices set and tripped appropriately.	Didn't Test
CA	Test Des Verified	cription all relevant safeties are fun	nctioning properly	-			

AHU (	typical)						
FPT	Date	Type of Test	Function	Component	Device	Expected/Final Results	Status
112	Test Desci	Steady-State Operation	zz_Control	Sequences		All control loops and functions operating normally per spec. Date/Time:	Didn't Test
CA	Observe sy parameters	rstem in operation before	e making any chang	es. Recorded key syste	em operating		
113 CA	Test Descr Review tre	Trend Review •iption nd graphs for anomalies	zz_Control	Sequences -		No anomalies noted.	Didn't Test
118 CA	<b>Test Descr</b> Validated t was accept	Training Sign Off <b>iption</b> that the training on all eq able, was attended by re	zz_Control uipment and systen quired Owner perso	Sequences - ns related to this FPT h nnnel, is adequately doo	as been conducted, cumented	Training Conducted on: Owner Feedback Positive: Yes Attendees were as required: Yes	Didn't Test
121 CA	Test Descr	z_Loop Response / Sequence 3.1	zz_Control	Sequences -		Control loops responded acceptably. Action correct for application and normal positions of controlled devices.	Didn't Test
	<ul> <li>3.1 SEQUI</li> <li>A. Not in c</li> <li>B. Set point</li> <li>C. S/S com</li> <li>D. Alarm M</li> <li>E. Adjustal</li> <li>F. Reset Sc</li> <li>G. Reset Sc</li> <li>H. Prove o</li> <li>I. Refer to</li> <li>J. Smoke I</li> <li>K. Set point</li> </ul>	ENCE OF OPERATION operation, off position. tts umands Messages ble setpoints chedule (not on drawings chedule (specified) peration drawings for additional i Dectectors tts	s)				

FPT							
	Date	Type of Test	Function	Component	Device	Expected/Final Results	Status
122		z_Loop Response / Sequence 3.2	zz_Control	Sequences		Control loops responded acceptably. Action correct for application and normal positions of controlled devices.	Didn't Test
CA	Test Des	cription		-			
	3.2 ALAI	KMS - GENERAL					
	A. Alarm B. Overri C. Analog D. HOA E. Mainte	Priority Levels de Alarms g Input Alarms Fampering nenace Alarms					
123		z_Loop Response / Sequence 3.3	zz_Control	Sequences		Control loops responded acceptably. Action correct for application and normal positions of controlled devices.	Didn't Test
~	Test Des	cription		-			
CA	3.3 ADD	TIONAL REQUIREMEN	TS FOR ALTERN	NATE CONTROL COM	PANY BIDS		
	A. Altern B. Existir C. Field v D. Incorp	ate bidders responsible tof g wire, conduit, relays, see erfiy and provide addition orate all existing to remair	ield verify existing nsors and other dev al sequences as ree equipment by usi	equipment vices may be reused if co quired w min control po ng ASI into new Base B	ompatible ints id DDC system.		
124		z_Loop Response / Sequence 3.4	zz_Control	Sequences		Control loops responded acceptably. Action correct for application and normal positions of controlled devices.	Didn't Test
СА	Test Des	cription		-			
0,1	3.4 MON	ITORING AND ALARMS	5				
	A. Points B. Point I C. Remot	listed shall be monitored a Descriptions e I/O	nd alarmed				

FPT							
	Date	Type of Test	Function	Component	Device	Expected/Final Results	Status
125		z_Loop Response / Sequence 3.5	zz_Control	Sequences		Control loops responded acceptably. Action correct for application and normal positions of controlled devices.	Didn't Test
	Test Des	cription		-			
CA	3.5 VAV	AIR HANDLING UNITS	(AHU-1, RTU-01	, RF-1, RTU-02)			
	A. AHU B. Occuj C. Start J D. Ecom E. SF/RI F. Air TG G. Occ C H. Chilld I. Occ H J. Occ D K. Unocc D. Unocc O. Unocc O. Unocc O. Unocc O. Unocc O. Unocc P. Ventil Q. Venti R. Morn S. Safeti T. Future U. UVC V. Bi-po W. Spac X. More Y. Diff I Z. Min I AA. Ala BB. Grag	S/S ied Mode 'ans at low speed mizer Mode Status mp Setpoints ooling r Operation ating humidification Mode Night Setback Cooling c Night Setback Heating Dehumidification Override ation CFM Reset ation CFM Reset ation Control ng Warm-up/Cooldown s Duct Static Pressure Reset Lighting ar Ionization Pressurization Control than One Room ressure Alarm DC Point Configuration ms hcs					
126		z_Loop Response / Sequence 3.6	zz_Control	Sequences		Control loops responded acceptably. Action correct for application and normal positions of controlled devices.	Didn't Test
~	Test Des	cription		-			
CA	3.6 EME	RGENCY SHELTER-IN-P	LACE				

A. Contractor shall furnish and install Emergecny Shut-Down system for us in Chelter-In-Plance

event.

B. Contractor shall furnish and install interface wiring and relays.C. Min DDC point configuration

FPT							
	Date	Type of Test	Function	Component	Device	Expected/Final Results	Status
127		z_Loop Response / Sequence 3.7	zz_Control	Sequences			Didn't Test
CA	Test Des	cription		-			
0/1	3.7 FAC	LITY ELECTRICAL SER	VICE POWER M	ONITORING			
	B. Contro C. Conra D. Syster E. Size o F. Graph G. Alarm	ls integrated power systen ctor interface wiring n Demand level CTS cs s	a				
128		z_Loop Response / Sequence 3.8	zz_Control	Sequences		Control loops responded acceptably. Action correct for application and normal positions of controlled devices.	Didn't Test
CA	Test Des	cription		-			
U.	3.8 AIR	COOLED CHILLERS AN	D CHILLED WAT	TER PUMPS			
	A. Gener B. Summ C. Chille D. Chille F. Chille G. Chille H. Chille I. Chille J. Demar K. Contr L. Min D M. Alarm N. Graph	al er Mode : Start Sequence r Pump Lead/Lag l Water Pump Operation Failure d Water Flow Status r Stop Sequence Freeze Protection d Limiting ol Systems Failure DC Point Configuration is ics					
129		z_Loop Response / Sequence 3.9	zz_Control	Sequences		Control loops responded acceptably. Action correct for application and normal positions of controlled devices.	Didn't Test
CA	Test Des	cription		-			
	3.9 BUII	DING DEMAND LIMITI	NG				
	A. Limit B. Low, C. Load D. Load E. Buildi F. Demai G. Morri H. Unoco	peak energy usage nedium and high setting hed and monitor only mod priorities ng power unreliable d limiting algorithm ng Start-up upied Mode	les				

+1/IO	
	ioui,

FPT								
	Date	Type of Test	Function	Component	Device	Expect	ed/Final Results	Status
130		z_Loop Response / Sequence 3.10	zz_Control	Sequences		Control loops responded acceptably. controlled devices.	Action correct for application and normal positions of	Didn't Test
CA	Test Des 3.10 VA	<b>cription</b> V BOX W ELECTRIC RH	ſ	-				
	A. Box p B. OCC C. UNOO D. UNOO E. UNOO F. Overri G. CO2 J H. Min a I. Min D J. Alarm K. Graph	rovided with volume damp Mode: CC Mode CC Heating CC Cooling de DemandSetting nd Max CFM DC Point Configuration s	per and velocity pro	obe for ATC to mount				
131		z_Loop Response / Sequence 3.11	zz_Control	Sequences		Control loops responded acceptably. controlled devices.	Action correct for application and normal positions of	Didn't Test
CA	1 est Des	CTIPTION						
	3.11 CO	NIKOL SYSTEM CA TEX	STING, ADJUSTI	NG, CALIBRATION				
	A. Syster	ns installed shall be fully f	unctioning prior to	Demonstration, Acceptance	e and Close Out			
132		z_Loop Response / Sequence 3.12	zz_Control	Sequences		Control loops responded acceptably. controlled devices.	Action correct for application and normal positions of	Didn't Test
CA	<b>Test Des</b> 3.12 CO	cription NTROL SYSTEM DEMO	NSTRATION	-				
	A. Demo systems t B. If Wo for all di C. Contr	nstrate operation of contro to Owner/Engineer. rk fails to conform to Cont rect and indirect costs of su ols Contractor to supply all n shall be domonstrated for	l systems hardward ract specifications, ibsequent Engineer personnel and eqi	e, software and all related co Contractor to reimburse O r site visits. upment for demonstration. occdures used in the Cy Te	omponents and wner/Engineer			

D. System shall be domonstrated folliwing the same procedures used in the Cx Tests. E. Coordinate Control System Demonstration requirements with training sessions.

FPT							
	Date	Type of Test	Function	Component	Device	Expected/Final Results	Status
133		z_Loop Response / Sequence 3.13	zz_Control	Sequences		Control loops responded acceptably. Action correct for application and normal positions of controlled devices.	Didn't Test
~ .	Test Des	cription		-			
CA	3.13 BUI	LDING AUTOMATION S	SYSTEM SOFTW.	ARE COMMISSIONING			
	A. Monito B. Softwa C. Access D. BAS g	oring set-up complete ure checkout before hardwa to BAS graphics must also be check	are checkout ced.				
134		z_Loop Response / Sequence 3.14	zz_Control	Sequences		Control loops responded acceptably. Action correct for application and normal positions of controlled devices.	Didn't Test
	Test Des	cription		-			
CA	3.14 DDC	C CONTROL SYSTEM (E	BAS) HARDWARI	E COMMISSIONING			
			4:0	····· 6··········			

A. After programming complete, notify and schedule time for site visit B. Commission og BAS witnessed by Owner's Rep, TAB and Engineer C. Refer to specifications for Training requirements


New

**School - Commissioning** 

## **COMMISSIONING ISSUES LOG**

Project Name:		•	Project Number:	Prepared BY:	'Vineel Busa Date Issued:		
Issue #	Date Found	Location / System	Issue	Requested Response Date	Corrective Actions Taken	Responsibility	Date Resolved
1	11/23/2020	Exhaust Fans	Motion sensor exhaust fans are not currently displayed on BAS with enable/disable or status.	12/4/2020	Engineer confirmed this met the design intent, issue closed.		12/30/2020
2	11/23/2020	Building Power Monitor	Building power is not reading B to C and A to C phases. All phases to neutral are reading values.	12/4/2020	Reading showing correctly.		12/22/2020
3	11/23/2020	EF1-24	Fan status is staying on regardless of enable/disable position.	12/4/2020	Corrected and fixed graphic reference. Verified 12/23/2020		12/23/2020
4	11/23/2020	EF2-5	Exhaust fan does not prove status when given enable signal.	11/23/2020	Corrected when on site. Status displays properly when fan is ON.		11/23/2020
5	11/23/2020	ERV	Add low temperature alarm on ERV graphic.	12/4/2020	Added alarm to graphics.		12/29/2020
6	11/23/2020	VRI2-12	Temp sensor on wall is loose. Sensor is reading 73°F space temp. sensor, and adjacent stat VRI5-8 is reading 68°F space temperature. Verify stat is operating properly.	12/4/2020	Both units are reading within a degree of each other. Both are heating and are working properly as far as we can determine.		12/4/2020
7	11/23/2020	General	Internet service was down. Functional performance testing for BACnet equipment was not possible.	12/4/2020	Internet restored and fully functional for 12/23/2020 field testing.		12/9/2020
8	11/23/2020	DHW Pumps	Circulating pumps are given enable signal but no status is displayed. Pumps appear to not be running when enable signal is sent.	12/4/2020	Reverified 12/23/2020 and pumps are responding and status is working.		12/23/2020
9	11/23/2020	Kitchen	Kitchen hood shuts down when running at full speed after about 5 minutes.	12/4/2020	Corrected when on site. Fan was rotating backward and was corrected.		11/23/2020
10	11/23/2020	DOAS	Twice upon testing, DOAS-1 entered "e-stop". Verified it was not external, field smoke detector not an issue.	12/4/2020	The building voltage was running high. Trane adjusted the phase monitor to max setting which appears to resolve the issue. Trends since show power 497 to 505V. HVAC controls may have issues at 506V. Retested 12/23/2020 without issue. Continue to monitor and request power company to adjust incoming power voltage if necessary.		12/23/2020
11	11/23/2020	DOAS	DOAS-02 did not respond to shelter in place command.	12/4/2020	ATC contractor corrected issue during 11/23/2020 testing. DOAS-02 responded to hard wired occupied/unoccupied signal before conclusion of Functional Performance Testing.		11/23/2020
12	11/23/2020	Kitchen Area	RTU-2 space sensor is reading incorrectly which causes the unit to stay in cooling mode. Unit is currently off until sensor is replaced.	12/4/2020	The thumbwheel is broken, MC ordered a new sensor and was replaced. ATC met with Trane on 12/18/2020 and found wires reversed which were changed and verified on 12/23/2020.		12/23/2020
13	12/23/2020	DHW Pumps	Front end graphics missing pump and water heater alarms	12/23/2020	ATC added the alarms when on site and resolved		12/23/2020
14	12/23/2020	DOAS -1,2,3	Supply fan speed is not controlled properly to satisfy duct static pressure set point. Noise issue was observed, likely due to supply fan running at higher speeds than required.	12/23/2021	ATC and Trane met on 12/18/2020 to troubleshoot and resolve. BACnet response rate is slower than desired and being monitored for refinement. Commissioning efforts helped reduce air noise and improve operation. Scaling issues on duct static pressure sensors resolved.		12/23/2020
15	12/23/2020	VAV Boxes	Min and Max CFM values of some VAV's do not match the scheduled values likely due to troubleshooting DOAS units on 12/23/2020. The VAV's demand control ventilation mode were inactive during testing. Clarified with ATC that during unoccupied heating or morning warm-up cycle the VAV Dampers are to be at scheduled design CFM settings. The ATC will need to restore design VAV cfms and reactivate demand control ventilation control once testing mode is no longer being required.	12/30/2020	Testing completed and ATC re-engaged the demand control ventilation to meet design intent.		12/30/2020
16	12/23/2020	KMUA	Remote interface for the kitchen hood manufacturer's CASIink cloud-based BMS shown on M620 is missing/not installed. ATC reported they are not able to provide interface since the controls are proprietary stand alone by kitchen hood MFR. MC likely needs to interface network drop to kitchen hood controller for activating CASIink controls for access to the internet. ATC will then need MC to provide internet link, password, access for showing link on floor plan graphics once active.	1/5/2021	System installation completed. Remote access for Cx and County Schools being finalized by County Schools maintenance staff which remain outstanding.		1/8/2021
17	12/23/2020	RTU-1A,1B	Balancing incomplete for RTU-1A,1B which was scheduled by Performance HVAC on 12/23/20 but needed rescheduled due to windy weather.	1/4/2021	Performance HVAC returned 12/28/2020 to complete the balancing.		12/28/2020
18	12/23/2020	DHW Pumps	Lead Lag pumps are altered every 15 days instead of 7 days.	12/23/2020	Sequence change accepted by Engineer.		12/23/2020
19	12/23/2020	RTU-1A,1B & 2; DOAS- 1,2 & 3	Night heating Set Points for RTU's and DOAS units on front end graphics doesn't match with the specifications. Initially Trane's heating setting of 60°F provided a 6.5°F "standby offset" below unoccupied setpoint. This was field changed to 2.5°F by Trane. This point was picked up by ATC through BACnet to be adjustable. DOAS units to be primary unoccupied heating source with VRF systems secondary for setpoints.	12/29/2020	RTU-1A,B,2 unoccupied heating set point set to 62°F with an offset of 2°F. DOAS unoccupied heating set point is set for 65°F with 1.5°F offset to turn off, using ATC furnished temp sensors instead of BACnet temps for VRF system to make that decision. VRF unoccupied heating setpoint 2°F below DOAS. Engineer accepted sequence change.		12/30/2020

New

## Commissioning Issues log



## New

School - Commissioning

## **COMMISSIONING ISSUES LOG**

Proje	ect Name:	-	Project Number:	Prepared BY:	Vineel Busa Date Issued:	-,-	
Issue #	Date Found	Location / System	Issue	Requested Response Date	Corrective Actions Taken	Responsibility	Date Resolved
20	12/23/2020	Electric Wall, Ceiling & Unit Heaters and Radiant Ceiling Panels.	ECHs, EUHs, & RCPs are not responding to the thermostats and the electric wall heaters (EWHs) are not working. Pennington reported heaters arrived at site late (12/22/2020) and completed the wiring on 12/30/2020.	1/4/2021	Everything except radiant heaters completed. Waiting on Pennington to verify final radiant heater operation. Pennington confirmed RCP's are operational.		1/19/2021
21	12/23/2020	Light Fixtures & Controls	Light fixtures in B202 and B201 classrooms didn't respond to the motion sensors, but are responding to the light switch.	1/4/2021	Light fixtures are responding to the motion sensors. Verified during Cx site visit.		1/8/2021
22	12/23/2020	VRS	VRS Indoor unit's Fan Speed status & control, all failure alarms are not being displayed on the BAS.	1/4/2021	ATC found BACnet "error codes 1 thru 9" alarm data points and added to the graphics.		12/29/2020
23	12/30/2020	VRS	Remote scheduling of VRS units not available through ATC remote system.	1/4/2021	Trane states this be accessed through VRS central controller.		1/8/2021
24	1/3/2021	Gas Meter	Gas meter reading missing on front end graphics floor plan.	1/8/2021	Gas meter reading added to the floor plan.		1/4/2021
25	1/3/2021	Graphics	Building Power monitor alarms missing on the front end graphics.	1/8/2021	Power Monitor alarms added to floor plan and on the building power tab.		1/4/2021
26	1/3/2021	DOAS -1,2,3	High Relative humidity alarms missing on the DOAS graphics.	1/8/2021	Relative humidity alarm added to the floor plan and tested during the Cx functional performance testing.		1/4/2021
27	1/3/2021	DOAS -1,2,3	DOAS front end graphics doesn't display Smoke detector Alarm.	1/8/2021	Smoke detectors not directly monitored by BAS, only through BACnet interface to units. Smoke detector alarms will show up as ESTOP alarms.		1/4/2021
28	1/3/2021	Graphics	Floor plan graphics missing Outside Air CO2 reading.	1/8/2021	Outdoor air CO2 now displayed on floorplan graphics.		1/4/2021
29	1/3/2021	SSIU-1,2	High/Low space Temperature alarms are missing from the graphics. Assumed same as when not defined in sequence of operation.	1/8/2021	The alarms are now displayed on the floor plan graphics.		1/4/2021
30	1/3/2021	Elevator Pit Pump	Pump status and alarm points are missing on front-end.	1/8/2021	Interface to elevator pit pump data is not field accessible (Pump model doesn't support BAS monitoring).		1/4/2021
31	1/8/2021	DOAS-1,2,3	Front end graphics currently missing occupied/unoccupied override capability. VAV box programming to be adjusted by ATC to account for the DOAS override feature if confirm this is the actual design intent.	1/21/2021	All three DOAS units are programmed with "Manual Unoccupied" mode for override capability from the Front End.		2/17/2021
32	1/8/2021	DOAS-1,2,3	Item #1. During unoccupied heating mode and heating season optimum start the discharge air set point is currently 85°F and may need raised to 90F discharge with 72F Return Air set point as necessary to minimize VRS operation after monitoring. Currently BAS is monitoring for the 2nd lowest zone temp. for the Unoccupied heating set point and is currently set for 65°F. Item #2. Cooling discharge air set point is 55F DB and the sequence is calling it to be controlled to 53°F Dew point temperature for cooling season that needs verified during cooling season.	1/15/2021	Item #1 - ATC changed setpoint to 90°F to match sequence, Item #2 will need checked when HVAC is in cooling season. Engineer Confirmed that controlling discharge air to 55°F DB during cooling mode is also acceptable.		1/8/2021
33	1/8/2021	DOAS-3	During occupied non-vent mode the unit responded according to the sequence of operation, but the unoccupied non-vent status didn't update on front end graphics. ATC to address this and verify on other DOAS units.	1/15/2021	Corrected the graphics to update the status properly.		1/13/2021
34	1/8/2021	DOAS-1,2,3	Cooling Failure alarm is missing on DOAS graphics (Trane BACnet point for the alarm is not currently available to ATC).	1/21/2021	Alarm added to the DOAS graphics		5/12/2021
35	1/8/2021	VRS graphics	Failure alarms for VRS units in the office area are missing. ATC to add the alarms to the graphics and correct the Fan Status/Status text on the graphics to be consistent with other VRS graphics.	1/15/2021	Failure Alarms added to the office area VRS graphics.		1/13/2021
36	1/6/2021	DOAS-1,2,3	Supply Duct static pressure is overshooting and not maintained to the set point, which leads to noise issues. Trane/RDS/TAB to troubleshoot the factory Airflow measuring station's calibration to verify if that is cause of the issue. Requesting Trane to verify if there is any factory setting that limit the Supply fan being controlled to duct statics pressure set point and confirm the DOAS minimum air flow requirement (in-built safety) by MFR.	1/21/2021	Field investigation confirmed that the Airflow measuring stations on the DOAS units needs to be calibrated. Trane calibrated the airflow measuring stations.		4/9/2021
37	1/8/2021	DOAS-1,2,3	CxA couldn't test DOAS Heat Recovery Wheel frost protection sequence and Economizer sequence as BAS doesn't have the ability to control these sequences. Requesting Trane to confirm the Heat recovery Wheel's set points are per engineer's sequence of operation for both sequences and provide the information.	1/21/2021	Frost protection sequence is in-built to the unit controller. Trane confirms the sequence of operation is according to the design intent.		5/21/2021
38	1/8/2021	RTU-1A,1B,2	Front end graphics missing occupied/unoccupied override capability and currently done through scheduling. Verify if scheduling is sufficient confirmation from if this is the actual design intent.	1/21/2021	Manual occupied/unoccupied override mode added to the graphics.		5/12/2021



## School - Commissioning

## **COMMISSIONING ISSUES LOG**

New

Project Name:			Project Number:	Prepared BY:	Vineel Busa Date Issued:		
Issue #	Date Found	Location / System	Issue	Requested Response Date	Corrective Actions Taken	Responsibility	Date Resolved
39	1/8/2021	RTU-1A,1B,2	The Trane wall mounted thermostat doesn't have the manual occupied override button to provide a 1-hour increment of occupied operation.	1/21/2021	Trane installed thermostats with override button.		5/21/2021
40	1/8/2021	RTU-1A,1B	Zone CO2 reading place holder showing on the front end graphics but missing a value. Trane sensor found on site and may be out of service. Demand control ventilation sequence needs verified once placed in operation.	1/21/2021	Wired the sensors and CO2 readings displayed on the the graphics and trane confirms that demand control ventilation is active on these units.		5/21/2021
41	1/8/2021	RTU-1A,1B,2	ATC to add morning cool down per sequences.	1/21/2021	Cool down sequence is not available. Engineer confirmed that this is acceptable.		4/28/2021
42	1/8/2021	RTU-1A,1B,2	CxA verified cooling request but couldn't test economizer cycle sequence since ATC doesn't have direct control to force the units which is by Trane. Requesting Trane to verify and confirm economizer enthalpy set points matches the engineer's design intent and provide the information.	1/21/2021	Comparitive enthalpy is enabled when Outside air enthalpy is 3 btu/lb less than Return air enthalpy.		4/28/2021
43	1/8/2021	RTU-1A,1B,2	Mixed air temp. alarm missing on the RTU graphics. ATC to add the alarm.	1/15/2021	ATC placed BACnet diagnostic point for Mixed Air Low Limit sequence in effect on graphics for RTU-1A, 1B, and 2.		1/13/2021
44	1/8/2021	RTU-1A,1B,2	Requesting Trane to verify and confirm the cooling lockout temp. set point to match the design intent and provide that information.	1/21/2021	Cooling Lockout coincides with economizer function. When economizer is enabled the cooling is disabled. There is also a BAS point for this.		4/28/2021
45	1/8/2021	RTU-1A,1B	High Relative humidity alarms missing on the front end graphics.	1/15/2021	High humidity alarms added to the graphics.		1/13/2021
46	1/8/2021	RTU-1A,1B,2	Requesting Trane to verify and confirm Morning Warm up/Cool down and Dehumidification cycles set points to match the design intent and provide that information. ATC couldn't access the set points from the BAS.	1/21/2021	RTU's do not have specific warm-up or cool down sequences similar to multi-zone VAV systems. These single zone systems can use unoccupied heating and cooling to accomplish these functions. Trane confirms that dehumidification sequence is active on these units and CxA verified the dehumidification sequence.		5/21/2021
47	1/8/2021	VRS	Zone high/low temp. alarm limits are 77°F and 66°F respectively, verify this meets ZMM intent.	1/21/2021	Issue closed.		3/8/2021
48	1/8/2021	ECH-10	Fan runs continuously even after lower the thermostat set point. Trane to replace the fan switch.	1/21/2021	The fan proving switch on ECH-10 has been replaced and operational		1/19/2021
49	1/8/2021	VRS	The indoor cassettes currently reading temperature from the return air sensor at the unit and ZMM has since directed to use the wall stat instead. Trane to adjust the cassettes setup to read the temp. from the wall mounted thermostat sensor to address the VRS comfort issues.	1/21/2021	Trane adjusted the settings on the indoor VRS units to read temperature from wall thermostat.		3/1/2021
50	1/8/2021	VRS	User adjustable temperature set point limits are not active. Field spot checked verified the current user adjustable set point limits are from 67/63°F to 87/83°F (cooling/heating) respectively.	1/21/2021	User adjustable set point limits corrected to 66-72 for heating and 70-76 for cooling.		4/16/2021
51	1/15/2021	VAV4-4	Air Flow sensor needs to be serviced to read accurate CFMs	1/25/2021	Replaced the controller and the terminal is now operating correctly		1/25/2021
52	1/15/2021	VAV3-2	CO2 sensor associated with VAV box is not reading accurately.	1/25/2021	Replaced the sensor		1/25/2021
53	3/3/2021	DOAS 1,2,3	Some of the VAVs are out of minimum target CFM range, because they only have one point of calibration, and they were calibrated at design maximum airflow.	3/4/2021	Engineer confirmed that this is acceptable.	-	3/4/2021
54	3/3/2021	DOAS 1	The Unit's Outside airflow station is not operational and needs to be serviced.	3/17/2021	Trane serviced the Airflow measuring station and the duct static pressure is operating at the setpoint.		4/9/2021
55	3/3/2021	SD 2-8	The Iris Damper is in fully closed position.	3/4/2021	Engineer Confirmed this is okay.	-	3/4/2021
56	3/3/2021	SD 2-16	There is no balancing damper installed on this outlet	3/17/2021	Pennington confirmed the presence of the damper. TAB verification and coordination completed		4/9/2021
57	3/3/2021	EG 2-11	Final TAB report mentions that the airflow is out of range even when the damper completely closed.	3/4/2021	Engineer Confirmed this is okay as the variation is low.	-	3/4/2021
58	3/3/2021	DOAS-2	TAB verified that the Airflow measuring station needs to be calibrated with 1.3 multiplier on minimum airflow.	3/17/2021	Trane calibrated the Airflow measuring station and the duct static pressure is operating at the setpoint.		4/9/2021
59	3/3/2021	DOAS-3	TAB verified that the Airflow measuring station needs to be calibrated with 0.76 multiplier on minimum airflow.	3/17/2021	Trane Calibrated the Airflow measuring station.		4/9/2021



## New

School - Commissioning

## **COMMISSIONING ISSUES LOG**

Project Name:			Project Number:	Prepared BY:	Vineel Busa Date Issued:		
Issue #	Date Found	Location / System	Issue	Requested Response Date	Corrective Actions Taken	Responsibility	Date Resolved
60	3/3/2021	RTU-1A,1B	The measured minimum Outside airflow is above design airflow	3/4/2021	Engineer confirmed that this is acceptable.	-	3/4/2021
61	3/3/2021	RTU-2	The unit is above design airflow with the direct drive fan motor set at low	3/4/2021	Engineer confirmed that this is acceptable.	-	3/4/2021
62	3/3/2021	VRI4-8,9,10	The airflows are below the design airflow at max fan speed.	3/17/2021	Pennington changed the filters on these units. Engineer accepted the airflows after the corrective measures taken on these units.		4/9/2021
63	3/3/2021	ERV-1	Outside airflow and exhaust airflow are above 10% of design.	3/17/2021	Balancing damper added at the unit inlet after the electric duct heater as directed by the engineer.		4/9/2021
64	4/9/2021	DOAS-1,2,3	Discharge temps primarily observed going from 53°F to 73°F when testing for cooling when OAT was above 67°F on afternoon of 4/9/21 when the setpoint was 55°F. Verify cooling is controlling properly on DOAS 1,2,3.	4/16/2021	Corrected. Heating and cooling changeover range adjusted to 4°F to address this issue.		4/28/2021
65	4/9/2021	DOAS-1,2,3	Requesting Trane to confirm if the Supply Air Dewpoint Setpoint is in service.	4/16/2021	Engineer confirmed that this strategy was abandoned for operation in cooling mode.		4/29/2021
66	4/9/2021	RTU-1A,1B	Units doesn't appear to have heating lockout. Verify if the heating lockout is active on rest of the equipment.	4/16/2021	Heating and cooling lockouts points are available via BAS. Trane recommends not to place a heating lockout.		4/29/2021
67	4/9/2021	RTU-1A,1B	Mixed Air Temperature readings on the units appear to be readings from the sensor that is located after the cooling coil. Requesting Trane to confirm the location of this sensor. Verify the mixed air temperature sensor location on RTU-2.	4/16/2021	Sensors are located after the cooling coil. This is not a true mixed air sensor due to small space.		4/29/2021
68	4/9/2021	RTU-1A,1B, 2 and DOAS 1,3	Observed significant difference (over 10°F higher for RTUs and 7°F higher for DOAS units) in Outside Air Temperature readings on these units relative to the Global outside air sensor. The global Outside air sensor readings are accurate. Requesting trane to verify the sensor locations on these units to measure accurate values.	4/16/2021	Unit mounted OA sensors are influenced by radiation on a sunny day, which will effect the economizer sequence on these units.		
69	4/9/2021	DOAS-3	Observed duct static pressure overshooting (As high as 1.9" when the setpoint is 1.1" on 4/12 and 4/13) the setpoint during morning time. Trane to monitor and verify proper operation of supply fan. on 4/16/21 testing observed the unit's min. CFM requirement when the compressors are operating is scheduled design value which is causing the Supply Fan to operate at higher speeds than required and overshooting the duct static pressure setpoint.	4/16/2021	Increased minimum VAV CFMs associated with DOAS-3 to resolve this issue. Engineer accepted this solution.		5/26/2021
70	4/16/2021	RTU-2	The unit doesn't have supply temperarture sensor. Detail #15 on M620 drawing calls for this sensor to be field installed.	4/23/2021	Trane installed the new sensor to measure supply temperature.		5/21/2021

New



# SECTION VI.

## Attachments

State of WV Centralized Expression of Interest Designated Contact Form State of WV Purchasing Affidavit





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

## State of West Virginia Centralized Expression of Interest

<b>Proc Folder:</b> 1644514		Reason for Modification:	
Doc Description:	Martinsburg Readiness Cen	ter Design Commissioning Services	
Proc Type:	Central Purchase Order		
Date Issued	Solicitation Closes	Solicitation No	Version
2025-03-10	2025-03-25 13:30	CEOI 0603 ADJ2500000019	1

BID RECEIVING LOCATION						
BID CLERK						
DEPARTMENT OF ADMINISTRATION						
PURCHASING DIVISION						
2019 WASHINGTON ST E						
CHARLESTON WV 25305						
US						
VENDOR						
Vendor Customer Code:						
Vendor Name : ZDS Limited Liability Company dba ZD	S Design/Consulting Services					
Address: 135 Corporate Center Drive						
Street : Suite 532						
City : Scott Depot						
State : West Virginia Country :	USA <b>Zip</b> : 25560					
Principal Contact: Ted (Todd) A. Zachwieja						
Vendor Contact Phone: (304) 755-0075 Extension: 1001						
FOR INFORMATION CONTACT THE BUYER						
304-558-0067						
david.h.pauline@wv.gov						

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

Vendor

Signature X

FEIN#

55-0735995

DATE

March 24, 2025

## ADDITIONAL INFORMATION

## 35% Design Award Process

The West Virginia Purchasing Division, for the agency, the West Virginia Army National Guard, Construction and Facilities Management Office, is soliciting Expressions of Interest from qualified firms to provide professional architectural and engineering design services to develop construction documents for the construction of a new Readiness Center, in Martinsburg WV, per the attached documentation.

INVOICE TO		SHIP TO			
ADJUTANT GEN	IERALS OFFICE	ADJUTANT GENERAL	ADJUTANT GENERALS OFFICE		
1707 COONSKI	N DR	WV ARMY NATIONAL	GUARD		
		731 NOVAK DRIVE			
CHARLESTON	WV 25311	MARTINSBURG	WV 25405		
US		US			
Line	Comm Ln Desc	Qty	Unit Issue		
1	Martinsburg Readiness Center Desi Services	gn Commissioning			
Comm Code	Manufacturer	Specification	Model #		
81101508					
Extended Descr	iption:				

## Provide professional architectural and engineering design services per the attached documentation.

## SCHEDULE OF EVENTS

<u>Line</u>

Event

**Event Date** 

**DESIGNATED CONTACT:** Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

(Printed Name and Title)	
(Address)	
(Phone Number) / (Fax Number)	
(email address)	

**CERTIFICATION AND SIGNATURE:** By signing below, or submitting documentation through wvOASIS, I certify that: I have reviewed this Solicitation/Contract in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation/Contract for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that this bid or offer was made without prior understanding, agreement, or connection with any entity submitting a bid or offer for the same material, supplies, equipment or services; that this bid or offer is in all respects fair and without collusion or fraud; that this Contract is accepted or entered into without any prior understanding, agreement, or connection to any other entity that could be considered a violation of law; that I am authorized by the Vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on Vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

By signing below, I further certify that I understand this Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law; and that pursuant to W. Va. Code 5A-3-63, the entity entering into this contract is prohibited from engaging in a boycott against Israel.

(Company)

(Signature of Authorized Representative)

(Printed Name and Title of Authorized Representative) (Date)

(Phone Number) (Fax Number)

(Email Address)

## STATE OF WEST VIRGINIA Purchasing Division PURCHASING AFFIDAVIT

**CONSTRUCTION CONTRACTS:** Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

**ALL CONTRACTS:** Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

**EXCEPTION:** The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

### **DEFINITIONS:**

"**Debt**" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"**Related party**" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (*W. Va. Code* §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

## WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name:			
Authorized Signature:	Lodd a Corbineja	Date:	
State of			
County of	, to-wit:		
Taken, subscribed, and s	worn to before me this day of	, 20	
My Commission expires		_, 20	
AFFIX SEAL	OFFICIAL SEAL NOTARY PUBLIC STATE OF WEST VIRGINIA Lori Zachwieja 135 Corporate Center Dr., Suite 532 Scott Depot WV 25560 My Commission Expires January 26, 2029	ARY PUBLIC Purchasing Affidavit (Revis	sed 01/19/2018)